

# Environmental Pollution: Types, Causes and Consequences

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**Abstract.** Environmental pollution is not a new phenomenon, but it remains the greatest global problem facing humanity and a major environmental cause of morbidity and mortality. Human activities related to urbanization, industrialization, mining and exploration are at the forefront of global environmental pollution. Both developed and developing countries share this burden, although awareness and stronger laws in developed countries have done more to protect their environment. Despite global attention to pollution, its impact is still being felt due to its severe long-term effects. The purpose of this work is to display the severity of the problem of environmental pollution, in particular, water pollution, air pollution, radioactive pollution, noise pollution. When writing the article, materials and methods obtained from the study of scientific papers were used. This study is further evidence that the pollution of our planet is one of the most pressing problems and that its solution should be in the first place, as the findings show that pollution affects the planet itself, people and their health, animals and much more.

## 1 Introduction

Earth is the only planet known to modern science on which life exists thanks to the atmosphere. It ensures our existence. Atmosphere is, first of all, air, which must be breathable for people and animals and must not contain harmful impurities and substances. How to protect air from pollution? This is a very important issue that needs to be addressed in the foreseeable future.

In recent centuries, we often behave very unreasonably. Minerals are wasted. Forests are cut down. Rivers dry up. This disrupts the natural balance, and the planet is gradually becoming uninhabitable. The same thing happens with air. It is constantly polluted by all sorts of things that enter the atmosphere. Chemical compounds found in aerosols and antifreezes are destroying the earth and threatening global warming and related disasters. How to protect the air from pollution so that life on the planet can continue?

Environmental pollution is an effect caused by undesirable changes in the natural environment that have a harmful effect on plants, animals and humans. The substance that causes pollution is known as a pollutant. Pollutants can exist as liquids, solids or gases. A substance becomes a pollutant when its concentration exceeds its natural abundance, and this increase in concentration is caused either by human activities or by natural phenomena.

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Contaminants can decompose and are rapidly destroyed by natural processes similar to the decomposition of vegetables. We also have pollutants that take decades to decompose and are difficult to remove once released. DDT, plastics, heavy metals and nuclear waste are just a few examples.

One of the greatest scourges of our age is air pollution, not only because of its impact on climate change, but also because of its impact on the health of populations and individuals due to increased morbidity and mortality. There are many pollutants that are major contributors to disease in humans. Among them, particulate matter (PM), particles of variable but very small diameter, enter the respiratory system when inhaled, causing respiratory and cardiovascular disease, reproductive and central nervous system dysfunction, and cancer. Although ozone in the stratosphere plays a protective role against ultraviolet radiation, it is harmful in high concentrations at ground level, affecting the respiratory and cardiovascular systems as well. In addition, nitric oxide, sulfur dioxide, volatile organic compounds (VOCs), dioxins, and polycyclic aromatic hydrocarbons (PAHs) are considered air pollutants harmful to humans. Carbon monoxide can even cause direct poisoning if inhaled in large quantities. Heavy metals such as lead, when ingested, can lead to direct poisoning or chronic intoxication, depending on the exposure. Diseases resulting from the aforementioned substances include mainly respiratory diseases such as chronic obstructive pulmonary disease (COPD), asthma, bronchiolitis, as well as lung cancer, cardiovascular diseases, central nervous system dysfunctions and skin diseases. Last but not least, climate change as a result of environmental pollution affects the geographic distribution of many infectious diseases, just like natural disasters. The only way to solve this problem is to raise public awareness, combined with an interdisciplinary approach of scientific experts; national and international organizations must respond to this threat and offer sustainable solutions.

There are two types of air pollutants:

Primary pollutants are those that directly contribute to air pollution. Sulfur dioxide emitted from factories is the main pollutant.

Secondary pollutants are formed as a result of mixing and reaction of primary pollutants. Smog is a secondary pollutant resulting from the mixing of smoke and fog.

Following are the main causes of air pollution.

1. Burning fossil fuels: Burning fossil fuels produces significant amounts of sulfur dioxide. Carbon monoxide pollution is caused by the incomplete combustion of fossil fuels;

2. Cars: Polluting gases emitted by vehicles such as jeeps, trucks, cars and buses. These are the main sources of greenhouse gases, as well as causes of disease in humans;

3. Agricultural activities: Ammonia is one of the most dangerous gases produced by agricultural activities. Insecticides, pesticides and fertilizers release hazardous chemicals into the atmosphere, polluting it;

4. Factories and industry: carbon monoxide, organic compounds, hydrocarbons and chemicals are mainly produced in factories and industries. They are released into the atmosphere, degrading its quality;

5. Household Sources: Toxic chemicals are released into the air from household cleaners and paints. The smell coming from freshly painted walls is the smell of chemicals present in paints. It not only pollutes the air, but also affects breathing;

6. Consequences of air pollution;

7. Diseases: As a result of air pollution, people have developed various respiratory and cardiovascular diseases. Lung cancer has become more common in recent decades. Children living near contaminated areas are more likely to develop pneumonia and asthma. Every year, many people die as a result of direct or indirect exposure to air pollution;

8. Global warming: the gaseous composition of the air is unbalanced as a result of greenhouse gas emissions. As a result, the Earth's temperature has risen. This increase in the

Earth's temperature is called global warming. As a result, the glaciers melted and sea levels rose. Many areas are completely submerged under water;

9. Acid rain: When fossil fuels are burned, harmful gases such as nitrogen oxides and sulfur oxides are released into the atmosphere. When water droplets combine with pollutants, they become acidic and fall out as acid rain, harming people, animals and plants;

10. Ozone depletion: The main cause of ozone depletion is the emission of chlorofluorocarbons, halons and hydrochlorofluorocarbons into the atmosphere. The depleting ozone layer does not protect people from the sun's harmful ultraviolet rays that cause skin diseases and vision problems;

11. Impact on Animals: Air pollutants settle on water bodies and harm aquatic life. Animals are also forced to leave their natural habitats due to pollution. This causes them to become vagrants and has also led to the extinction of a large number of animal species;

Water pollution:

The British poet W. H. Auden once remarked: "Thousands of people live without love, but none without water." Water quality is of vital importance to humanity as it is directly related to human well-being. When water becomes polluted, it has a direct or indirect negative effect on all forms of life that depend on it. The effects of water pollution can be felt for many years.

Contaminated water is the cause of many waterborne diseases and epidemics that are widespread in many countries.

Water pollution is defined as pollution of water bodies. Water pollution occurs when rivers, lakes, oceans, groundwater and aquifers are polluted by industrial and agricultural runoff.

Sources of water pollution: Water pollution is caused by urbanization, deforestation, industrial effluents, detergents and fertilizers, and agricultural effluents are all examples of pollution.

Consequences of water pollution:

The impact of water pollution is determined by the type and concentration of pollutants. The location of water bodies is also an important factor in determining pollution levels.

1. Water bodies located in close proximity to urban areas are heavily polluted. This is the result of industrial and commercial plants dumping garbage and pesticides;

2. Water pollution has a significant impact on aquatic life. This affects their metabolism and behavior, and causes disease and death. Dioxin is a chemical that causes a variety of problems, ranging from reproductive problems to uncontrolled cell growth and cancer. This chemical accumulates in seafood, poultry, and meats. Chemicals like this move through the food chain before entering the human body;

3. Water pollution can have a significant impact on the food chain. It breaks the food chain. Cadmium and lead are two toxic substances that enter the food chain through animals (fish when consumed by animals and humans) and can continue to be broken down at higher levels;

4. Pollution affects people, and faeces in water sources can cause diseases such as hepatitis. Poor drinking water treatment and contaminated water can always lead to an outbreak of infectious diseases such as cholera;

5. Due to water pollution, the ecosystem can be seriously damaged, changed and destructured;

Soil pollution:

Soil pollution is soil contamination with an abnormally high content of toxic substances.

This is a serious environmental problem as it poses numerous health risks. Exposure to soil containing high concentrations of benzene, for example, increases the risk of developing leukemia. Xenobiotics - substances that do not occur naturally in nature, but are

synthesized by humans, are among the most dangerous soil pollutants. Several xenobiotics have been identified as carcinogens.

The following types of pollutants have been found in contaminated soil:

1. Heavy metals: Heavy metals (such as lead and mercury in abnormally high concentrations) in soil can make them highly toxic to humans. These metals can come from a variety of sources, including mining, agriculture, e-waste (e-waste), and medical waste;

2. Polycyclic aromatic hydrocarbons: These are organic compounds containing only carbon and hydrogen atoms and a few aromatic rings in their chemical structure. Naphthalene, anthracene and phenalene are three examples. Exposure to polycyclic aromatic hydrocarbons has been associated with several types of cancer. These organic compounds are also associated with cardiovascular disease in humans. Soil pollution caused by PAHs can be associated with coke (coal) processing, vehicle emissions, cigarette smoke, and shale oil mining;

3. Industrial Waste: Dumping industrial waste into the soil can contaminate the soil.

Noise pollution:

Noise is an unpleasant and unwanted sound that causes discomfort to a person.

Sound loudness is measured in decibels (dB). The human ear can detect the weakest sound at 1 dB. As the population of civilizations grew, noise pollution became a problem. Among the main causes are vehicles, aircraft, industrial machines, loudspeakers, burglars and other similar devices. Other household appliances such as televisions, transistors, radios, etc. contribute to noise pollution when used at high volumes.

Types of noise pollution

1. Traffic noise: It mainly consists of road noise, which has increased in recent years as the number of vehicles has increased. Noise pollution causes deafness in the elderly, headaches, hypertension and other health problems.

2. Noise in the neighborhood: the sound of gadgets, household items, etc. Musical instruments, transistors, loudspeakers and other electronic devices are among the most common sources.

3. Industrial noise: This is a high intensity sound produced by heavy industrial machinery. Many studies have shown that industrial noise pollution reduces the ability to hear by about 20%.

Causes and sources of noise pollution:

1. Industrialization: Industrialization has led to an increase in noise pollution due to the use of heavy machinery such as generators, mills, and massive exhaust fans that produce unwanted noise.

2. Vehicles. The second reason for noise pollution is the increase in the number of vehicles on the roads.

3. Events: Loudspeakers are used to play music at weddings and social gatherings, creating unwanted noise in the area.

4. Construction sites: Noise pollution is exacerbated by mining and building construction.

Noise pollution can pose a risk to human health in the following ways:

1. Hypertension is a direct result of noise pollution and is caused by elevated blood levels over a long period of time;

2. Hearing loss occurs when human ears are constantly exposed to loud noises that exceed the range of sound that human ears can handle, causing damage to the eardrum and hearing loss;

3. Sleep disorders: Lack of sleep can cause fatigue and low energy levels during the day, which interferes with daily activities. Noise pollution disrupts sleep cycles, leading to irritation and an uncomfortable state of mind;

4. Cardiovascular problems. Heart problems such as blood pressure, stress, and cardiovascular disease can occur in a healthy person, and a person suffering from any of these conditions may experience a sudden increase in levels.

#### Nuclear pollution

The flow of energy in the form of electromagnetic waves, the flow of energetically charged particles (positively or negatively charged) from one space to another without touching another surface, is called radiation.

Radiation depends on frequency and wavelength. If the frequency is greater and the wavelength is shorter, then the energy will be greater or higher. If the radiation energy is high, then it will cause more harm to organisms.

#### What is radioactive contamination?

The rays produced by radioactive decay can ionize the atoms and molecules of the medium through which they pass and turn them into ions. Alpha ( $\alpha$ ), beta ( $\beta$ ) and gamma ( $\gamma$ ) are mainly responsible for the process of radioactivity, and these radiations are produced in a process called radioactive decay.

Alpha radiation contains charged alpha particles. Each alpha particle carries two units of positive charge and reacts strongly with the tissues of a living organism. Beta radiation is made up of energetic electrons. Each beta particle carries one unit of negative charge and interacts strongly with matter. Gamma rays are made up of high energy photons. Photons bring a strong electromagnetic interaction with matter.

There are two types of radiation - ionizing and non-ionizing radiation.

1. Ionizing radiation is associated with high energy, which means that they contain higher energy, such as short wavelength ultraviolet rays, x-rays and gamma rays. The charged rays produced by radioactive decay ionize both the atoms and molecules of the medium through which they pass and turn them into ions;

2. Non-ionizing radiation is associated with electromagnetic waves having a long wavelength, from ultraviolet rays to radio waves. These waves have enough energy to excite the atoms and molecules of the medium in which they move and cause them to oscillate faster. The sun's rays reaching the earth's surface are mainly non-ionizing radiation.

#### How does radioactive contamination occur?

Radioactive waste from human-made nuclear activities and military/defence-related nuclear weapons activities cause many problems. It is important to handle them carefully to protect the environment as well as living organisms for a better and safer future. They are in contact with various radiations. If the level of radioactive radiation exceeds a certain limit, it may harm living beings. This harmful effect of radiation emitted by radioactive elements is called radioactive contamination.

There are two sources of radioactive contamination - natural sources and anthropogenic sources.

#### Natural sources of radiation:

Natural sources are those that are exposed to or occur naturally in the environment from the earth or other external sources. The following are a few natural sources of radiation:

1. Natural minerals or radioactive minerals are found under the earth's crust. An example is uranium;

2. Cosmic rays are highly ionizing electromagnetic radiation. Their sources are outside the Earth, like stars;

3. Radioactive minerals, such as uranium, thorium, radium, potassium isotopes, are found in the lithosphere;

#### Anthropogenic sources of radiation:

Anthropogenic sources are those created or created by mistake or by human activities that result in human exposure to radioactive materials. The following are a few anthropogenic sources:

1. Medical x-ray;
2. Smoke detector;
3. Fireplace lights;
4. Nuclear medicine;
5. Nuclear power plant.

Radioactive contamination can be prevented in many ways. The main ways to stop radioactive contamination are:

1. The nuclear reactor must be stored in sealed containers to prevent leakage of radioactive material. In addition, a proper cooling system must be installed in the reactor so that there is no leakage through the coolant;
2. Nuclear tests should be banned or carried out under very strict circumstances so that they do not affect the environment and other people;
3. Radioactive waste must be properly handled so that it does not harm anyone or nature;
4. Industrial waste containing radioactive materials should be disposed of after they have been rendered harmless or in a place where they will cause less harm;
5. Proper monitoring should be carried out from time to time to be aware of any hazard in advance.

## 2 Research Methodology

The methods of this study are the analysis and processing of information obtained from the study of scientific articles, books and other works.

## 3 Results and Discussions

From this study it is clear that the question of how to protect the air from pollution should be at the head of the problems of scientists, politicians, statesmen and officials of all countries. In order not to kill itself, humanity must take urgent measures to prevent this pollution. Citizens of all countries are also obliged to take care of the cleanliness of the environment. It just seems like nothing really matters to us. There is hope that by working together we can all save the air from pollution, animals from extinction, and forests from deforestation.

## 4 Conclusions

In order not to kill itself, humanity must take urgent measures to prevent this pollution. Citizens of all countries are also obliged to take care of the cleanliness of the environment. It just seems like nothing really matters to us. There is hope that by working together we can all save the air from pollution, animals from extinction, and forests from deforestation.

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