

Name

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## **Air Pollution**

Air is essential to life as it offers oxygen and other gases, making clean air a fundamental requirement. Air pollution happens when certain particles and gases accumulate to high enough concentrations in the atmosphere. Pollution results in various environmental effects such as acid rain, increasing the greenhouse effect, global warming, and climate change. Besides, contamination continues to pose a significant threat to human health, including heart and respiratory diseases. In the year 2013, premature deaths of more than 450,000 people in Europe were recorded because of air pollution (Goldstone 35). Globally, estimates of around 5.5 to 7 million premature deaths are linked to air pollution annually (Goldstone 35). Though it may be possible to control air pollution, the efforts to prevent it become problematic because many different sources are responsible for releasing various pollutants into the air.

### **The Science Behind the Problem**

Air quality thresholds and limits are essential in quality of air management as they measure the degree of pollutants dilution in a specific user geographical airshed. According to Goldstone, ambient air quality limits are set for conventional air pollutants emissions from either human-made or natural sources such as forest fires and volcanic eruptions, usually in large quantities (37). The major pollutants are classified either as primary or secondary. The primary contaminants are emissions that are direct from a source. On the other hand, secondary pollutants form by chemical interaction between primary pollutants and standard atmospheric conditions in the atmosphere.

Indeed, air quality guidelines are essential in air management as they measure the degree of contaminants dilution in a specific user geographical airshed.

Sulfur dioxide is one of the major pollutants in the air. Sulfur dioxide is a primary pollutant that forms during fuel combustion containing sulfur, oil and coal, and metal-containing ores for energy generation and industrial activities. Other sources of sulfur dioxide include paper manufacturing, petroleum refineries, metal smelting, and cement manufacturing (Tomasi 55). In addition, massive ships, locomotives, and non-road diesel machinery burn high-sulfur fuels resulting in sulfur dioxide emissions into the environment. Besides, the natural sources of sulfur dioxide in the air are volcanic eruptions and hot springs. Moreover, sulfur dioxide dissolves easily with water resulting in environmental acidification, which is also a significant component of acidic rain. Thus, sulfur dioxide is a pivotal contributor to decomposition found in building paints and materials.

Next, an increase in vehicle exhausts, industrial and construction sites has led to Particulate Matter (PM) pollutants. PM are tiny pieces of liquid or solid matter in the atmosphere comprising different chemicals, including nitrogen, carbon, sulfur, and metal compounds. Tomasi argues that Particulate Matters are predominant in the urban population in both developing and developed countries (87). Some are subtle particles, generally smaller than 2.5 micrometers, and can only be visible through a powerful microscope. However, other particles such as dirt, dust, smoke, or soot are visible to the naked eye and have a measurable effect on climate variations. Thus, there is a need to regulate human-made sources of fine particles pollutants responsible for reduced visibility and greenhouse gasses.

### **Opposing Views to Air Pollution**

Formerly, efforts to prevent air pollution have been hindered due to many opposing views about the subject. Although aerosol particles are air pollutants of both human-made and natural origin, their substantial influence on the climate is widely unknown. According to Miller, they play a crucial climate role inside and outside the clouds by interacting with solar beams (173). Particle matters containing little or no carbon reflect solar radiation away from the earth's surface. As a result, the air and the earth's surface below are effectively cooler. Comparatively, the warmer earth section results from the absorption of solar radiation by aerosols that contain soot.

Furthermore, the reflection of sun rays by the black carbon aerosols leads to the more cool earth surroundings by acting as a shade. In the lower troposphere, aerosols create cloud droplets, producing heat by trapping and emitting long-wave radiation. Indeed, these reasons contribute to the opposing views about air pollution.

Concurrently, engineers and scientists are evaluating the idea of curbing the severe threat of global warming temporarily by utilizing the reflective capability of some aerosol. The idea behind the exploration involves an artificial increase of white atmospheric aerosols in the lower stratosphere (Miller 177). Moreover, Miller argues that these tiny particles are essential for regulating the amount of carbon dioxide in the air since they determine the release of carbon dioxide by plants in the sea and on the land (178). However, climate interventions are relatively new, and an increase in particulate matter concentration potentially accompanies severe ramifications for ecosystems and human health. Therefore, a thorough consideration following an intentional rise of particulate matter concentration in the atmosphere ought to be done before any deployment.

Further, although the earth is not heating up as fast as it should, aerosols make people sick and contribute to premature deaths. To protect the public health of their citizens, countries around

the world are setting various air quality standards that are essential components of environmental and national risk management policies (Goldstone 40). Evidence on particulate matter concentration in the major cities indicates a rise in health risks, especially in developed countries. The health effects of short-term exposure to particulate matter are vast, with death from heart and respiratory diseases being predominant. Miller argues that air quality across the USA improves with time because of stringent standards by government regulators and policies on air pollution (180). Air pollutants have significantly declined due to cleaner factories, power plants, motor vehicles, consumer products, and home appliances. Between 1980 and 2005, particulate matter concentration in American cities has reduced by 40 percent (Miller 180). Hence, ambient air quality standards for various pollutants such as sulfur oxide and particulate matter are necessary by individual countries to keep their concentration values in check.

Overall, the paper has illuminated the various causes of air pollution. Air pollution occurs when pollutants concentration builds up in the atmosphere to critical levels that may result in health risks. The contaminants are categorized into two distinct classes, namely primary and secondary pollutants. Primary pollutants are emitted directly from natural sources, such as volcanic eruptions and hot springs, or human-made sources, such as incomplete combustion of fuels, industries, and construction sites. On the other hand, secondary contaminants such as acid rain, ozone, and haze, are caused by the interaction between the primary pollutants and the typical atmosphere. Besides, various opposing views on air pollution have stood out. However, different health risks that include heart and respiratory diseases result from human exposure to these pollutants. Therefore, countries worldwide are adopting air quality standards for effective air quality management for the public health of the citizens.

### Works Cited

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