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## SPECIAL ISSUE FOR NATIONAL LEVEL CONFERENCE "RENEWABLE ENERGY RESOURCES & IT'S APPLICATION"

### AIR POLLUTION IS ONE OF THE MAJOR DRAWBACK

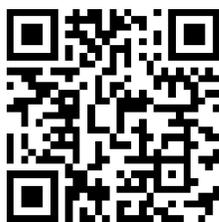
PROF. KAVITA K. GHOGARE, PROF. YOGESH S. NAVKAR

B.E (Civil), M. E (Structure), Department of civil engineering, COET, Akola

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**Abstract:** Now a day's air pollution is the biggest problem in all over the world. It is very much dangerous regarding human health, animals, birds etc. i.e., on all over the environment. Air pollution is the introduction of particulates, biological molecules or other harmful gases into earth's atmosphere, causing disease, death to humans and damage to other living organisms such as food crops or the natural or built environment. Air pollution may come from anthropogenic or natural sources. In this paper the study is done for air pollution. And understanding all the effects, damages and also controlling of it.

**Keywords:** Pollution, Pollutants, Hazards, Damages, Effects.



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Corresponding Author: PROF. KAVITA K. GHOGARE

Co Author: PROF. YOGESH S. NAVKAR

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## INTRODUCTION

Air pollution is very dangerous and therefore it is very much important to reduce it. There are many – more causes of air pollution. Air pollution is hazardous not only for the human health but also to the all over the environment. Air pollution is the introduction of particulates, biological molecules or other harmful gases into earth atmosphere, causing disease, death to humans, damage to living organisms such as food crops or the natural or built environment. Air pollution may come from anthropogenic or natural sources. But defining air pollution is not simple. One could claim that air pollution started when humans began burning fuels. In other words, all man-made emissions into the air can be called air pollution, because they alter the chemical composition of the natural atmosphere. The increase in the global concentrations of greenhouse gases CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O can be called air pollution using this approach, even though the concentrations have not found to be toxic for humans and ecosystem. One can refine this approach and only consider anthropogenic emissions of harmful chemicals as air pollution.

Air pollutants together with climatic parameters are of major importance for the deterioration of many materials used in cultural monuments. They are emitted by industrial activities and by the transport sector. These pollutants create problems on the local scale, but they are also transported in the air over long distances.

Air pollution has a variety of effects on materials such as the corrosion of metals, the deterioration of materials and paints and fading of dyes. There have been number of attempts at estimating the resultant economic losses due to those detrimental effects of air pollution.

### SOURCES OF AIR POLLUTION:

Air pollution consists of gas and particle contaminates that are present in the atmosphere. Gaseous pollutants include SO<sub>2</sub>, NO<sub>x</sub>, ozone, CO, volatile organic compounds, certain toxic air pollutants and some gaseous forms of metals. Particle pollution includes a mixture of compounds .The majority of these compounds can be grouped into five categories such as sulphate, nitrate, elemental carbon, organic carbon and crustal material. These pollutants are also classified as primary and secondary pollutants. Now,

#### Primary and secondary pollutants:

Pollutants can be classified as primary or secondary. Primary pollutants are substances that are directly emitted into the atmosphere from sources. The main primary pollutants known to cause harm in high enough concentrations are the following:

- Carbon compounds such as CO, CO<sub>2</sub>, CH<sub>4</sub> and VOCs
- Nitrogen compounds such as NO, N<sub>2</sub>O, NH<sub>3</sub>
- Sulphur compounds such as H<sub>2</sub>S and SO<sub>2</sub>
- Halogen compounds such as chlorides, fluorides and bromides
- Particulate matter either in solid or liquid form which is usually categorized into these groups based on the aerodynamic diameter of the particles.
  - Particles less than 100 microns, which are also called inhalable-10 since they can easily enter the nose and mouth.
  - Particles less than 10 microns, which are also called thoracic since they can penetrate deep in the respiratory system.
  - Particles less than 4 microns. These particles are often called respirable because they are small enough to pass completely through the respiratory system and enter the bloodstream.
  - Particles less than 2.5 microns.
  - Particles less than 0.1 microns

Secondary pollutants are not directly emitted from sources, but instead form in the atmosphere from primary pollutants. The main pollutants known to cause harm in high enough concentrations are the following:

- NO<sub>2</sub> and HNO<sub>3</sub> formed from NO.
- Ozone (O<sub>3</sub>) formed from photochemical reactions of nitrogen oxides and VOCs.
- Sulphuric acid droplets formed from SO<sub>2</sub> and nitric acid droplets formed from NO<sub>2</sub>.
- Sulphates and nitrates aerosols formed from reactions of sulphuric acid droplets and nitric acid droplets with NH<sub>3</sub> respectively.
- Organic aerosols formed from VOCs in gas to particle reactions.

### EFFECTS OF AIR POLLUTION:

Effects and causes of air pollution are shown in following diagrams:

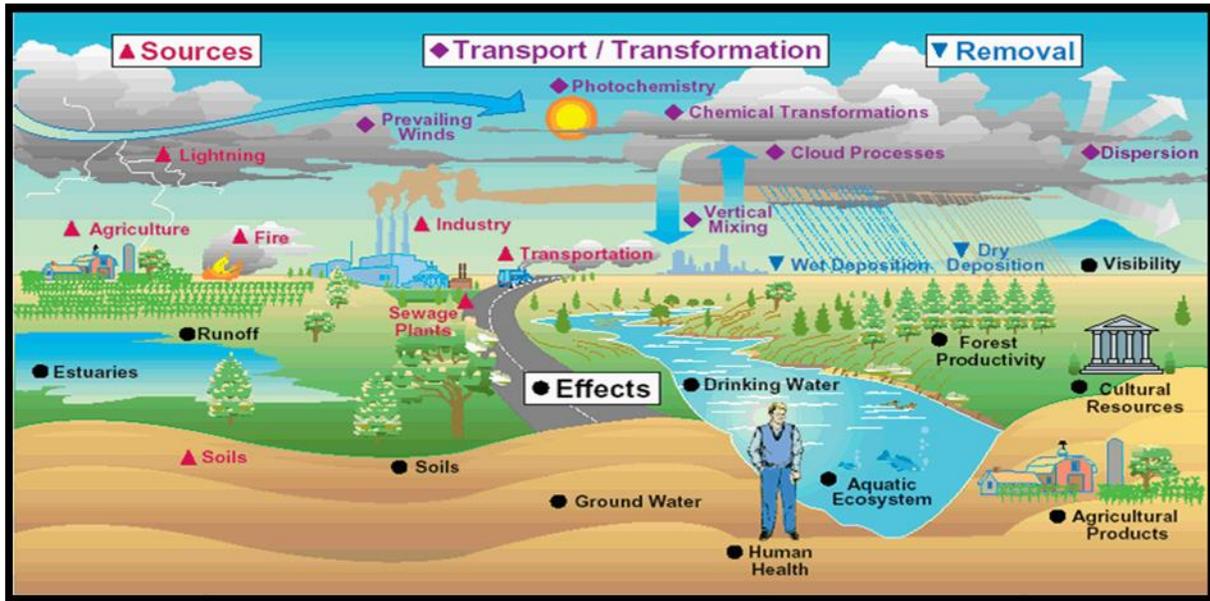


Figure 1. Sources and Effects.

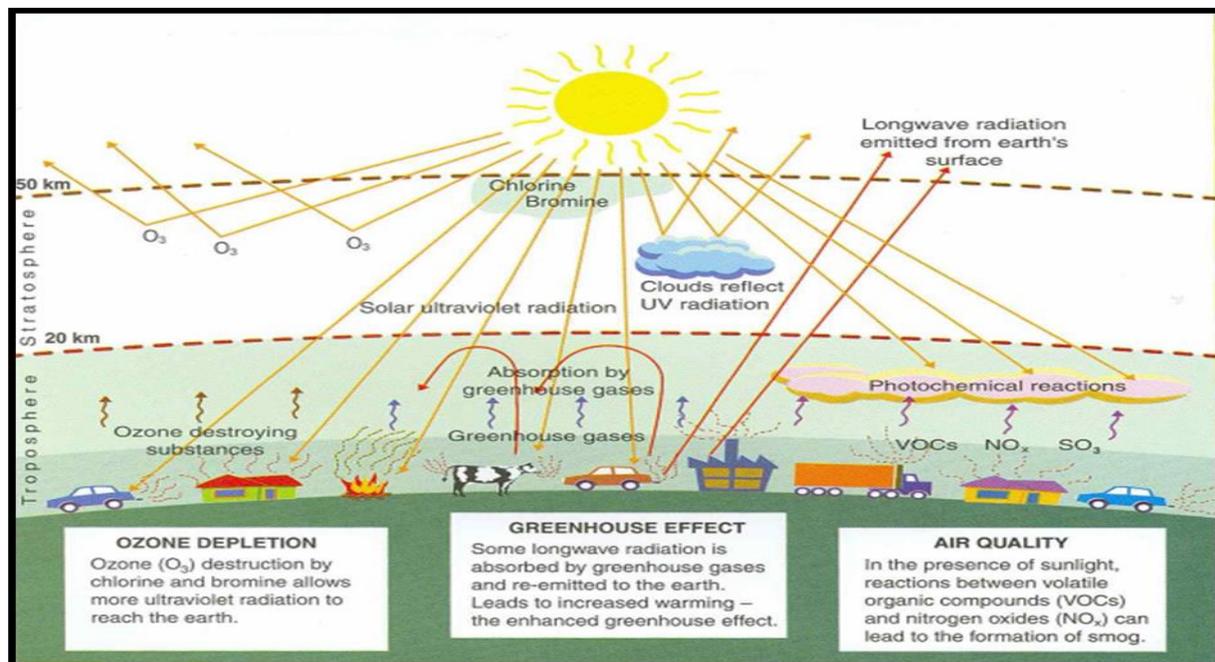


Figure 2. Effects of air pollution.

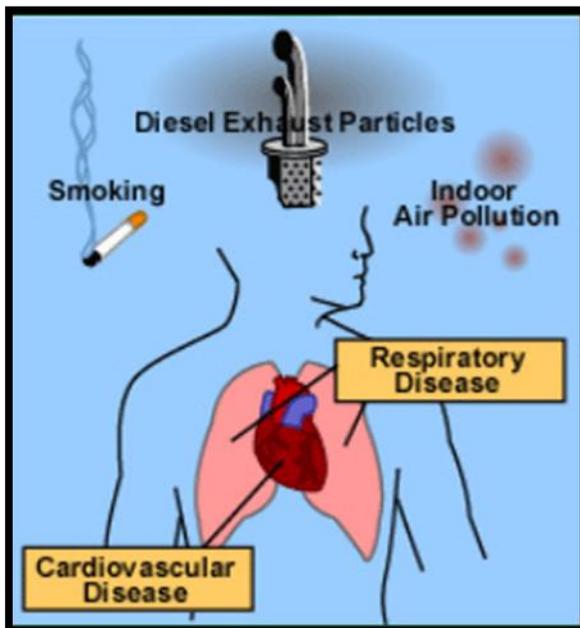


Figure: 3. Effects

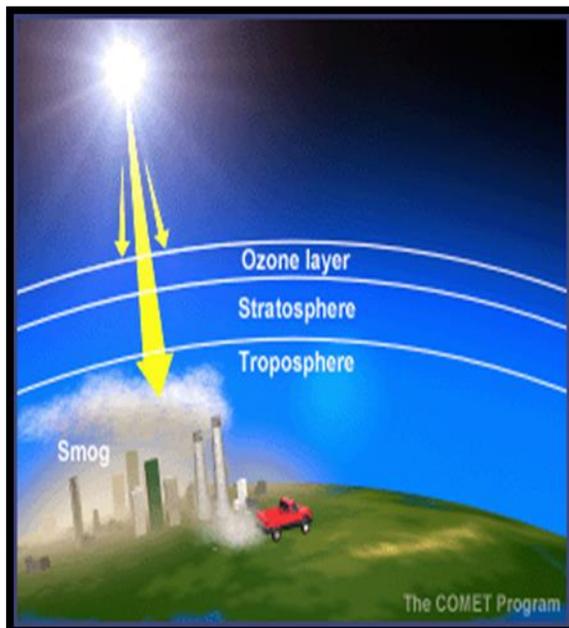


Figure: 4. Effects



Figure: 5. Effects

Table 1: Shows Health Effects With Sources

Sources and Health Effects of Air Pollution		
Pollutant	Sources	Health Effects
Ozone (O <sub>3</sub> )	Secondary pollutant typically formed by chemical reaction of volatile organic compounds (VOCs) and NO <sub>x</sub> in the presence of sunlight.	Decreases lung function and causes respiratory symptoms, such as coughing and shortness of breath; aggravates asthma and other lung diseases leading to increased medication use, hospital

Particulate Matter (PM)	Emitted or formed through chemical reactions; fuel combustion (e.g., burning coal, wood, diesel); industrial processes; agriculture (plowing, field burning); and unpaved roads.	admissions, emergency department (ED) visits, and premature mortality. Short-term exposures can aggravate heart or lung diseases leading to respiratory symptoms, increased medication use, hospital admissions, ED visits, and premature mortality; long-term exposures can lead to the development of heart or lung disease and premature mortality.
Lead	Smelters (metal refineries) and other metal industries; combustion of leaded gasoline in piston engine aircraft; waste incinerators; and battery manufacturing.	Damages the developing nervous system, resulting in IQ loss and impacts on learning, memory, and behavior in children. Cardiovascular and renal effects in adults and early effects related to anaemia.
Oxides of Nitrogen (NOx)	Fuel combustion (e.g., electric utilities, industrial boilers, and vehicles) and wood burning.	Aggravate lung diseases leading to respiratory symptoms, hospital admissions, and ED visits; increased susceptibility to respiratory infection.
Carbon Monoxide (CO)	Fuel combustion (especially vehicles).	Reduces the amount of oxygen reaching the body's organs and tissues; aggravates heart disease, resulting in chest pain and other symptoms leading to hospital admissions and ED visits.
Sulphur Dioxide (SO <sub>2</sub> )	Fuel combustion (especially high-sulphur coal); electric utilities and industrial processes; and natural sources such as volcanoes.	Aggravates asthma and increased respiratory symptoms. Contributes to particle formation with associated health effects.

**Table 2: Effects on the materials:**

MATERIAL EFFECTED	RANGE OF SENSITIVITY
Brick	very low
Concrete	low
Mortar	moderate to high
sandstone, limestone, marble	high
Unalloyed steel	high

Stainless steel	very low
Nickel and nickel-plated steel	high
Zinc and galvanised steel	high
Aluminium	very low
Copper	low

**4. Air pollution controlling devices:**

Following are the different controlling devices which are useful for controlling air pollution. These devices are used in an industry and transportation. They can either destroy contaminants or remove them from an exhaust stream before it is emitted into the atmosphere.

**Table 3: Controlling Devices:**

Sr.No.	Sources	Devices
1.	Particulate control	Mechanical collectors Electrostatic precipitators Baghouses Particulate scrubbers
2.	Scrubbers	Baffle spray scrubber Cyclonic spray scrubber Ejector venture scrubber Spray tower Wet scrubber
3.	NO <sub>x</sub> Control	Low NO <sub>x</sub> burners Selective catalytic reduction (SCR) Selective non-catalytic reduction (SNCR) NO <sub>x</sub> scrubbers Exhaust gas recirculation Catalytic converter (also for VOC control)
4.	VOC abatement	Adsorption systems, using activated carbon, such as Fluidized Bed Concentrator Flares Thermal oxidizers Catalytic converters Biofilters Absorption (scrubbing) Cryogenic condensers Vapor recovery systems

5. Acid Gas/SO<sub>2</sub> control

Wet scrubbers  
Dry scrubbers  
Flue-gas desulfurization

**CONCLUSION:**

- From above study, it is noted that Air pollution is very dangerous, harmful.
- Air pollution is critical factor as whole environment point of view.
- Air pollution totally affects the human, animals, birds and all organisms present on the earth surface.
- Some programs are conducted by the Govt. bodies for awareness such as “Save Environment”.
- Save Earth from these pollutants and minimise the air pollution by different methods controlling devices, awareness programs.
- For minimising the air pollution conducts fuel free day in Govt. Sectors, private sectors and in other places.

**REFERENCES:**

1. www.google.com
2. Stefan Doytchinov, Augusto Screpanti, Giovanni Leggeri, “Effects of Air Pollution on Materials, Including Historic and Cultural Heritage Monuments”.
3. Dr. Peter Bellin, “Environmental Impact of Air Pollution” 2008.
4. N. Venkat Rao, M. Rajasekhar, Dr. G. Chinna Rao, “Detrimental effect of Air pollution, Corrosion on Building Materials and Historical Structures” e-ISSN : 2320-0847 p-ISSN : 2320-0936 Volume-03, Issue-03, pp-359-364, 2014.
5. G.S. Birdie, J.S. Birdie (2013), Water Supply and Sanitary Engineering (including Environmental Engineering and Pollution control Acts), Dhanpat Rai Publications, New Delhi