Air pollution

By
Dr. Shashi Bala
Faculty of Engineering
University of Lucknow

Pollution is now a common term, that we are very familiar. We know about the various forms of pollution and read about it. Air pollution is one such form that refers to the contamination of the air, irrespective of indoors or outside. That contaminants are termed as pollutants. A physical, biological or chemical alteration to the air in the air is known as pollution. It occurs when any harmful gases, dust, smoke enters into the atmosphere and makes it difficult for plants, animals, and humans to survive as the air becomes dirty.

Air pollution can further be classified into two sections-

- visible air pollution and
- invisible air pollution.

Another way of looking at air pollution could be any substance that holds the potential to hinder the atmosphere or the well being of the living beings surviving

in it. We all can live in this world because of air, and all things living is due to a combination of gases that collectively form the atmosphere; the imbalance caused by the increase or decrease in the percentage of these gases can be harmful to survival.
The ozone layer is very important for survival and global warming is also because of excess of green house gases, one result of air pollution

Types of Pollutants
In order to understand the causes of Air pollution, several divisions can be made.

Primarily air pollutants- caused by primary sources or secondary sources. The pollutants that are a direct result of the process can be called primary pollutants. A classic example of a primary pollutant would be the sulfur-dioxide emitted from factories. Result of smoke which is combination of carbon, ash particles and hotgases are primary pollutants.

Secondary pollutants -are those which are caused by the intermingling and reactions of primary pollutants. Smog created by the interactions of several primary pollutants is known to be as a secondary pollutant. Example Photochemical smog, formed due to PAN formation

Various Causes of Air pollution
1. **The burning of fossil fuels**
Sulfur dioxide emitted from the combustion of fossil fuels like coal, petroleum and other factory combustibles are major cause of air pollution. Pollution from vehicles including trucks, and other automobiles trains, airplanes cause an immense amount of pollution. We depend on them to fulfill our daily primary needs of transportation.

But, their overuse of it is destroying our environment as dangerous gases are polluting the environment. Carbon Monoxide caused by incomplete combustion and generally exhaustef from vehicles is another major pollutant along with Nitrogen Oxides, that is produced from both natural and synthetic processes.

2. **Agricultural activities**

Ammonia is a very common byproduct from agriculture-related activities and is one of the most hazardous gases in the atmosphere. Ammonium ion is a part of fertilizer industry. Use of insecticides, pesticides, and fertilizers in agricultural activities has grown quite a lot. The harmful chemicals came into the air and can cause water pollution also.

3. **Effluent from factories and industries**

Manufacturing industries release a large amount of carbon monoxide, hydrocarbons, organic compounds, and chemicals into the air thereby depleting the quality of air. Manufacturing industries can be found at every corner of the earth and there is no area that has not been affected by it. Petroleum refineries also release hydrocarbons and various other chemicals that pollute the air and also cause land pollution.

4. **Mining operations**

Mining, a process where minerals below the earth are extracted using large equipment and too much digging result dust and chemicals which are released in the air causing massive air pollution. It is one of the reasons which is responsible for the deteriorating health conditions of workers and nearby residents.

5**.** ***Indoor air pollution***

Household cleaning products like vacuum cleaner, painting supplies releases toxic chemicals in the air and cause air pollution. We noticed that once we paint the walls of our house, it creates some sort of smell which makes it literally impossible for you to breathe. That smell of solvent cause air population.

Suspended particulate matter popular by its acronym SPM, is another cause of pollution. SPM is usually caused by dust, combustion, etc.

Disastrous Effects of Air pollution

1. **Respiratory and heart problems**

The effects of air pollution are very serious. They are known to create several respiratory and heart problems along with Cancer or Pnuemo among other threats to the body. So many million persons are known to have died due to direct or indirect effects of Air pollution. Children in areas exposed to air pollutants are said to commonly suffer from pneumonia and asthma.Persons who

are working in cotton industry, chalk factory and cement factories may be die due to polluted air in working area.

2. **Global warming**
One more direct effect is the immediate alterations that we face due to global warming. With increased temperatures worldwide, increase in sea levels and melting of ice caps from colder regions and icebergs, displacement and loss of habitat have already signaled an impending disaster if actions for preservation and normalization aren't undertaken soon.

3. **Acid rain**
So many harmful gases like nitrogen oxides and sulfur oxides are released into the atmosphere during the burning of fossil fuels like coal and patrol, disiel. When it rains, the water droplets combine with these air pollutants, changes acidic and then falls on the ground in the form of acid rain. Acid rain causes great damage to human, animals, and crops.

4. **Eutrophication**
Eutrophication, a condition where a high amount of nitrogen present in some pollutants like fertilizer, gets developed on sea's surface and turns itself into algae and adversely affect fish, plants and animal species. This blue green algae that are present on lakes and ponds is due to the presence of this chemical only decreases amount of dissolved oxygen.

5. **Effect on wildlife**
As humans, animals also face negative effects of air pollution. Toxic chemicals present in the air can force wildlife species to move to a new place and change their habitat. The toxic pollutants deposit over the surface of the water and can also affect sea animals.

6. **Depletion of the ozone layer**
Ozone exists in the Earth's stratosphere and is responsible for protecting humans from harmful ultraviolet (UV) rays. Earth's ozone layer is depleting due to the presence of chlorofluorocarbons, hydrochlorofluorocarbons in the atmosphere. As the ozone layer will go thin, it will emit harmful rays back on

earth and can cause skin and eye related problems. UV rays also have the capability to affect crops.

Series of activities and interactions that create these pollutants. There are two types of sources that we will take a look at Natural sources and Man-made sources.

- Natural sources of pollution include dust carried by the wind from locations with very little or no green cover, gases released from the body processes of living beings (Carbon dioxide from humans during respiration, Methane from cattle during digestion, Oxygen from plants during Photosynthesis).
- Smoke from the combustion of various inflammable objects, volcanic eruptions, etc along with the emission of polluted gases also makes it to the list of natural sources of pollution.
- Man-made contributions towards air pollution, smoke again features as a prominent component. The smoke emitted from various forms of combustion like in biomass, factories, vehicles, furnaces, etc. Waste used to create landfills generate methane, that is harmful in several ways. The reactions of certain gases and chemicals also form harmful fumes that can be dangerous to the well being of living creatures.

Solutions For Air Pollution

1. Use public mode of transportation

Encourage people to use more and more public modes of transportation to reduce pollution. Also, try to make use of carpooling. If you and your colleagues come from the same locality and have same timings you can explore this option to save energy and money.

2. **Conserve energy**

Switch off fans and lights when we are going out. A large number of fossil fuels are burnt to produce electricity. Wecan save the environment from degradation by reducing the number of fossil fuels to be burned.

3. **Understand the concept of Reduce, Reuse and Recycle**

Do not throw away items that are of no use to you. In-fact reuse them for some other purpose. For e.g. you can use old jars to store cereals or pulses.

4. **Emphasis on clean energy resources**

Clean energy technologies for example, solar, wind and geothermal are on high demand in these days. Governments of various countries have been providing grants to consumers who are interested in installing solar panels for their home. This will go a long way to curb air pollution.
We should give more emphasis on green building concept.

5. **Use energy efficient devices**

CFL lights consume less electricity as against their counterparts. They live longer, consume less electricity, lower electricity bills and also help you to reduce pollution by consuming less energy.

Several attempts are being made worldwide on at personal, industrial and governmental level, to cure the intensity of air pollution is rising and regain a balance. It is a direct attempt to reduce Global warming. We are seeing a series of innovations and experiments aimed at alternate and unconventional options to reduce pollutants. Air pollution is one of the larger mirrors of man made fault and a challenge to see a shining tomorrow.