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Air and Water Pollution: Causes, Effects and Solutions

Dr. B. N. Parmar
Head of Department,
Department of Sociology
M. V. M. Arts College,
Kalawad Road, Rajkot

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Abstract:

We are astronauts—all of us. We ride a spaceship called Earth on its endless journey around the sun. This ship of ours is blessed with life-support systems so ingenious that they are self-renewing, so massive that they can supply the needs of billions.

But for centuries we have taken them for granted, considering their capacity limitless. At last we have begun to monitor the systems, and the findings are deeply disturbing.

Pollution is the contamination of Earth's environment with materials that interfere with human health, the quality of life, or the natural functioning of *ecosystems* (living organisms and their physical surroundings). Although some environmental pollution is a result of natural causes such as volcanic eruptions, most is caused by human activities.

This article chiefly discusses the air and water pollution – their causes and effects on the living being in general and humans in particular. Regulations and legislation have led to considerable progress in cleaning up some air and water pollution in developed countries.

Key Words: Pollution, environment, ecosystem, human health.

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"There is no such thing as a free lunch." Most people would not think to apply this idiom to the health of the planet, but the saying is one of biologist Barry Commoner's three rules of ecology, along with "Everything is connected with everything else" and "Everything goes somewhere." In this 1970 National Geographic article, staff writer Gordon Young talks with Commoner and other scientists who discuss the devastating effects of pollution.

Pollution is the contamination of Earth's environment with materials that interfere with human health, the quality of life, or the natural functioning of *ecosystems* (living organisms and their physical surroundings). Although some environmental pollution is a result of natural causes such as volcanic eruptions, most is caused by human activities. This article chiefly discusses the air and water pollution – their causes and effects on the living being in general and humans in particular.

The Third Assessment Report of Working Group I of the Intergovernmental Panel on Climate Change (IPCC) builds upon past assessments and incorporates new results from the past five years of research on climate change. Many hundreds of scientists from many countries participated in its preparation and review.

Because humans are at the top of the food chain, they are particularly vulnerable to the effects of non-degradable pollutants. Pollution also has a dramatic effect on natural resources. Ecosystems such as forests, wetlands, coral reefs, and rivers perform many important services for Earth's environment. They enhance water and air quality, provide habitat for plants and animals, and provide food and medicines. Any or all of these ecosystem functions may be impaired or destroyed by pollution. Moreover, because of the complex relationships among the many types of organisms and ecosystems, environmental contamination may have far-reaching consequences that are not immediately obvious or that are difficult to predict. For instance, scientists can only speculate on some of the potential impacts of the depletion of the ozone layer, the protective layer in the atmosphere that shields Earth from the Sun's harmful ultraviolet rays.

Another major effect of pollution is the tremendous cost of pollution cleanup and prevention. The global

effort to control emissions of carbon dioxide, a gas produced from the combustion of fossil fuels such as coal or oil, or of other organic materials like wood, is one such example. The cost of maintaining annual national carbon dioxide emissions at 1990 levels is estimated to be 2 percent of the gross domestic product for developed countries.

In addition to its effects on the economy, health, and natural resources, pollution has social implications. Research has shown that low-income populations and minorities do not receive the same protection from environmental contamination as do higher-income communities. Toxic waste incinerators, chemical plants, and solid waste dumps are often located in low-income communities because of a lack of organized, informed community involvement in municipal decision-making processes.

Pollution exists in many forms and affects many different aspects of Earth's environment. Point-source pollution comes from specific, localized, and identifiable sources, such as sewage pipelines or industrial smokestacks. Nonpoint-source pollution comes from dispersed or uncontained sources, such as contaminated water runoff from urban areas or automobile emissions.

The effects of these pollutants may be immediate or delayed. Primary effects of pollution occur immediately after contamination occurs, such as the death of marine plants and wildlife after an oil spill at sea. Secondary effects may be delayed or may persist in the environment into the future, perhaps going unnoticed for many years. DDT, a non-degradable compound, seldom poisons birds immediately, but gradually accumulates in their bodies. Birds with high concentrations of this pesticide lay thin-shelled eggs that fail to hatch or produce deformed offspring. These secondary effects, publicized by Rachel Carson in her 1962 book, Silent Spring, threatened the survival of species such as the bald eagle and peregrine falcon, and aroused public concern over the hidden effects of non-degradable chemical compounds.

Human contamination of Earth's atmosphere can take many forms and has existed since humans first began to use fire for agriculture, heating, and cooking. During the Industrial Revolution of the 18th and 19th centuries, however, air pollution became a major problem.

Urban air pollution is commonly known as smog. The dark London smog that Evelyn wrote of is generally a smoky mixture of carbon monoxide and organic compounds from incomplete combustion (burning) of fossil fuels such as coal, and sulfur dioxide from impurities in the fuels. As the smog ages and

reacts with oxygen, organic and sulfuric acids condense as droplets, increasing the haze. Smog developed into a major health hazard by the 20th century.

A second type of smog, photochemical smog, began reducing air quality over large cities like Los Angeles in the 1930s. This smog is caused by combustion in car, truck, and airplane engines, which produce nitrogen oxides and release hydrocarbons from unburned fuels. Sunlight causes the nitrogen oxides and hydrocarbons to combine and turn oxygen into ozone, a chemical agent that attacks rubber, injures plants, and irritates lungs. The hydrocarbons are oxidized into materials that condense and form a visible, pungent haze.

Eventually most pollutants are washed out of the air by rain, snow, fog, or mist, but only after traveling large distances, sometimes across continents. As pollutants build up in the atmosphere, sulfur and nitrogen oxides are converted into acids that mix with rain. This acid rain falls in lakes and on forests, where it can lead to the death of fish and plants, and damage entire ecosystems. Eventually the contaminated lakes and forests may become lifeless. Regions that are downwind of heavily industrialized areas, such as Europe and the eastern United States and Canada, are the hardest hit by acid rain. Acid rain can also affect human health and man-made objects; it is slowly dissolving historic stone statues and building facades in London, Athens, and Rome.

One of the greatest challenges caused by air pollution is global warming, an increase in Earth's temperature due to the buildup of certain atmospheric gases such as carbon dioxide. With the heavy use of fossil fuels in the 20th century, atmospheric concentrations of carbon dioxide have risen dramatically. Carbon dioxide and other gases, known as greenhouse gases, reduce the escape of heat from the planet without blocking radiation coming from the Sun. Because of this greenhouse effect, average global temperatures are expected to rise 1.4 to 5.8 Celsius degrees (2.5 to 10.4 Fahrenheit degrees) by the year 2100. Although this trend appears to be a small change, the increase would make the Earth warmer than it has been in the last 125,000 years, possibly changing climate patterns, affecting crop production, disrupting wildlife distributions, and raising the sea level.

Air pollution can also damage the upper atmospheric region known as the stratosphere. Excessive production of chlorine-containing compounds such as chlorofluorocarbons (CFCs) (compounds formerly used in refrigerators, air conditioners, and in the manufacture of polystyrene products) has depleted the

stratospheric ozone layer, creating a hole above Antarctica that lasts for several weeks each year. As a result, exposure to the Sun's harmful rays has damaged aquatic and terrestrial wildlife and threatens human health in high-latitude regions of the northern and southern hemispheres.

The demand for fresh water rises continuously as the world's population grows. From 1940 to 1990 withdrawals of fresh water from rivers, lakes, reservoirs, and other sources increased fourfold. Of the water consumed in the United States in 1995, 39 percent was used for irrigation, 39 percent was used for electric power generation, and 12 percent was used for other utilities; industry and mining used 7 percent, and the rest was used for agricultural livestock and commercial purposes.

The pollution of rivers and streams with chemical contaminants has become one of the most critical environmental problems of the 20th century. Waterborne chemical pollution entering rivers and streams comes from two major sources: point pollution and nonpoint pollution. Point pollution involves those pollution sources from which distinct chemicals can be identified, such as factories, refineries or outfall pipes. Nonpoint pollution involves pollution from sources that cannot be precisely identified, such as runoff from agricultural or mining operations or seepage from septic tanks or sewage drain fields. It is estimated that each year 10 million people die worldwide from drinking contaminated water.

Sewage, industrial wastes, and agricultural chemicals such as fertilizers and pesticides are the main causes of water pollution. The U.S. Environmental Protection Agency (EPA) reports that about 37 percent of the country's lakes and estuaries, and 36 percent of its rivers, are too polluted for basic uses such as fishing or swimming during all or part of the year. In developing nations, more than 95 percent of urban sewage is discharged untreated into rivers and bays, creating a major human health hazard.

Industrial pollutants that run into streams, rivers, or lakes can have serious effects on wildlife, plants, and humans. In the United States there are strict rules for the amount and composition of substances that factories can release into bodies of water. These rules are not always enforced, and much industrial water pollution comes from accidental chemical or oil spills.

Water runoff, a nonpoint source of pollution, carries fertilizing chemicals such as phosphates and nitrates from agricultural fields and yards into lakes, streams, and rivers. These combine with the phosphates and nitrates from sewage to speed the growth of algae, a type of plantlike organism. The

water body may then become choked with decaying algae, which severely depletes the oxygen supply. This process, called eutrophication, can cause the death of fish and other aquatic life.

Erosion, the wearing away of topsoil by wind and rain, also contributes to water pollution. Soil and silt (a fine sediment) washed from logged hillsides, plowed fields, or construction sites, can clog waterways and kill aquatic vegetation. Even small amounts of silt can eliminate desirable fish species. For example, when logging removes the protective plant cover from hillsides, rain may wash soil and silt into streams, covering the gravel beds that trout or salmon use for spawning.

The marine fisheries supported by ocean ecosystems are an essential source of protein, particularly for people in developing countries. Yet pollution in coastal bays, estuaries, and wetlands threatens fish stocks already depleted by overfishing. In 1989, 260,000 barrels of oil spilled from the oil tanker Exxon Valdez into Alaska's Prince William Sound, a pristine and rich fishing ground. In 1999 there were 8,539 reported spills in and around U.S. waters, involving 4.4 billion liters (1.2 billion gallons) of oil.

Regulations and legislation have led to considerable progress in cleaning up some air and water pollution in developed countries. Vehicles in the 21st century emit fewer nitrogen oxides than those in the 1970s did; power plants now burn low-sulfur fuels; industrial stacks have scrubbers to reduce emissions; and lead has been removed from gasoline. Developing countries, however, continue to struggle with pollution control because they lack clean technologies and desperately need to improve economic strength, often at the cost of environmental quality. The problem is compounded by developing countries attracting foreign investment and industry by offering cheaper labor, cheaper raw materials, and fewer environmental restrictions.

References:

Benjamin Ross; Steven Amter, The *Polluters: The Making of Our Chemically Altered Environment,* Oxford University Press, 2010.

Currie, Donya. *WHO: Air Pollution a Continuing Health Threat in World's Cities*, The Nation's Health (February 2012)

Web Resources:

http://www.epa.gov/

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https://en.wikipedia.org/wiki/Water_pollution