

Air Pollution: Causes, Effects & Preventions

Dr. Sushil Kumar

Associate Professor, Department of Geography, Govt. College, Bherian, Pehowa (Haryana)

INTRODUCTION

Air Pollution is another major problem that is yet to be solved. The air is 99.9% nitrogen, oxygen, water vapor, and inert gases. We as humans depend on the air around us to live, without it we would die. Although we rely on this as an essential source for living, it is still littered and polluted with chemicals. Pollution of the atmosphere and the air around us is air pollution, and this is becoming more "popular" everyday. There are several main types of air pollution that include smog, acid rain, the greenhouse effect, and "holes" in the ozone layer. The types are extremely harmful to the environment and could result in serious damage. There are many causes of air pollution and there are many to blame. The first type of air pollution is smog. The word smog came from a newspaper article almost 50 years ago. The word is slang for smoke and fog, and that is indeed what smog is. Smog is a form of air pollution created by the photochemical reaction with sunlight and the chemicals in the air, and then this deadly mixture is released into the atmosphere. An example of how fatal smog was in 1952 with the incident, "London's killer smog." This incident happened in December of 1952, when a deadly wave of smog hit London killing over 10,000 people. Citizens walked through the streets with surgical masks on, waiting for a wind to raise and blow this terrible wave of pollution away. Their wish came true on December 10, after almost a week of terror and many injured and dead people. Smog alone is just as fatal and dangerous as the other forms of air pollution.

AIR POLLUTION AND PUBLIC HEALTH

One of the primary criteria for an airborne chemical to be a pollutant is its effect on public health. One of the first areas of public concern about air pollution is breathing.

Asthma is becoming more common. This is true even though some air pollutant concentrations have decreased. The increase in asthma is concentrated in people of color and low-income people. The incidence

of acute asthma attacks in children doubled in the last 13 years even as very effective medicines were developed. About five million child hospitalizations were children who had asthma attacks. It is the most frequent cause of childhood hospitalization. Deaths of children with asthma rose 78 percent from 1980 to 1993. It is concentrated in high-population urban areas. This one environmental effect of air pollution can spread to inner-ring suburbs then to air regions over time. Asthma is described as like breathing through a straw. The serious public health issues around air pollution highlight the gravity of the problem as a whole.

Air pollution can have short- and long-term health effects. Asthma from air pollution can have short- and long-term effects. Short-term effects of asthma are irritation to the eyes, nose, and throat. Long-term reactions to air pollution can include upper respiratory infections such as bronchitis and pneumonia. Other symptoms of exposure to air pollution are headaches, nausea, and allergic reactions. Short-term air pollution can aggravate underlying medical conditions of individuals with asthma and emphysema. Long-term health effects are more controversial. Depending on the type of air pollution, there is general consensus that exposure can cause chronic respiratory disease, lung cancer, heart disease, and damage to the brain, nerves, liver, or kidneys. Continual exposure to most kinds of air pollution affects the lungs of growing children by scarring them at early stages of development. Recent studies suggest that the closer one is raised to a freeway in southern California, a notoriously low-quality air region overall, the greater the chance of having one of the listed long-term effects.

Cumulative exposure to polluted air does aggravate or complicate medical conditions in the elderly. Some air pollution risk is involuntarily assumed. However, people die prematurely every year in the United States because of smoking cigarettes and voluntarily increasing other risk factors. Members of these communities label this type of risk assessment as blaming the victim. The involuntary assumption of

health risks is something most communities strongly object to. With the advent of the Toxics Release Inventory many communities can track airborne industrial emissions. Citizen monitoring of environmental decisions has increased, especially around air quality issues.

STATE OF AIR POLLUTION

The air becomes polluted in different ways. How the air becomes polluted determines the types of problems it causes. Different sources of emissions contain different chemicals. These may interact with other airborne chemicals in unknown ways. As the chemicals mix with moisture in the air they can become rain. The rain can move the chemicals through the ecosystem, including crops and livestock. Mercury, lead, and aluminum all move in this way, with adverse ecological effects. There may be other chemicals with adverse ecological effects that do not last as long as metals do and may therefore be hard to detect while present. Air pollution can expose populations to more than just airborne pollution.

The Natural Resources Defense Council closely tracks the air emissions of the biggest polluters. They call it their benchmarking project. They are a nonprofit environmental advocacy organization that believes in keeping track of environmental conditions to establish a baseline. Their research is based on publicly available environmental information, much of it available in the Toxics Release Inventory. Key findings of the benchmarking project's 2004 report include the following:

- Emissions of sulfur dioxide and nitrogen oxides have decreased by 36 percent and 44 percent, respectively, since the stricter pollution-control standards of the 1990 Clean Air Act went into effect.
- Carbon dioxide emissions increased 27 percent over the same period.
- Carbon dioxide emissions are expected to spike in coming years due to a large number of proposed new coal plants.
- Wide disparities in pollution rates persist throughout the electricity industry with a small number of companies producing a relatively large amount of emissions.
- Few power plants use currently available, state-of-the-art emissions control technologies.

- The electric power industry remains a major source of mercury emissions in the United States. The Natural Resources Defense Council's benchmarking project uses public data to compare the emissions performance of the 100 largest power producers in the United States. They account for 88 percent of reported electricity generation and 89 percent of the industry's reported emissions. Emissions performance is examined with respect to four primary power plant pollutants: sulfur dioxide, nitrogen oxides, mercury, and carbon dioxide. These pollutants cause or contribute to global warming and to environmental and health problems including acid rain, smog, particulate pollution, and mercury deposition.

INDOOR AIR POLLUTION

The air inside of buildings can be as polluted as outside air. Indoor air can accumulate gases and other chemicals more quickly than outside air. Cooking, heating, smoking, painting, new carpeting and glue, and heavy electronic equipment usage can all affect indoor air quality. Large numbers of books without adequate ventilation can cause carbon dioxide to build up. As most people spend most of their time indoors, the exposure to this air is much greater. Vulnerable populations, such as the very young and very old, spend even more time inside. Depending on the pollutants, indoor air pollution can lead to mold and fire hazards.

EFFORTS TO CONTROL AIR POLLUTION

Pollution is controlled in two ways: with end-of-the-pipe devices that capture pollutants already created, and by limiting the quantity of pollutants produced in the first place. End-of-the-pipe devices include catalytic converters in automobiles and various kinds of filters and scrubbers in industrial plants. In a catalytic converter, exhaust gases pass over small beads coated with metals that promote reactions changing harmful substances into less harmful ones. When end-of-the-pipe devices first began to be used, they dramatically reduced pollution at a relatively low cost. As air pollution standards become stricter, it becomes more and more expensive to further clean the air. In order to lower pollution overall, industrial polluters are sometimes allowed to make cooperative deals. For instance, a power company may fulfill its

pollution control requirements by investing in pollution control at another plant or factory, where more effective pollution control can be accomplished at a lower cost. End-of-the-pipe controls, however sophisticated, can only do so much. As pollution efforts evolve, keeping the air clean will depend much more on preventing pollution than on curing it. Gasoline, for instance, has been reformulated several times to achieve cleaner burning. Various manufacturing processes have been redesigned so that less waste is produced. Car manufacturers are experimenting with automobiles that run on electricity or on cleaner-burning fuels. Buildings are being designed to take advantage of sun in winter and shade and breezes in summer to reduce the need for artificial heating and cooling, which are usually powered by the burning of fossil fuels. The choices people make in their daily lives can have a significant impact on the state of the air. Using public transportation instead of driving, for instance, reduces pollution by limiting the number of pollution-emitting automobiles on the road. During periods of particularly intense smog, pollution control authorities often urge people to avoid trips by car. To encourage transit use during bad-air periods, authorities in Paris, France, make bus and subway travel temporarily free. Indoor pollution control must be accomplished building-by-building or even room-by-room. Proper ventilation mimics natural outdoor air currents, reducing levels of indoor air pollutants by continually circulating fresh air. After improving ventilation, the most effective single step is probably banning smoking in public rooms. Where asbestos has been used in insulation, it can be removed or sealed behind sheathes so that it won't be shredded and get into the air. Sealing foundations and installing special pipes and pumps can prevent radon from seeping into buildings. On the global scale, pollution control standards are the result of complex negotiations among nations. Typically, developed countries, having already gone through a period of rapid (and dirty) industrialization, are ready to demand cleaner technologies. Less developed nations, hoping for rapid economic growth, are less enthusiastic about pollution controls. They seek lenient deadlines and financial help from developed countries to make the expensive changes necessary to reduce pollutant emissions in their industrial processes. Nonetheless, several important international accords have been reached. In 1988, the United States and 24 other nations agreed in

the Long-Range Transboundary Air Pollution Agreement to hold their production of nitrogen oxides, a key contributor to acid rain, to current levels. In the Montreal Protocol, adopted in 1987 and strengthened in 1990 and 1992, most nations agreed to stop or reduce the manufacture of CFCs. In 1992 the United Nations Framework Convention on Climate Change negotiated a treaty outlining cooperative efforts to curb global warming. The treaty, which took effect in March 1994, has been legally accepted by 160 of the 165 participating countries. In December 1997 at the Third Conference of the United Nations Framework Convention on Climate Change in Japan, more than 160 nations formally adopted the Kyoto Protocol. This agreement calls for industrialized nations to reduce their emissions of greenhouse gases to levels 5 percent below 1990 emission levels between 2008 and 2012. The United States, which releases more greenhouse gases than any other nation, has traditionally been slow to support such strong measures. The U.S. Senate may be reluctant to ratify the Kyoto Protocol because it does not require developing countries, such as China and India, to meet similar emissions goals. All these antipollution measures have helped stem the increase of global pollution emission levels. Air pollution control is a race between the reduction of pollution from each source, such as a factory or a car, and the rapid multiplication of sources. Smog in cities is expected to increase as the number of cars and miles driven continues to rise. Meanwhile, developing countries are building up their own industries, and their citizens are buying cars as soon as they can afford them. Ominous changes continue in the global atmosphere.

CONCLUSION

The controversies around air pollution show no signs of abating. Points of concentrated air pollution are getting more attention and becoming political battlegrounds. Ports are the latest example of this. On September 5, 2007, the EPA began a research project to test equipment that measures air emissions by equipment used in ports to move goods around docks and on and off cargo ships, trucks, and trains. Most of this equipment burns diesel fuel. The EPA wants to test new equipment that can recapture the energy of hydraulic brakes and thereby use less polluting fuel. They are predicting fuel savings of 1,000 gallons per vehicle per year, with decreased maintenance costs for

the fleet. The EPA is working with the Port Authority of New York and New Jersey, Kalmar Industries, Parker Hannifin Corporation, and the Port of Rotterdam. Port authorities are very powerful independent legal entities that can neither tax nor be taxed. They issue bonds. Interest on bonds is not income for federal tax purposes, or for state tax purposes if issued in that state. Wealthy individuals can reduce their tax liability and invest in the country's infrastructure. Historically, this was done in the West with railroad bonds. Authorities are creatures of state law, but very little is required in the way of public participation or environmental planning. Port authorities are able to resist many environmental requirements, especially if they involve several different states. The environment and ecology of ports are often toxic and unappealing. Ports are places where many ships empty their bilges of waste, often illegally. Some states have passed legislation to prevent cruise ships from dumping their wastes in their ports, such as California. Ports have also been the site of land-based waste-dumping practices. Along tidal areas many communities did this with the idea that the tide would take it away. Wastes from fishing and fish processing can also add to the mix. Ports are also the terminus of many rivers that have collected agricultural runoff, municipal sewage, industrial water discharges, and other types of waste. Ports are among the most environmentally challenging ecosystem reconstruction projects in the United States. In early 2000 many port authorities began to incorporate principles of sustainability into their long-range strategic corporate planning. The cumulative effects of waste, the increasing liability for cleanup costs and its accounting as a contingent liability, and increasing urban environmental activism all undercut achieving anything sustainable in an environmental, business, or social sense. Port authorities now partner with the EPA around air pollution, expressly motivated by a concern about sustainability. New controversies will also emerge from these new policies, such as how clean is clean.

REFERENCE

- [1] Bas, Ed, *Indoor Air Quality: Guide for Facility Managers*, 2d ed. New York: Marcel Dekker, 2004.
- [2] Harrap, D., *Air Quality Assessment and Management*. London: Spon Press, 2002.

- [3] Lipfert, Frederick W., *Air Pollution and Community Health*. New York: Wiley, 1994.
- [4] Moussiopoulos, Nicolas, ed., *Air Quality in Cities*. New York: Springer, 2003.
- [5] Schwartz, Joel, *Air Quality in America*. Washington, DC: AEI Press, 2007.
- [6] Simioni, Daniela, *Air Pollution and Citizen Awareness*. New York: United Nations Publications, 2004.