8. Pollution

Observe



8.1 Various problems of environment

1. Why these problems in environment may have been arised?
2. What should be done to overcome these problems?

Many problems have been arisen on the earth due to human interference in the nature. Industrialization, increasing population, mining, transportation, indiscriminate use of pesticides and fertilizers are causing pollution on the earth. It is affecting human beings.

Pollution : Contamination of natural environment that will be harmful to ecosystems is called as pollution.

Can you tell?

1. Where do you see the pollution around you?
2. How does the pollution occur?

Pollutants :

Factors affecting natural functions of ecosystem and causing harmful effects on abiotic and biotic factors are called as pollutants. Pollutants make the environment poisonous and unhealthy.

Pollutants may be natural or manmade. Natural pollutants are destroyed in due course of time by nature's rule; however, manmade pollutants are not.

8.2 Save me my children !

Think about it.

If natural materials are pollutants, why do we not perceive their adverse effects during their use? When such materials are referred as pollutants?

Try this

Activity : You yourself survey your residential area and identify the polluted locations. Try to identify the pollutant at each polluted location.

Use your brain power

1. Which types of pollutant are observed?
2. Whether the pollutants are degradable or non-degradable?

A. Air Pollution :

Can you recall?

1. Plot a graph showing the proportion of various gases in earth's atmosphere.
2. Why is it said that air is homogenous mixture of different gases?
3. Which different hazardous gases are released through fuel combustion?

Contamination of air by harmful substances like poisonous gases, smoke, particulate matter, microbes, etc. is called as air pollution.

Reasons of air pollution

Can you tell?

Which factors are responsible for pollution shown in the following pictures?



8.3 Air pollution due to different factors

Reasons of air pollution

Natural reasons	Manmade reasons
1. Volcanic eruption: Solid, gaseous and liquid materials emerge out through eruption. Ex. Hydrogen sulphide, sulphur dioxide, carbon dioxide, ammonium chloride, hydrogen, vapors, dust, etc. 2. Earthquake: Poisonous gases and water vapors from inside of earth are released into air. 3. Cyclones and dust storms: Dust, soil, garbage, pollens, microbes are mixed with air. 4. Forest fires: Forest fires release carbon dioxide, sulphur dioxide, hydrogen sulfide, smoke in air. 5. Microbes in air: spores of bacteria, fungi are mixed with air	1. Fuel: I. Burning of fuel like coal, timber, LPG, kerosene, diesel, petrol releases carbon dioxide, carbon monoxide, nitrogen oxide, sulphur dioxide, lead compounds, etc. are released in air. II. Burning of solid waste, agricultural waste, etc. in open space causes air pollution. 2. Industrialization: Smoke is released in large quantity from various factories. sulphur powder, nitrogen oxide, Cotten seed powder in air. 3. Atomic energy plants and blasts: Use of elements like uranium, thorium, graphite, plutonium release radiations in air and thus pollution occurs.

Think about it.

1. What are reasons other than above mentioned responsible for air pollution?
2. Whether the vehicles with two stroke engine cause more pollution than four stroke engine?

Internet My Friend

1. Collect information about larger volcanoes of the world.
2. Collect information about effect of air pollution on human health from large cities and villages from Maharashtra.

Peeping in the history

1. There had been thick fog in London due to air pollution during 5th – 9th Dec.1952. Smoke due to burning of coal had been mixed. Dark shadow of this SMOG remained on the city for consecutive 5 days. Same situation occurred again during 3rd – 6th Dec.1962.
2. In 1948, Petersburg was named as 'BLACK CITY' when smoke and soot casued night like situation during day time.

Sr. No.	Air Pollutants	Source	Effects
1.	Sulphur dioxide (SO_2)	Factories (where coal and mineral oil used as fuel)	Irritation of eyes, respiratory tract, excess mucus, cough, breath.
2.	Carbon monoxide (CO)	Vehicular and industrial smoke	Lowered O_2 carrying capacity of blood.
3.	Oxides of nitrogen	Vehicular smoke	Irritation of respiratory tract and lungs
4.	Particulate matter	Vehicular and industrial smoke	Respiratory diseases
5.	Dust	Vehicular and industrial smoke	Silicosis
6.	Pesticides	Production and use of pesticides	Mental weakness, death due to prolonged exposure
7.	Methane (CH_4)	Industrial leakage	Poisoning, skin cancer, asthma, respiratory diseases.

8.4 Air pollutants: Sources and effects

Do you know?

Worst ever industrial accident had been occurred in Bhopal on the night of 2nd Dec.1984. Eight thousand people had been died due to accidental gas leakage. Collect more information about Bhopal gas accident discuss the nature of accident, reasons, aftereffects, preventive measures.

Effect of air pollution on plants and animals

Plants

1. Stomata get closed.
2. Slowing down of rate of photosynthesis.
3. Growth is retarded. Leaves fall off or become yellow.

Animals

1. Respiration is adversely affected.
2. Irritation of eyes.

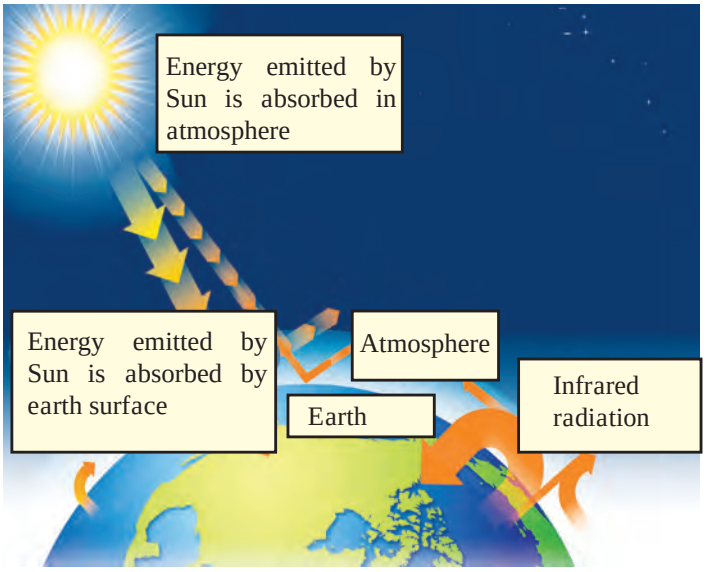
Can you recall?

1. What is importance of ozone layer?
2. What are reasons for depletion in ozone layer?

Effect of air pollution on plants and animals

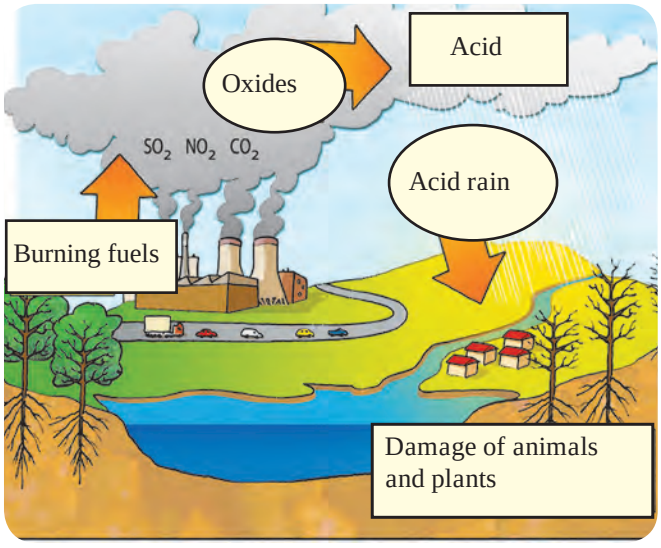
Depletion in Ozone layer : Earlier, we have studied that ozone layer is present below the stratosphere, at the height of 48 kilometres from earth's surface. It protects the living world of the earth from ultraviolet rays (UV-B) radiating from the Sun. However, nowadays, ozone layer is getting depleted due to following reasons.

Green house effect and Global warming : Though CO_2 is present in very less quantity in atmosphere, it plays very important role of absorption of solar heat. Over the last 100 years, proportion of CO_2 has been increased due to industrialization. Effect of this CO_2 on the earth's temperature is nothing but green house effect. Similar to CO_2, nitrous oxide, methane and CFC also trap the heat. Collectively, these are called as green house gases.



8.5 Green House effect

Global temperature is gradually increasing due to green house effect. Due to this, atmosphere is changing, causing disturbances in agricultural yield, distribution of wild animals. Icebergs and glaciers are melting causing increase in sea level.



8.6 Acid rain

Acid Rain : Oxides of sulphur and nitrogen are released into atmosphere through burning of coal, timber and fuel oils. Those oxides mix with rain water and form acids like sulphuric acid, nitric acid, nitrous acid, etc. These acids mix with rain drops and snowflakes and come down as rain, called as acid rain.

Effects of acid rain:

1. Acidity of soil and water bodies increases due to acid rain. It harms the aquatic organisms, plants and entire forest life. Total ecosystems are adversely affected.
2. Erosion of buildings, busts, historical monuments, bridges, metal idols, wire fences, etc. occurs due to acid rain.
3. Heavy metals like mercury and cadmium are absorbed up by plants and thereby enter the food chain indirectly due to acid rain.
4. Due to acidification of water in water bodies and pipes, leaching of metal and plastic material occurs in water and thereby serious health problems arise.

Preventive measures of air pollution

1. Smoke emerging from factories contains harmful particles. Hence, pollution controlling machinery should be used. Ex. Arresters, filters.
2. Proper disposal of stinking waste generated in cities.
3. Control on atomic tests, chemical weapons, etc.
4. Control / ban over CFC production.

Do you know?

Air Quality Index

It is important for citizens to know the extent of air pollution in their city. So as to define the air quality index, proportion of SO_2, CO, NO_2, ozone, particulate matter, etc. is measured every day.

Boards indicating the air quality index are displayed in busy squares in metro cities.

Do you know?

Air pollutants with sulphur cause colour change in paints, oil paintings, nylon, cotton fabrics, leather articles and papers etc.

B. Water Pollution :

Can you tell?

1. From which water sources do we get the water suitable to use?
2. For which different purposes do we use the water?
3. How much percent of the earth's area is occupied by water?
4. What are the reasons of water pollution?
5. Why does water is referred as 'molecule of life'?

Water is said to be polluted when it becomes unclean and poisonous due to mixing of natural or artificial unwanted material, when it becomes harmful to living organisms due to decreased oxygen content, when epidemic diseases are spread through the water.

Fresh water or marine water pollution includes physical, chemical and biological changes.

8.7 Water pollution

Water Pollutants

A. Biological pollutants : Water does not remain potable due to algae, bacteria, viruses, parasites, etc. Diseases are spread due to biological pollution.

B. Inorganic pollutants : Suspended particles like fine sand, dust, soil, precipitates of salt, compounds of arsenic, cadmium, lead, mercury, and traces of radioactive material.

C. Organic pollutants : Weedicides, insecticides, fertilizers, sewage, industrial effluents, etc.

Do you know?

Large number of tanning centers are present in Tamilnadu. Waste water from those centers is released into Palar river. Hence that river is referred as Puzzar (Gutter river).

Reasons of water pollution

A. Natural reasons

1. Aquatic weeds
- Depletion in O_2 level
- Changes in natural qualities of water

2. Decomposing matter
- Decomposing bodies of plant, animals

3. Mud/sludge
- River current and its diversion

4. Soil erosion
- Many biotic and abiotic factors are added to water due to soil erosion.

5. Microbes like fungi and bacteria
- grow on organic matter decaying in water.

6. Algae
- Excessive algal growth pollutes water

7. Nematodes :
- Soil nematodes flow in with rain water

B. Manmade reasons

1. Domestic sewage
- Domestic sewage from villages and cities is disposed off in river water

2. Industrial effluent
- Various pigments, bleaching chemicals, leather pieces, fibres, mercury, lead, etc. are released in to water.

3. Oil spillage
- While transportation, cleaning of tankers oil spills in to water

4. Use of fertilizers and pesticides
- N, P, K containing chemical fertilizers
- Pesticides like endrin, chlorine, carbonate containing pesticides, flow and mix with water.

5. Other reasons :
- Disposal of human wastes, washing of clothes, decomposing hemp and flax in water, disposal of ashes, floral offerings to god, water from thermal power plant, etc.

Effects of water pollution

1. Effects on human being
- Diseases like hepatitis, typhoid, diseases of skin and alimentary canal.
- Ailments of liver, kidneys, brain, deformities in bones, hypertension.

2. Effects on ecosystem
- Retarded plant growth
- Loss of plant species
- Increase in salt content of water
- Decreased dissolved oxygen level
- Disturbance in aquatic ecosystem
- Death of aquatic animals
- Adverse effects on sea birds

3. Other effects
- Changes in physical and chemical properties of water
- Changes in natural color and taste
- Useful aquatic fauna is destroyed
- Soil fertility is affected
- Toxic materials are added to crops

C. Soil Pollution :

Can you recall?

1. What is meant by soil erosion?
2. What are reasons for depletion in soil fertility?

Out of the total land area of the soil, some is covered by ice; some is desert, whereas some is occupied by mountains and hills. Very less area of land is available for human use.

Soil is said to be polluted when there are changes in its physical biological and chemical properties and its fertility decreases due to either natural or manmade reasons.

Compare this

Compare two neighbouring photographs.

Give 5 examples of each of domestic waste, biological waste, and agricultural waste and write in your own words about soil pollution due to those wastes.

Discuss the issues like 'dry waste-wet waste' and 'toilet in each home' and write information in your own words.

Effects of soil pollution

1. Soil fertility decreases due to mixing of salty, acidic water from industry.
2. Radioactive and other pollutants enter and pass through food chain like the soil, crop, water and human body.
3. Problem of water pollution increases due to soil pollution. Toxic substances leach into water. Similarly, diseases spread through various pathogens.

Relationship of soil pollution with air and water pollution

If wet waste is dumped at wrong places instead of composting, pathogens grow upon it, which are then mixed with water causing water pollution.

Insecticides, chemical fertilizers, weedicides are used in agriculture, which causes soil pollution. Excessively sprayed insecticides and weedicides are mixed with air causing air pollution. Similarly, excessive use of chemical fertilizers causes water pollution.

Soil pollution occurs due to mixing of human wastes, birds and animals waste. This releases various stinking gases causing air pollution. Same waste may cause water pollution if mixed with water.

Pollution - Prevention and control : Government of India has enacted some laws for control, regulation and prevention of pollution. Following are laws regarding pollution control.

1. Water pollution and prevention act, 1974. 2. Air pollution and prevention act, 1981.

3. Environmental Protection Act, 1986.

Various laws and rules are in force in relation to biomedical waste, harmful effluents, solid waste and sound pollution. Government statutory bodies like Maharashtra Pollution Control Board and Central Pollution Control Board supervise about whether the industries, industrial areas, local governing bodies like municipalities, district councils, panchayat samiti, gram panchayat, etc. follow the laws about pollution control.

Exercises

1. Following are some statements about pollution. Which type of pollution do those express?

a. Fog seems to be appearing in Delhi during day hours.
b. Many times, vomiting and dysentery occurs after eating 'pani puri'.
c. Problem of sneezing occurs sometimes during visit to garden.
d. Crop does not grow up in some areas.
e. People living in the busy squares face the problems like short breathing and other respiratory problems.

2. Read the passage and identify the sentences expressing types of pollution.

Nilesh is a student of std. VIII and lives in urban area. It takes about an hour to go to the school by bus. He faces the heavy traffic of two wheelers, four wheelers, rickshaws, buses while going to school. He is facing the problem of asthma since last few days. Doctors recommended him to stay away from urban area. Since then, his mother sent him to the village of his maternal uncle. Nilesh saw the heaps of garbage at many places in village. Foul smell of human and animal wastes was present at many places. Blackish water with foul smell was flowing in a stream. He developed some abdominal disease within few days.

3. Match the pairs from 'A' and 'B' columns and explain the effect of pollution on human health.

Column 'A'	Column 'B'
1. Water containing cobalt	a. Mental retardedness
2. Methane gas	b. Paralysis.
3. Water containing lead	c. Inflammation of lungs.
4. Sulphur dioxide	d. Skin cancer
5. Nitrogen dioxide	e. Irritation of eyes

4. True or false

a. Water does not get polluted by washing the cloths in running water of river.
b. More the use of electric appliances, more will be the pollution.

5. Answer the following.

a. What is pollution?
b. What are pollutants?
c. What is acid rain?
d. What is green house effect?
e. Which are visible pollutants known to you?
f. Which are invisible pollutants?

6. Answer the following

a. Give two examples of each of water, soil and air pollution from your residential area.
b. How does the pollution occur due to vehicles? Give the names of vehicles causing least pollution.
c. What are natural reasons for water pollution?
d. Suggest four preventive measures for air pollution.
e. Explain relation between green house effect and global warming.
f. Construct two slogans each on air, water and soil pollution.

7. Classify the following pollutants into natural and manmade categories.

Sewage, dust, pollen grains, chemical fertilizers, vehicular smoke, algae, pesticides, waste of animals and birds.

Project :

1. Visit the water testing laboratory in your area and collect the information about tests for checking the purity of water.
2. Visit the square having heavy traffic in your area and report the pollution at different times of day and find out the duration of maximum pollution.

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