Air Pollution

What you will learn

What pollutes the air
Effects on the environment
Greenhouse effect and Global warming
Cleaning up the air
Air is not always as clean as it should be. Harmful substances called air pollutants are constantly being released into the air by natural sources such as volcanoes and decaying plants. However, the fastest growing source of air pollution comes from the activities of humans.

**Chlorofluorocarbons (CFCs)**

These are chemicals which are used in aerosol sprays (e.g. deodorants, hairsprays, insect sprays and spray paint), refrigerators, air-conditioning systems, cleaning solvents etc. They cause the thinning of the ozone layer in our environment.

The ozone layer protects us from the harmful ultraviolet rays of the Sun. As this layer gets thinner and thinner more ultraviolet rays will reach us. These rays could cause skin cancer to us and interferes with the photosynthetic process in plants.

**Lead compounds**

Lead particles in the air come mainly from the exhaust fumes emitted due to the combustion of leaded petrol or fuel in motor vehicles. This can result in lead poisoning which may lead to brain damage in human beings especially among young children. It has also been proven that lead is one of the main causes of forest decline.

*Do you Know?*

One in four people worldwide is breathing air which is damaging their health.
Sulphur dioxide

Sulphur dioxide is a harmful, colourless gas. It is given off by the burning of coal and oil especially in power stations.

Breathing in this gas irritates our eyes and nasal passageways. If you are in constant exposure to this, it can cause breathing difficulties, bronchitis, pneumonia, and even lung cancer. It can also stop plants photosynthesizing. It dissolves in rainwater to form acid rain.

Carbon monoxide

Carbon monoxide is a very poisonous gas. Major sources of carbon monoxide are exhaust fumes from motor vehicles and industries. In Maldives we don’t have to worry much about fumes from industries, but the exhaust fumes from motor vehicles is a big problem. Exposure to carbon monoxide causes various harmful effects ranging from headaches to brain damage or even death within a short period.

Oxides of nitrogen

These are poisonous gaseous compounds containing nitrogen and oxygen. They dissolve in rainwater to form acid rain. Major sources of these gases come from the burning of oil and coal at high temperatures, power stations, industries and exhaust fumes from motor vehicles.

These can damage the lungs if you are in constant exposure to these gases.

1. Fill in the blanks with the correct word.
   a. Air pollution is caused by harmful substances called __________ pollution/pollutants.
   b. Major cause of air pollution is due to __________ natural/human activities.

2. Name the main pollutants found in the air. What are their sources?

3. Write down the harmful effects of the pollutants that you mentioned in question 2.
We share the earth’s environment with many other living things. So we have to take care of the shared environment for all to survive. However, the world becoming so overpopulated and industrialized, we put a lot of burden on our environment and its ability to maintain life. Some human activities has led to environmental threats such as the greenhouse effect, the thinning of the ozone layer and acid rain.

**The ozone layer gets thinner!**

Ozone is a naturally occurring gas whose chemical symbol is \( \text{O}_3 \).

There is a layer of ozone gas in our atmosphere. Meanwhile there is the sun doing its job of providing light and heat. We can only see a certain range of light from red to violet. Right next to red is the invisible infrared. This light is harmful to life on earth as we know it, and can kill us if we get exposed to it too much. This is where ozone plays its part. Ozone absorbs most of these ultraviolet rays before it reaches the earth.

Unfortunately, some of the gases we produce on earth such as CFCs cause the ozone in the ozone layer to be destroyed and the ozone layer gets thinner. As the ozone layer gets thinner, more ultraviolet rays are able to reach the earth. Ultraviolet rays can affect all life on earth. It can damage crops, plants and trees, from which we get our food. It causes sunburn in humans, which can cause skin cancers and cataracts.

A total of 67% of Britain’s trees have been damaged by acid rain which is the highest percentage in Europe.
Acid rain

As the name suggests, acid rain is rain, which is acidic. The rain becomes acidic because of gases, which dissolve in the rainwater to form various acids. Rain is naturally slightly acidic because of the carbon dioxide dissolved in it.

The rain becomes acidic because of the gases, which dissolve in the rainwater to form various acids. Major contributing gases for acid rain are sulphur dioxide, oxides of nitrogen, carbon dioxide and chlorine.

The acidity of rainwater greatly increases in polluted areas where sulphur dioxide from power stations and oxides of nitrogen from exhaust fumes of motor vehicles dissolve in the rainwater.

Acid rain has terrible effects. It kills fish, destroys trees, eats the stonework of buildings and corrodes metals. Few plants can grow in acidic soil. When acid rain falls on trees, the trees loose their leaves and are unable to resist pests and diseases. Lakes and rivers may become too acidic for living things to survive.

1. Fill in the blanks using the correct words from the list given below.

- cancer
- chlorofluorocarbon
- ultraviolet
- crops
- acid

a. Ozone absorbs___________ rays.
b. __________ cause ozone in the ozone layer to be destroyed.

C. Ultraviolet rays damage __________, plants and trees.
d. Ultraviolet rays cause skin _________ in humans.

2. What is the importance of ozone layer?

3. What are the gases that contribute to acid rain?

4. What are the effects of acid rain?
Earth has warmed by about 1°C over the past 100 years. But why? And how? Well, scientists are not exactly sure. The Earth could be getting warmer on its own, but many of the world’s leading climate scientists think that things people do are helping to make the Earth warmer.

**Greenhouse effect**

Most green houses look like a small glass house. Green houses are used to grow plants, especially in the winter. Green houses work by trapping heat from the sun. The glass panels of the green house let in light but keep heat from escaping. This causes the green house to heat up, much like the inside of a car parked in sunlight, and keeps the plants warm enough to live in winter.

**Global warming**

The green house gases in the atmosphere behave much like the glass panes in a green house. Carbon dioxide, methane, water vapour, oxides of nitrogen and ozone are naturally occuring greenhouse gases. Sunlight enters the Earth’s atmosphere, passing through the blanket of green house gases. As it reaches the Earth’s surface, land, water and biosphere absorb the sun’s energy. Once absorbed, this energy is sent back into the atmosphere. Some of the energy passes back into space, but much of it remains trapped in the atmosphere by the greenhouse gases, causing our world to heat up. This heating up of Earth is known as global warming.

*Do you know?*

The Earth is about 3-6°C warmer today than it was 10,000 years ago during the last ice age.
The green house effect is important. Without green house effect, the Earth wouldn’t be warm enough for humans to live. But if the green house effect becomes stronger, it could make the Earth warmer than usual.

Human activities are upsetting the balance of green house gases such as carbon dioxide, methane and chlorofluorocarbon in the atmosphere. Every year we release billions of tons of heat-trapping gases to the atmosphere. Even a little extra warming will cause problems for humans, plants and animals.

Global warming does not mean that everywhere on earth is getting hotter. Undesirable effects of global warming include big changes in climate and rising sea levels due to the expansion of sea water and the melting of the ice cap. A rise in sea level will cause low-lying islands like Maldives and coastal regions to be flooded.

Due to the increase in greenhouse gases it has led to global warming.

Green house gases include carbon dioxide, methane, water vapour, oxides of nitrogen and ozone.

Global warming can cause sea level rise and flooding.
Cleaning up the air is everyone's job. Here are some ways of keeping the air clean.

- Use CFC-free products
- Reduce waste by recycling cans, bottles, and paper we use.
- Do not start smoking
- Get rid of waste carefully and report pollution
- Reduce the number of motor vehicles on the road by walking as much as possible.
- Plant more trees

Do you Know?

Air pollution levels in Mexico City exceed World Health Organization standards on 310 days each year.
Solutions

| Green house gases         | Reduce burning of fossil fuels.  
|                          | Reduce cutting down trees.      
|                          | Replant trees.                  |
| Ozone layer              | Use fewer Chlorofluorocarbons. CFCs are very long lived, and those already in the atmosphere will take 100 years to degrade. |
| Acid rain                | Clean up emissions in car exhausts. |
|                          | Clean up emissions on power stations. |
| Lead                     | Reduce use of leaded petrol. Most cars are now run on unleaded petrol, and leaded petrol is becoming less readily available. |

1. Suggest how the following people can help to reduce air pollution.
   
   a. Scientists
   b. You and your family

2. Mr. Ahmed leads an average lifestyle. He takes a taxi to go to work in the morning, works in his air-conditioned office, takes a taxi to go back home, watches television while waiting for food to be ready and go to bed in his bedroom with all the basic electrical appliances. He was very surprised when his daughter claimed that he was polluting the air.

   “Girl, I am just an ordinary man doing what many people are doing. I don’t even litter or smoke. How am I polluting the air?” His daughter was right. What do you think she said to him?

   \[\text{We could reduce air pollution by planting more trees, saving energy, recycling materials, reducing vehicles etc.}\]
The son of a minister, Jean Louis Rodolphe Agassiz was born on May 28, 1807 in the village of Montier, in the French-speaking part of Switzerland. Agassiz was educated in the universities of Switzerland and Germany as a physician, like many naturalists of the time. He developed a keen interest in natural history at an early age.

Agassiz took up the study of glaciers in 1836 as something of a sideline, but his contributions made him known as the “Father of Glaciology.” Observing the glaciers of his native Switzerland, Agassiz noticed the marks that glaciers left on the Earth: great valleys; large glacial erratic boulders carried long distances; scratches and smoothing of rocks; mounds of debris called moraines pushed up by glacial advances. He realized that in many places these signs of glaciation could be seen where no glaciers existed. Previous scientists had variously explained these features as made by icebergs or floods. Agassiz integrated all these facts to formulate his theory that a great Ice Age had once gripped the Earth, and published his theory in *Étude sur les glaciers* in 1840. His later book, *Système glaciare* (1847), presented further evidence for his theory, gathered all over Europe: Agassiz later found even more evidence of glaciation in North America.