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Physical component of the environment

### 1. Water

Water covers 70% of the earth's surface. Water supports life and no living thing can survive without water. Lack of water in the environment would mean no life hence death of all the living components.

- Water forms a big part of living organisms. The human body for example, is made up of 70% water.
- Water is the habitat of many living things such as fish, whales and water plants such as water lily, water hyacinth and arrow roots,
- Some organisms do not live in water but depend on water for food. Such organisms include the fish-eagles which feed on fish, flamingos feed on tiny water plants and human beings who take fish, whales, lobsters and shrimps as food.

### 2. Air

Air is composed of various gases. These gases and their composition in air are shown in the pie chart below. All living things depend on air for life. Animals, for example, need oxygen for breathing in order to stay alive. Plants on the other hand need oxygen for respiration and carbon-dioxide to produce food in a process called photosynthesis.

### 3. Soil

Soil supports plant life by allowing plants to anchor into it. Soil also provides mineral salts such as nitrates to the plants. Soil is home or habitat to many living things such as earthworms, insects, spiders, millipedes and disease-causing germs such as bacteria. Soil contains air that is used by living organisms which means that a soil without air will not support life.

## **Pollution**

**Pollution** is the introduction of wastes or harmful substances into the environment, making the environment unfit to support life in a healthy way. The materials that cause pollution are called **pollutants**. The components of the environment that can be polluted include air, water and soil.

### **1. Air pollution**

Polluting the air is called air **pollution**. Air is a very important component of the environment since it supports life. Fresh air is one of the most important natural resources that is necessary to support life.

#### *How can air get polluted?*

Air can be polluted by smoke, gases and dust. This can happen in the following ways:

#### **Smoke**

Smoke can get to the air from:

**Cigarettes** - when smoking cigarettes, smoke from the cigarettes is released into the air. Some smoke is also released from the smoker's body through the mouth or nose. This smoke pollutes the air and is dangerous to living things. In human beings for example, the cigarette smoke can cause cancer and other diseases in the body.

**Burning tyres and plastic material** -when tyres and plastic materials burn, huge clouds of smoke are released into the environment. This smoke contains tar, soot and some gases. Soot is the black matter that is produced once something burns. When soot settles on plant leaves it blocks the stomata of the plant therefore affecting gaseous exchange in the plant. This smoke is also dangerous for animal life.

## **Gases**

Gases get to the air from:

**Aerosol sprays** - these are usually found in tightly closed containers. The gases are kept under pressure in these containers. They include perfumes, insecticides, some pesticides and some paints. These gases may cause respiratory diseases. Burning tyres and plastic materials - when these burn, they release carbon dioxide and carbon monoxide into the air. Carbon monoxide is a very poisonous gas that can cause death.

Vehicle exhaust - when vehicles run, they use up petrol or diesel and release gases into the air. Some of these gases are carbon dioxide and carbon monoxide which pollute the air. Some vehicles also use leaded fuel (fuel containing lead). These vehicles release lead in gas form in the air. Lead is very poisonous and when inhaled may cause damage to the brain. Farm chemicals - Pesticides, herbicides and even some fertilizers contain chemicals that get carried into the air when a farmer is using them. These chemicals may be harmful and can pollute the air just as aerosol sprays do.

Industrial **wastes** - industries emit a lot of gas as waste products in the manufacturing process. Some of these gases may be carbon dioxide, carbon monoxide, lead, mercury etc. These gases are poisonous to living things.

## **Dust**

Dust comes from soil. Ways in which dust can get into the air include:

Quarries - activities that are carried out in quarries, for example blowing up rocks, emit a lot of dust in the air.

**Vehicles** - move on murrain roads, they raise a lot of dust in the air.

**Wind** - when wind blows, it raises dust into the air causing air pollution.

Air pollution may also cause water pollution. This happens when polluted air containing various chemicals from the gases emitted by industries, vehicle exhausts, and aerosol sprays and farm chemicals get into contact with rain water. The chemicals in the

polluted air dissolve in the rain water. Some chemicals are acidic and when they dissolve in the rainwater, they make it acidic hence forming **acid rain**.

## **Effects of air pollution**

Air pollution affects both living and non living things.

### **Effect of air pollution on living things**

#### ***Plants***

Plants need clean air to be able to grow well and also to be able to make food. Polluted air may affect plants in the following ways:

- When soot settles on to the plant leaves, they block the stomata of the plants thereby denying the plant air. This suffocates the plant. If all the leaves are covered in soot, the plant may not carry out photosynthesis and respiration and may die.
- Dust particles, just like soot, settle on the leaves and can cause choking to the plant.
- When gases from polluted air dissolve in rain causing acid rain, the rain water may settle on leaves leaving acids on it. These acids damage the leaves of plants by burning them.
- When acids from rain reach the soil, they make the soil acidic making it hard for plants to grow in it.
- The chemicals in polluted air can also dissolve in water bodies like rivers, lakes, dams, and oceans making the water poisonous to plants living or growing in the water and around the water.

#### ***Animals***

- Polluted air causes respiratory diseases to human beings and other animals. It may also cause suffocation.
- 'Cigarette smoke causes cancer to both the smoker and the other people who don't

smoke but have inhaled air containing this smoke. These other people are called passive smokers.

- Clouds of smoke from vehicle exhaust and from industries cause visibility to be low. This may cause accidents along the roads and in the industries.
- Some gases are very poisonous and may cause death. An example is carbon monoxide.
- When gases get dissolved in water, they may affect the health of animals that live in the water. When acid rain falls on soil making the soil acidic, the lives of animals living in the soil are threatened.
- Water from acid rain is not safe for drinking. The acid is poisonous and can cause death.

### **Effects of air pollution on non-living things**

- Soot from polluted air stains things in the environment.
- Dust makes items in our environment dirty.
- Polluted air forms acid rain which corrodes roofs made from iron sheets.
- Acid rain damages the soil. It also destroys humus in the soil.
- Acid rain can cause weathering of rocks.
- Water pollution and its effects has been covered in Unit 7 (Water).
- Soil pollution and its effects has been covered in Unit 8 (Soil).

## ASSESSMENT QUESTIONS

1. It is **true** to state that the environment is
  - A. composed of soil, air and water only.
  - B. all that which surrounds an organism.
  - C. the habitat of an organism.
  - D. composed of plants and animals only. [B]
2. Which of the following is a **non-living component** of the environment?
  - A. Rocks
  - B. Grass
  - C. Antelopes
  - D. Bacteria [A]
3. Which statement best explains what is meant by the word **pollution**?
  - A. Not exercising environmental conservation
  - B. Being unclean
  - C. Making the environment unclean
  - D. Failure to recycle water [C]
4. Which one of the following will **NOT** pollute the air?
  - A. Dust
  - B. Chemicals
  - C. Smoke
  - D. Trees [D]
5. Which of the following activities does **NOT** expose you to pollution?
  - A. Cooking ugali using wet firewood
  - B. Painting the cow shed
  - C. Spraying the crops in the farm using pesticides
  - D. Watching news at home in the evening [D]

6. The kind of pollutant that mostly affects people in the rural areas is
- A. Pesticides
  - B. Raw sewage from broken sewage pipes
  - C. Uncollected garbage
  - D. Motor vehicle exhaust fumes [A]
7. One of the following is **NOT** a method of pollution control. Which one is it?
- A. Driving well-serviced motor vehicles
  - B. Planting grass as ground cover on bare ground
  - C. Burying domestic waste such as polythene bags
  - D. Selling old papers to a recycling factory [C]
8. A pollutant is **not**
- A. excessive use of fertilizers.
  - B. excessive use of pesticides.
  - C. excessive soft sound.
  - D. excessive loud noise. [C]
9. Rotting of dead organic matter tends to
- A. make our environment unclean,
  - B. add nutrients to parts of the physical environment.
  - C. reduce the number of plants in the environment.
  - D. reduce the number of animals in the environment. [B]
10. Which of the following is **not** an air pollutant?
- A. Flooding
  - B. Burning of bushes
  - C. Sewage
  - D. Using insecticides [A]
11. Which of the following is **not** an effect of air pollution?
- A. Acid rain
  - B. Respiratory disorders

- C. Blurred vision
- D. Water borne-diseases [C]

12. Air-borne diseases are caused by

- A. drinking dirty water.
- B. breathing in contaminated air.
- C. planting crops in contaminated soil.
- D. aerosol spray [B]