

INNOVATION LAB STUDENT PROJECT

Date	September 5, 2016
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Class &House	Class 8 e in St. David's House
House Leader	Jason Dsouza
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Title	Air Pollution

Social Problem

- What is air pollution?
- What are the types of air pollution?
- What has the government done to protect the environment?
- What are the several schemes launched by other private organisations or others?
- What solutions have you come up with to prevent air pollution ?

Tasks And Timelines:

1. **Shinon** must research and bring out the effects
2. **Cyril** must research along with Shinon and Jason and bring the introduction
3. **Ashish** And **Darren** To research together and bring the quality of air and the various air pollutants
4. **Jason** to bring about various solutions & to review the work along with **Darren** and **Cyril Wilson**

The whole team must compile and structurise the entire project before October 15

Proposed Solution

Introduction :

The atmosphere that surrounds us is a major constituent of the biosphere . It is nothing but a mass of air and carries solids, liquids and gases in it. These external materials enter the air due to human and natural activities that degrade the quality of air. Before we can determine what enters the air as contamination , it is necessary to know what air normally contains. Air is made up of several components that we recognise as pollutants and are harmful. But when they are present in limited quantities, no harm is done to the biosphere.

Only when the air concentrations are above acceptable levels, does the air get polluted .

Air pollution is defined as the presence in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odour, smoke or vapour in quantities, of characteristics, and of duration, such as to be injurious to human, plant or animal life or to property, or which unreasonably interferes with the comfortable enjoyment of life and property.

Quality Of Air

According to the World Health Organisation (WHO), air pollution is a situation where the atmosphere contains concentrated materials that are harmful to the biosphere. The quality of air or the extent of pollution can be determined by measurements made either at the source or the air around it. Now remote measurements can be made at large heights above the ground with sophisticated instruments .

Types Of Air Pollutants

Depending upon the generation of different air pollutants, they are grouped as primary pollutants and secondary pollutants.

Primary pollutants can be defined as a harmful chemical that directly enters the air as a result of either natural or man-made processes . The following 5 types of primary pollutants account for more than 90% of the global air pollution:

1. Oxides Of Carbon

Oxides of carbon mainly include carbon monoxide and carbon dioxide that are produced from burning of fossil fuels, automobile discharge and from various other natural and anthropogenic (man-made) sources . About 80% carbon monoxide is produced by automobile exhaust. Carbon monoxide is produced by the oxidation of methane. A small amount is emitted from volcanoes, forest fires and by incomplete combustion of fuels. On inhaling, carbon monoxide passes into the blood stream through the lungs. Progressively, higher exposure to carbon monoxide causes impairment of the central nervous system functions, changes in cardiac and pulmonary functions, drowsiness, coma, respiratory failure and finally death.

2. **Carbon dioxide**

Carbon Dioxide is the basic end product obtained on burning fossil fuels, paper leaves & other carbon-containing material. Carbon dioxide is used by plants for photosynthesis. Although carbon dioxide has no direct effect on health, higher concentrations (above 10%) can lead to global warming, acid rain and greenhouse effect.

3. **Hydrocarbons**

In India, automobiles are the chief sources of hydrocarbon pollutants in the atmosphere. Hydrocarbons are also emitted out by some plants like Eucalyptus, Cottonwood, Oak, Sweet Gram & Spruce trees. They are also produced by activities such as the production of coke & smouldering of garbage near coal mines. Hydrocarbons at high concentrations (500-1,000 ppm) are carcinogenic and therefore, harmful to the lungs. Increased concentration of hydrocarbon vapours causes blockage in the respiratory tract. Hydrocarbons react with nitrogen dioxides and causes irritation to the eyes, nose and throat, as well as respiratory distress. Plants exposed to high levels of hydrocarbons display yellowing in its leaves.

4. **Sulphur oxides**

Besides natural sources, coal-fired electrical power plants, burning of brick kilns and industries are the main sources of sulphur dioxide pollutants. Sulphur dioxide reacts with Ozone, Hydrogen peroxide or Atmospheric water vapour to produce a toxic acid called sulphuric acid. It comes down on the earth with rain or snow as acid rain, It corrodes limestone, metals and even clothes. It is also very injurious to the respiratory system, mainly the lungs.

5. **Particulate matter**

Air-borne, small, solid particles or liquid droplets are collectively called known as particulate matter or aerosols. These air pollutants remain in the atmosphere under gravitational pull. Depending on the size, their lifetime varies from a few seconds to several months. Aerosols like fog, plant spores, bacteria and pollen are of natural origin & do not cause any atmospheric pollution. On the other hand, smoke, cement dust, fuel dust, quartz, asbestos, powder, oil smoke, tobacco smoke, fly ash from power plants, mini operation, radioactive aerosols, volcanic eruptions, spraying of salt & other solid particles from the sea & ocean are air pollutants.

(a) Organic Particulate Matter

The natural particulate matter present in aerosol is known as organic particulate matter, for example, particulates originating from volcanoes, dust storms, forest & grassland fires & living vegetation.

(b) Inorganic Particulate Matter

This mainly comprises of metal oxides formed during the burning of fossil fuels, industrial processes, vehicular exhaustion and acid rain.

Abatement of Air Pollution (Introduced By The Government)

The Indian government has established the National Ambient Air Quality Monitoring (NAAQM) networks in almost all states & union territories to monitor the air quality of various pollutants such as sulphur dioxide and suspended particulate matter, ammonia, hydrogen sulphide in the air. The quantity of these pollutants is based on the parameters set by the government of India in the form of the National Ambient Air Quality Standards (NAAS). The NAAS refer to the levels of air quality necessary to protect public health, vegetation & property.

Abatement of Air Pollution (Solutions By Us)

One of our solutions is to come up with a device that removes gaseous and particulate air pollutants from the air. The air is made to flow through the first chamber which contains a wet or dry packing material. The air passing out of this chamber is dust-free and free of certain gaseous pollutants. The air then passes through the last chamber which contains electrically charged plates. The particles may be naturally electrically charged and as they pass through the charged plates of the precipitators, they get collected on the plates carrying an opposite charge and the now clean air passes out. The residue that remains is filled with a special kind of bacteria. Pumping methane that is filled with this bacteria, into tanks and then allow it to heat, kills the bacteria. What is left is a pink powder that can pack together into high-protein fish food.

Our second solution is to create a device that can be fitted into the exhaust pipes of vehicles. This will filter out the impurities in the air as well as reduce the amount of air pollution considerably.

Sources/References

conserve-energy-future.com ,
greentumble.com ,
howtoprevent.com ,
en.wikipedia.org ,
Longman Geography text book (grade 9)