

4. The Sources, Effects and Prevention of Air-Pollution

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Abstract:

Nature is mankind's best friend, and it is interlinked with the environment. One of the chief components of the environment is air. When unwanted harmful solids, liquid particles and gases enters into the environment, and create a destructive effect on living and nonliving particles by reducing the air quality then it is called as air pollution. The substances which cause air pollution are termed as air pollutants. These can be categorized as primary and secondary pollutants. Primary pollutants are the pollutants which are emitted from a source and come in contact with the air directly.

Emissions from industries, vehicles, volcanic eruption, sand storm, dust are the primary pollutants. Carbon monoxide, nitrogen oxides, hydrocarbons, Sulphur oxides are also the examples of primary pollutants. When the primary pollutants come in to the atmosphere, physical or chemical interactions between the atmospheric components and primary pollutants takes place and produce Photochemical smog, ozone, formaldehyde like secondary pollutants, which are dangerous and injurious to the atmosphere.

Keywords: *Interlinked, environment, emissions, pollutants, destructive, atmosphere.*

4.1 Introduction:

Air pollution has been an environmental issue since the time of industrial revolution. Air pollution come to the atmosphere and makes it unsafe for all living creatures and is a threat to the natural ecosystem. Vehicles, industries, wild fires, dust are the common examples of air pollutants. According to NEERI (National Environmental Engineering and Research Institute) in India 30% of dust particles are generated from construction activities.

- **History:**

History reminds us that air pollution tragedies happened in DONORA SMOG of United States in October 1948, the GREAT SMOG OF LONDON in December 1952, and the BHOPAL GAS TRAGEDY OF INDIA in 2nd December 1984. Nuclear explosions of HIROSHIMA, NAGASAKI were the examples of radio-active air pollutions. These show that air pollution was a world-wide serious problem since early days. Technically, the World develops every day but because of pollution it is also deteriorating day by day. The WHO (World Health Organization) declared Karachi of Pakistan, New Delhi of India, China's Beijing, Lima of Peru, Cairo of Egypt as some of the most air polluted cities of the World.(1).

- **Sources of air pollution:**

World's fourth largest threatening cause for early death is air pollution. (2). During the LOCK DOWN period of COVID -19 pandemic the improvement of air quality was seen as the whole World stopped in transportations, construction activities, economic and industrial field. It became very easy to find out the sources of air pollution at that time. Sources of air pollution are sometimes natural and sometimes artificial or carelessness of human beings. Air pollution is not always seen physically.

Sometimes a pungent smell detected in the air will be an evidence of air pollution. Various industries like brick plant, oil refinery, paper industry, domestic sewage are the odour emitting major industries. Newly painted houses deliver an unpleasant odour, inhalation of this odour is not good for our health.

Odour as well as the smog of smoking cigarettes is very dangerous for the health. Planes, trains, trucks, buses, cars, motorbikes, etc. can be categorized as mobile sources of air pollutions. Automobiles or fossil fuel vehicles are the great sources of carbon-monoxide, nitrogen oxides, and among them Trucks, and Jeeps are the main polluters (Figure 4.1) Soot comes to the atmosphere as a result of burning fuel from the industries and from the automobiles. (Figure 4.2)

Another air pollutant that comes in contact to the atmosphere is through smelter and coke oven industries. Different types of insecticides, pesticides, fertilizers used in agricultural field are also the causes of air pollution. Factories and industries are the stationary sources of air pollution, have great contribution towards the air pollution by emitting carbon monoxide, smog and hydrocarbons.

Emission of smog and ash from wild fires, Sulphur and chlorine gas of volcanic eruption, dust storm can also be considered as the natural sources of air pollution. Area sources of air pollution include agricultural land, cities, etc. Nuclear tests, nuclear explosions, medical equipment's for examples CT scan machine, X-ray machine, Gamma ray producing machines have been developing modern technologies, but also have harmful effects on the environment as radioactive pollutants.



Figure 4.1 Pollution from Automobiles



Figure 4.2: Pollution from Industries and Factories

Effects: Air pollution is directly proportional to climatic change i.e. when air pollution increases climatic changes also increases, and consequently global warming arises. By increasing the temperature of the Earth, global warming melts the mountain glaciers, increases the sea and ocean level, because of which flood rate of the World shoots up every year.

The Environment Protection Act or EPA has shown in 1986, that every 1% depletion of the ozone layer would lead to a 2% rise of skin cancer. Health risk of air pollution is much more higher among the living organisms. Discomfort to the nose, eyes, throat, skin and nausea,

headache, asthma among kids are the examples of short term effects of air pollutions on human beings. Excessive amount of lead can cause brain and kidney problems among children. Air pollutant mercury has the ability to damage the nervous system. Long term diseases generated by the polluted air on human health are- heart disease, lung cancer, damages to the liver, kidney, brain, nervous system. The protective shield against injurious ultra violet radiation (or ozone layer) has been depleting due to the air pollution caused by CHLOROFLUOROCARBONS. As a result of which immune systems of human beings are decreasing gradually. Diseases like non-melanoma skin cancer (NMSC) are increasing at a rapid rate, eye related problems mainly corneal infection, issues on eye lens, breathing problems, headaches, and cardio-vascular diseases are rising.

In the plant kingdom, Ultra-violet (UV) radiation causes physical changes like undersized leaf, reduced growth, deficient seed and diseases, harming in the harvesting process. Ozone layer depletion affects the phytoplankton and krill in the Antarctic Ocean, as a result of which marine animals like fish, birds including gulls, penguins, albatross, seals, and whales also suffer by the air pollution. Bacteria, fungi like microorganisms are affected by the methane gas released from the chemical and textile industries. (3). In case of Plants, Sulphur dioxide, hydrogen chloride, ammonia, nitrogen oxide, nitrogen dioxide, mercury hamper the growth of the plant and the photosynthesis phenomenon. Plastic bags are one of the most dangerous elements for the environment. They are non-biodegradable, therefore animals like cows, buffalos and sheep can easily consume this material at the time of grazing, as a result of which the internal organs of these animals get harmed by the plastic, and slowly milk production rate decreases.

Damages to the digestive systems, suffocation, and finally death have happened among the marine animals because of various types of harmful plastic materials in the oceans. (4). When Sulphur dioxide reacts with the air it initiates acid rain- the poisonous rain of the environment. The acid rain have damaged various historical monuments like the **Taj Mahal** of Agra, causing its white marble structure to turn yellow in colour. Delhi is one of the most rapidly growing cities of India and can be considered as one of the most polluted city. Here, increasing number of automobiles are the main source of air pollution. Due to the poor visibility in the air the Delhi International airport often have to cancel their domestic and international flights. (5) Recently primary schools of Delhi were closed for a few days due to the increasing quantity of air pollution. A study done by the PUNJAB POLLUTION CONTROL BOARD and INDIAN INSTITUTE OF TECHNOLOGY, Delhi (2013) proved that vehicles, industries, *tandoor* (a kind of clay oven) of nearby restaurants have led to adverse effect on the famous GOLDEN TEMPLE of Amritsar. (6). Artistic monuments for example the COLOSSEUM OF ROME, SAN MARCO BASSILLICA in Vanice, Italy are some examples of decaying due to air pollution. Air pollutants have also damaged various ancient buildings in Japan, France, Egypt, and London and in New York City.

Causes of air pollution: Deforestation is one of the primary sources for the generation of the air pollution, due to which carbon dioxide gas increases in the atmosphere. Over population directly or indirectly affects the deforestation to fulfill their needs. Building construction, government projects such as construction of roads, highways, bridges upset the ecosystem by developing lot of dust particles in the air. During the weddings and festivals like Diwali, the bursting of crackers can also lead to air pollution.

Prevention: Prevention of air pollution is a great challenge for the society. To generate the awareness amongst people against pollution issues and to create protection the 2nd December of every year is celebrated as **National Pollution Control Day**, and the 5th June of each year is noted as **World Environment Day**. One of the most effective methods to combat the air pollution is to adopt afforestation in an aggressive manner. The 'Forest Man of India' Jadav Payeng, has been a role model in afforestation, since 1979. He has single handedly turned a barren land into a lush green forest, and his remarkable contribution to the environment should be followed by all. The satellites of NASA (National Aeronautics and Space Administration) are orbiting the Earth and monitoring the air pollution vividly. (7).

In 1987, an International treaty MONTREAL PROTOCOL was signed to restrict the ozone depletion. Combustion, absorption, adsorption, controlling particulate emissions are the latest methods of air pollution control. (8) The CLEAN AIR ACT (1970) of United States permits the U.S. Environmental Protection Agency (EPA) to safe-guard human beings by monitoring the emission of air pollutants.(9). In 1981, Air (Prevention and Control of Pollution) Act was introduced in India to control the Air pollution in the country. Air Pollution Act of 1987 was put forward for the prevention and control of air pollution.

4.2 How to Reduced Air Pollution:

From the above studies, it has been seen that plantation of trees is very necessary to decrease air pollution. It is a basic and easy step to control air pollution. In urban areas indoor plantation, rooftop gardening (Figure 4.3) are suitable. Instead of using a vehicle, riding a bicycle (Figure 4.4) is more preferable because it does not release any harmful gases. Less driving of private cars, uses of public transport, or carpooling system and battery operated vehicles can reduce the air pollution to a great extent.

Turning off the engine of cars and bikes during the traffic jam and at traffic signals should be done. In case of industry, by using low Sulphur fuel, release of Sulphur dioxide into the atmosphere can be reduced. Eco-friendly fuel like CNG (Compressed Natural Gas), bio gas etc. are preferable in industry and vehicles. Building construction, government projects should be done in a systematic and non-polluting way so that there is no air pollution. Odors in an enclosed area can be minimized by proper ventilation. In future the use of paper, jute and cloth bags will become more applicable instead of plastic bags. Green Diwali i.e. Diwali with Rangoli and lighting of lamps will become more popular in the coming days.

By following the 3 Rs- Recycle, Reduce, Reuse, the amount of air pollution can be reduced, as well as energy sources can be saved with these 3Rs. Firm rules and regulations should be followed by the industries and factories so that minimum amount of gases and chemicals are released .When low volatile coal is used in many industries in place of high volatile coal, it helps in eliminating smoke and soot in lesser amount. Development of solar energy, wind energy, geothermal energy and uses of it in the place of fossil fuel is a suggestion for the reduction of air pollution. To reduce the air pollution painting of houses, offices and buildings should be done with brush not with the spray. Power consumption of AC (Air-conditioner) is very high and it produces lot of heat and harms the environment. This can be decreased by substituting the AC with fan for cooling purpose.



Figure 4.3: Rooftop Gardening in Urban Areas



Figure 4.4: Air Pollution can be Reduced by the Above Ways

4.3 Conclusion:

When human beings become aware about the causes and sources of air pollution, a beautiful and green World will become a reality. Awareness programs are the stepping stones for it. Workshops, seminars, rally like programs, different types of write-ups, posters making, and various types of essay competitions among the students will be helpful in this regard. Proper use of sunscreen lotion is a good protector against the harmful ultra violet radiation. By increasing the physical fitness, immune system human beings are able to overcome the various diseases caused by air pollution. To protect ourselves from radio-active pollution, measures such as keeping distance from the sources of radiation, monitoring of that particular area regularly, and proper protective equipment kits are necessary. By investigating the sources of air pollution researcher and scientist can improve the air quality easily.

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