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# Academia Open



*By Universitas Muhammadiyah Sidoarjo*

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## Types of Environmental Pollution, Its Harms, and Proposed Solutions for Mitigation

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### Abstract

**General Background:** Environmental pollution has become one of the most serious challenges facing humanity due to its adverse consequences for ecosystems, natural resources, and human health. **Specific Background:** Various forms of pollution, including air, water, soil, thermal, noise, oil, radioactive, and chemical pollution, have increased as a result of industrial development, population growth, urban expansion, and unsustainable human activities. **Knowledge Gap:** Although environmental pollution is widely recognized as a global problem, there remains a need for a comprehensive synthesis that explains the major pollution sources, their environmental and health consequences, and practical approaches for prevention and mitigation. **Aims:** This article aims to identify the principal types of environmental pollution, explain their causes and effects, and present strategies for reducing environmental degradation. **Results:** The study shows that pollution originates from multiple human-related activities such as industrial emissions, sewage disposal, pesticide use, oil spills, radioactive waste, excessive fertilizer application, and fossil fuel consumption. These pollutants negatively affect air quality, water resources, soil fertility, biodiversity, ecosystem stability, and human health. The article also highlights a range of preventive measures, including environmental legislation, pollution monitoring, waste treatment, recycling, renewable energy utilization, public awareness programs, and sustainable resource management. **Novelty:** The article integrates diverse forms of environmental pollution and their corresponding prevention strategies within a single comprehensive framework. **Implications:** The findings emphasize the importance of environmental awareness, responsible human behavior, and coordinated governmental and societal actions to preserve environmental quality and support sustainable development.

**Keywords:** Environmental Pollution, Air Pollution, Water Pollution, Soil Pollution, Sustainable Development

### Key Findings Highlights

Industrial and human activities are the primary contributors to ecosystem degradation.

Contaminants threaten biodiversity, natural resources, and public health.

Regulatory measures, education programs, and cleaner technologies support environmental protection.

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## Introduction

Human beings have long benefited from the resources and life-supporting systems provided by Earth. Since ancient times, humans have exploited the planet and developed various modes of living—constructing factories, mines, hospitals, mechanical equipment, oil transport systems, and diverse means of transportation such as trains and cars. These developments have introduced foreign substances into the ecosystem, disrupting its components and causing pollution across environmental elements. The consequences of pollution are vast and multifaceted, including health risks from the spread of epidemics and diseases, economic losses due to the decline in agricultural and livestock productivity, and atmospheric changes that affect climate patterns.

To mitigate these effects, individuals must adopt more conscious and responsible behaviors, utilizing safe and sustainable practices that protect forests, trees, seas, oceans, rivers, and the air we breathe. This includes safeguarding both living and non-living components of the environment and treating the issue of pollution with utmost seriousness. It is imperative to propose effective solutions that reduce pollution and preserve the Earth's air, water, and soil to ensure the continuity of human life.

## Definition of Pollution

Pollution is defined as the release of energy or substances into the environment in quantities that exceed natural thresholds, resulting in significant harm to both humans and the ecosystem. As humans utilize various forms of energy to build and develop cities and nations, they simultaneously introduce harmful materials that disrupt ecological balance, damage human and animal health, and cause undesirable changes in the physical, chemical, or biological properties of the environment. This disruption limits the environment's ability to sustain natural productivity (Saber, 2000, p. 8; Qaddan, 2012, p. 4; Gupta, 2014).

Pollution is not always visible, nor does it necessarily have a distinct smell or taste, yet it can render life unbearable for humans and other organisms. For example, noise generated by car engines and factory machinery is considered a form of pollution (Zaghloul, 2019, p. 1).

## Sources of pollution

Sources of pollution are divided into two types:

- **Natural pollution:** Natural pollution of the environment is attributed to natural phenomena and components of the environment that humans have no involvement in, such as the activity of volcanoes and the accompanying release of gases and fumes harmful to the environment, as well as earthquakes, hurricanes, floods, forest fires, and the accompanying dust flying, destruction and vandalism that harms both living organisms and the environment. (Hussain, 1997, 46)
- **Industrial pollution:** Environmental pollution occurs mostly due to the actions and activities of humans, the impact of industrial pollution on the environment increased after the Industrial Revolution, the excessive chemical manufacturing of plastics, the exploitation of fossil fuels, the use of pesticides, pharmaceutical compounds, food preservatives, and cosmetics in large quantities, and this adds gases and unfamiliar substances to the ecosystem, these toxic wastes enter the ecosystem slowly to destroy them when they reach the critical limit. (Saber, 2000, 8-9-10)

It should be noted that environmental pollution is not only caused by industrial and chemical substances, but it may also be pollution by one of the different forms of energy, such as pollution by sound, heat, light, or radiation. (Saber, 2000, 8-9-10)

## Causes of Environmental Pollution

Environmental pollution is due to one or more of the following factors:

**First: Smoke pollution resulting from the combustion of fossil fuels**, such as smoke emitted by cars, motorcycles, buses, and planes that burn fuel of various kinds, as the use of rapid transportation systems has become one of the necessities of modern societies, where people use modern and advanced means of transportation to travel quickly and travel large distances, as well as ships, trucks, and cargo planes are used to transport materials and goods. Most modes of transportation run on energy through the burning of fossil fuels (gasoline, diesel, and kerosene) and produce all kinds of Fuel is crude oil (petroleum), when oil is burned, it releases suspended gases and substances, the most prominent of which is carbon dioxide gas, which scientists consider one of the most important causes of global warming, as well as toxic carbon monoxide gas, which is colorless and odorless and works to prevent the supply of oxygen to the body in the process of breathing, as well as the emission of hydrocarbons and nitrogen oxides, which can react with sulfur oxides resulting from the combustion of coal coal, thus forming acids that dissolve in rainwater. These form what are known as acid rains that damage forests, poison animals in lakes and rivers, and slowly affect buildings and monuments (Shetty, et, al., 2023).

Due to the increase in the number of passengers, there are hundreds of planes flying in the sky daily for the purpose of trade, air travel and military purposes, as planes need huge amounts of energy that they get from burning fuel, which causes the emission of gases similar to gases emitted from car exhaust but in larger quantities, as is the case for ships, trains, and tankers, especially the huge ones designed to carry goods and products, for which the fuel used is often of low quality and cheap, so its combustion products are more Harmful and dangerous pollution to the environment compared to conventional fuels. (Qa'dan, 2012, 10-11-13)

**Second: Pollution by garbage, waste, and gases that are emitted and resulting from their burning** The types of garbage can be divided into three types: (Zaghloul, 2019, 269-273)

- Household garbage, as it consists of food residues, vegetable peels, fruits, cans, tins, plastics, and other household items that are out of use and need, and the reason for their accumulation is due to several factors: (Zaghloul, 2019, 269-273; Gao et al., 2023)
  1. Population growth.
  2. The development of the standard of living.
  3. Economic development.

Household waste is the result of the process of use, production, disposal and destiny to receive media after treatment, and it is the result of the use of the following materials: (Zaghloul, 2019, 269-273)

1. Paper is like newsprint, school paper, and paper bags.
2. Glass is like flasks and broken glass pieces.
3. Aluminum is like soft drink cans.
4. Plastics such as water bottles and plastic bags.
5. Other metals such as canneries, car bodies, and batteries.
6. Other materials such as used car tires, construction waste, furniture, and used clothes.

In addition, we find in household waste food residues, dirt and plastic containers, which makes it a fertile hotbed for various insects and rodents that transmit toxins and microbes, and a fertile environment to attract stray animals such as dogs and cats, which are often carriers of many diseases and affect human health in one way or another, in addition to their ugly appearance and the unpleasant smells or smoke they emit and fires burned by some individuals to get rid of them, causing air pollution by emitting toxic gases such as carbon oxide. It blocks oxygen access to the brain, heart, muscles, cancer-causing dioxins and sulfur oxides that later form acid rain. (Zaghloul, 2019, 269-273)

- Hospital waste, which consists of cotton, gauze mixed with blood, plastic injections, and expired medicine, in addition to the kitchen waste of these hospitals (Zaghloul, 2019, 269-273). These wastes are produced through detection, diagnosis, treatment, prevention, and vaccination, and studies indicate that more than 25% of these wastes are contagious and pose risks to the health of individuals if they are not properly managed, and these wastes are often not treated with the necessary attention in terms of disposal. (Abul Naga, 2012, 113-114)
- Factory waste, which is cartons, leathers, or some residues of operation (Zaghloul, 2019, 269-273). Or chemicals, papers, metals, dyes, pesticides, refining materials, rubber industry materials, and others, some of these wastes have high toxic effects on living organisms, some of them are the cause of corrosion of metals and building materials, and others are explosive or reactive (Abou El-Naga, 2012, 113-114). In general, the discharge of factory waste into the environment without treatment leads to the spread of damage that is difficult to address, which may be impossible to treat and get rid of. (Saber, 2000, 23)

**Third: Pollution with sewage water** resulting from kitchens and bathrooms in cities around the world, this water is polluted to the environment if it is not properly drained, and this water is characterized as turbid with a yellowish or dark color that contains organic substances such as food residues, urine, chemicals such as soaps, detergents, and hydrocarbon compounds, and contains types of bacteria that cause diseases for humans. (Zaghloul, 2019, 270-135-140-145-146; Wear et al. 2021) The amount of wastewater is proportional to the number of people and the quantities of water consumed in homes and other facilities, and the wastewater is collected in a special network in the city that transfers it to treatment and drainage facilities, while most rural areas lack these basic services, as it is often discharged in primitive ways, and in sewage treatment plants, the water is exposed to a set of technologies aimed at ridding it of pollutants so that it can be disposed of in safe ways that do not of course, the methods of treating these pollutants go through many levels, and the quality of the resulting water varies at each level, and usually most countries do not resort to the application of the system of treatment levels due to the high costs of this technology. (Saber, 2000, 17)

The risk of contamination with sewage increases if it is discharged into agricultural lands or the water of inland water bodies without purification, as it is still loaded with high concentrations of various pollutants, so pollution with sewage wastes works on the spread of many pathogens such as colon group bacteria, which is the main source of intestinal diseases, and Salmonella bacteria, which causes typhoid fever, intestinal cold, and diarrhea, and the damage is not limited to humans only, but extends to life in the water of rivers and lakes, and agricultural and food products, so it is essential to pay attention to the treatment, purification and reuse of wastewater to benefit from it and preserve the environment and the health of individuals. (Zaghloul, 2019, 270-135-140-145-146)

**Fourth: Contamination with agricultural pesticides** that humans use in agriculture to protect crops. There are approximately 80-100 thousand diseases that affect plants caused by various microbes, and there are about 1800 varieties of weeds that cause economic damage to agricultural production and about 100 thousand insects that attack and damage plants, and if these pests are not controlled, they will consume about a third of the world's agricultural production, hence man tried to search for substances that resist these pests and reduce or end their harmful effect on the product Agricultural.

The agricultural sector consumes about 68% of the total global production of pesticides, as well as they are used in animal care, hospital cleaning, wood preservatives, and in the control of household insects and disease-carrying insects, as the use of these pesticides has contributed to saving the lives of millions of people from diseases of Belarzia, malaria and others. It is certainly not possible to control pests in agricultural fields by adding pesticides directly to them, but a protective cover is sprayed over the crops to ensure that the pest is exposed to the action of the pesticide. Pests added to agricultural fields do not reach their goal, but spread in the agricultural environment, polluting surface and groundwater, soil and food, and harming wildlife and fisheries, and these effects increase when these pesticides are sprayed by aircraft, some of these pesticides can remain in the environment resistant to decomposition, or they may decompose in the agricultural environment into compounds that are more lethal than the parent compound, and most of the pesticides reach the human body through food, as their concentration can increase during their passage through the food chain. In some cases, their concentration may reach toxicity levels. (Saber, 2000, 39-40-41)

The World Health Organization (WHO) has estimated that one million cases of pesticide poisoning in the world each year can cause nerve damage, cancers, birth defects, liver damage and thyroid disease. (Qa'dan, 2012, 32)

Recently, humans have had to confront new types of agricultural pests that were not known before and in huge and diverse numbers, in addition to showing a rebellion against pesticides, and these insects did not give in to them as easily as their ancestors did, but rebuilt their genetic structure in the form of new pesticide-resistant mutations, which made humans modify and develop the composition of pesticides and make them more lethal to the nascent clans of pests and longer stay and stable in the environment. Naturally, the accumulation of pesticides in the environment has multiple risks, and eradicating these hazards is a fantasy and all we can do is reduce these harmful effects to some extent. (Qa'dan, 2012, 32)

**Fifth: Radiation pollution (hazardous waste)**, which is one of the most dangerous environmental pollutants that represent a threat to human life, living organisms and the quality of the environment, and the danger of these wastes lies in the fact that they are flammable and flammable, their ability to react, and contain toxic substances, in addition to the difficulty of their decomposition and their constant survival in the environment, as their negative effects on the environment can last for long periods of up to several thousand years.

One of the most dangerous radioactive wastes is the manufacture and reprocessing of fuel used in nuclear reactors (which is high-radiation waste), uranium grinding aggregates (low or medium radiation wastes), and waste generated by radiation and radioisotope applications in the medical, industrial, agricultural and other fields. (Saber, 2000, 29)

Nuclear reactors built on the banks of rivers, oceans and seas use large amounts of water for the purpose of cooling, and then that water is returned to water bodies loaded with some radiation, as well as dumping nuclear waste in them, which increases the pollution of these bodies with radiation, which has led to the elimination of nearly a quarter of aquatic life. Causes of radioactive pollution include the development of atomic weapons to obtain atomic bombs with greater destructive power, as well as accidents in atomic reactors used to generate electricity, conduct scientific experiments or other peaceful purposes, and the explosion of some atom-powered satellites, which releases radiation into the atmosphere, causing pollution and serious illnesses to humans and other living beings. (Hussain, 1997, 112-113)

## Sixth: Metal Pollution

The rapid development in various industrial fields is one of the most important causes of environmental pollution with toxic metals and metals, the accumulation of which leads to severe health damage to human health.

Both the manufacturing and mining industries contribute to the pollution of the environment with heavy metals, chemicals, and industrial detergents, and the mining industries related to the production of heavy metals such as mercury, lead, cadmium and zinc are considered one of the most dangerous causes of metal pollution due to their ability to accumulate in living tissues, especially mercury, which is the most prevalent, toxic and accumulated within the tissues of organisms, as well as its role in consuming a large amount of oxygen more than four times that consumed by sewage waste, which in turn leads to more killing of organisms live in the water in which these waste is dumped. (Zaghloul, 2019, 20-210)

Heavy metals damage bones and some internal organs of the human body and affect the nervous system or may cause cancer. (Qa'dan, 2012, 25)

## Seventh: Pollution by Agricultural Fertilizers

Humans use fertilizers and agricultural fertilizers and add them to agricultural soil with the aim of increasing agricultural production without committing to the needs of crops for these fertilizers, so the quantities that exceed the plant's need accumulate in the soil and then move to groundwater and surface water resources. (Zaghloul, 2019, 208-191)

When the use of fertilizers of all kinds (nitrogen, phosphate, potassium) that are not free of impurities, heavy elements such as lead, copper, cadmium, zinc, chromium, manganese, nickel, iron and mercury will accumulate in the soil due to their lack of solubility, causing unfortunate environmental damage. (Saber, 2000, 43-53-55) One of the most important elements that the plant needs is nitrogen, which is one of the most dangerous pollutants in the ecosystem because it later forms the nitrate ion, which is stored by some plants in their tissues in a high percentage, such as legumes, vegetables and fruits, which makes them lose their good taste and change their smell and color, and when nitrates are transported through the human food chain, they cause anemia in children and pharyngeal and bladder cancer in adults. (Zaghloul, 2019, 208-191)

## Eighth: Oil Pollution

After extracting crude oil from the ground, it goes through several different processes such as transportation, storage, discharge, and use, and these activities are often accompanied by unwanted leaks of some oil compounds into the components of the environment such as soil or water (Saber, 2000, 43-53-55), or this occurs in one of the accidents of transporting oil and extracting it from offshore wells (when separating water from oil), or damage to oil pipelines through wells, or due to the dumping of oil waste and residues on the land or water environment, or as a result of the deliberate destruction of wells. Land and offshore oil during wars. (Zaghloul, 2019, 208-191)

As it is known that crude oil (petroleum) consists of hydrocarbons that harm plant and animal organisms on land and water, as well as damage the environment and reduce its shelf life (Saber, 2000, 43-53-55), these hydrocarbons are deposited in the fat cells, liver and pancreas of fish, which are transmitted to humans by ingestion, causing carcinogens, as well as killing invertebrates, plankton, oysters, and coral reefs, and damaging the feathers of birds, which causes them to lose the ability to fly and then die. Due to climatic conditions, it also negatively affects trees when they reach them, causing soil erosion and lack of green cover. (Zaghloul, 2019, 208-191)

Oil pollution can be considered one of the serious problems due to its destructive effects on the elements of the environment, especially the aquatic environment, and the long time it takes to repair the damage caused by it, and in view of this, it is necessary to deal with this problem internationally by imposing laws that cannot be bypassed, intensifying the efforts of those working on monitoring and monitoring devices, in addition to applying modern methods in combating pollution in the event of its occurrence. (Hussain, 1997, 117)

## Ninth: Thermal Pollution

It refers to the increase in the temperature of the Earth's atmosphere as a result of the accumulated heat energy from human activities that harm the ecosystem. One of the most important factors for the occurrence of thermal pollution is industrial activities such as power generation facilities, oil industries, refineries, iron and steel industry, emissions from nuclear reactors, cement, steel, paper and other factories, as well as the burning of fossil fuels. (Al-Mufti, 154)

The surface of the earth is heated by the solar radiation reaching the earth, which is within the visible light area, and then the earth radiates its heat towards the atmosphere in the form of thermal rays, some gases (carbon dioxide, methane, chlorofluorocarbons, and nitrogen oxides) present in the Earth's atmosphere and close to the surface, which have recently increased as a result of incorrect human activities, absorb these heat rays and do not allow them to penetrate or escape to the higher layers of the atmosphere and convert them into heat so that it is difficult to return them to space This phenomenon is also known as the phenomenon of greenhouse or global warming. (Al-Khalidi, 2007)

Forest burning and deforestation is one of the sources that increase the percentage of carbon dioxide in the atmosphere and causes the warming of the earth's atmosphere, in order to benefit from these forests in the construction of resorts or turn them into pastures for raising livestock, which in turn emits methane gas, thus increasing its percentage in the atmosphere, which exacerbates the problem of the phenomenon of greenhouse gas and thermal pollution. (Shireen, 2020)

Thermal pollution is not limited to the phenomenon of greenhouse only, but also extends to the aquatic environment, as it is known that electric power plants need water for the purpose of cooling, so it is established near water resources, and this water involved in the cooling process acquires high temperatures when it comes out and is discharged into seawater or water streams, hot water harms living organisms because of the lack of dissolved oxygen in it if compared to cold water, which works to kill fish that depend on changes in seasonal temperatures in determining the place of mating, laying eggs and seasonal migration. (Qa'dan, 2012, 43)

## **Tenth: Noise Pollution (Noise)**

After the industrial development that the world is witnessing, the establishment and development of cities, and the expansion of buildings and their extension to villages and countryside, man has been able to make noise, and the sources of noise are many, the most important of which are means of transportation such as airplanes, airports, highway traffic, trains, the sounds of machines in factories, the sounds of loud music, and loudspeakers at weddings and events, and houses have also not been spared from the sounds of noise due to the presence of modern technical means such as the sounds of various electrical appliances, the sounds of cleaning tools and cooking utensils. (Zaghloul, 2019, 20-21-1)

The loudness of the sound in the unit of area is known as the intensity of the sound and is measured in the unit of decibel and db, and the intensity of the sound is 120-130 dB is the limit of pain in the ear, while the permissible limit in the workplace is the sound with a intensity of 85 dB. (Al-Khalidi, 2007)

Noise directly affects the ear and the level of hearing, and it also has psychological and neurological effects such as feeling anxious, nervous tension, loss of the ability to sleep peacefully, hearing impairment, as well as organic influences, and the inner ear is damaged when exposed to a noise level of more than 90 dB. The person exposed may develop total deafness, and as the intensity of the noise increases, organic symptoms begin to appear such as stress, low mental concentration, headache, desire to vomit, numbness, hearing loss, increased heart rate, muscle contraction, and increased pressure Inner of the skull. (Qa'dan, 2012, 43)

All of the factors mentioned together or separately have a negative impact on the elements of the environment (air, water and soil) causing a defect in them, which will have serious effects in the near future if this situation continues and man does not take any action or modification of his practices and ways of living, and the environmental damage is as follows: (Zaghloul, 2019, 20-21-1)

- 1: Air pollution
- 2: Water pollution
- 3: Soil Pollution

### **air pollution**

The atmospheric air that surrounds the earth is different from other planets is a condition for the existence of human life on this planet, and the air is composed of several gases that differ in their proportions from each other, namely nitrogen (75%), oxygen (23%), carbon dioxide (0.04%), and arcon (1.3%).

Atmospheric air is polluted when there is a difference in the proportions of its components or when it is mixed with various pollutants represented by fires, smoke emitted from the burning of fossil fuels, factory waste, and the accompanying release of sulfur oxides, nitrogen oxides, carbon monoxide, chlorofluorocarbons, and metals escalating with gases emitted from flues (arsenic, phosphorus, sulfur, mercury, lead, cadmium) known for their toxic effects. (Abul Naja, 2012, 75-76-78)

What makes air pollution an important environmental issue is that air pollution is rapidly spreading and is not limited to the source area, but extends to distant areas and cannot be controlled immediately after it spreads into the atmosphere, and is invisible in most cases. (Zaghloul, 2019, 225-263)

The effects of air pollution can be summarized to:

1. Harm to human health
2. Damage to animals
3. Damage to plants
- 4- Atmospheric damage.

Human health is affected when exposed to polluted air by the occurrence of severe irritation of the ear, nose and throat, impaired sense of smell, and asthma, and inhalation of radiocontaminated air leads to cancer or a genetic defect, and it can be said that air pollution increases the likelihood of diseases and mortality. (Al-Mufti, 139-140-141)

Air pollution also causes severe damage to plants, which in some cases may lead to their death or burning, as well as affecting their quality and quality. As for animals, they are also affected by air pollution by poisoning them when they eat polluted plants, which causes health damage or death. (Zaghloul, 2019, 225-263)

One of the most important damages that has received great attention in the current era is the impact of air pollution on the ozone layer envelope within the atmosphere because of its importance in absorbing ultraviolet rays and their penetration to the earth's surface, causing various

diseases for humans such as skin cancer and sunburn, in addition to its negative impact on plants and animals and causing it to change the climate of the earth's atmosphere, increase temperatures and fall acid rain. (Zaghloul, 2019, 264-267)

## Ways to combat air pollution

Some measures can be taken that have a role in reducing or reducing air pollution, which are as follows: (Zaghloul, 2019, 264-267) (Abou El-Naga, 2012, 100-101) (Shehata, 2007, 49-52)

1. Spreading awareness against smoking and preventing it in public places.
- 2- Criminalizing the burning of industrial and agricultural waste and plastic tools such as old car wheels within cities and near residential areas, with penalties in case of exceeding.
3. Establishing monitoring and monitoring units for the percentage of pollutants in the air and not licensing any industrial projects in which the percentage of pollution exceeds the maximum permissible limit.
- 4- Developing environmental awareness among individuals and urging citizens to cooperate with the concerned governmental and non-governmental authorities in order to keep the air clean and to introduce the risks of pollution and the harms of disturbance and noise, especially in residential areas and near hospitals and schools.
- 5- Treating the gases emitted from car exhausts by installing purification devices that reduce the emission of carbon monoxide and nitrogen oxides, with periodic inspection of all vehicles and trucks to control their engines and oblige them to install exhaust purification devices to reduce the impact of pollution caused by them.
- 6- Obliging factories and laboratories to use the technology of controlling the waste caused before emitting it and converting it into materials that are not harmful to the environment.
- 7- The necessity of enacting laws and legislation to determine the maximum concentrations of pollutants allowed to be present in the air.
- 8- Distributing new industries with high pollution rates according to geographical scientific maps and treating the causes of pollution.
9. Applying the laws of licensing, occupational safety, public hygiene, environmental safety, and environmental impact assessment of industrial, agricultural and other projects.
- 10- The necessity of using filters in factories with an increase in the height of the chimneys and providing them with special filters to trap dust and smoke and not allow the leakage of air pollutants into the surrounding environment.
- 11- Adopting new methods in urban and environmental planning for cities and villages, allocating industrial areas away from human gathering centers, and not permitting the establishment of factories in the middle of residential areas.
- 12- Expanding the public road networks to solve the problem of traffic jams and establishing special roads for the passage of trucks and not allowing them to pass through city centers.
- 13- Continuous monitoring of various air pollution cases, especially those that deplete the ozone layer, such as fumes, toxic gases, ultraviolet radiation, atmospheric plankton, minerals, wind, humidity, and temperature.
14. Carry out the transportation of garbage on a periodic and continuous basis, and properly dispose of it and treat it by classifying it according to the type of use it in new industries, in the generation of energy, and preventing its burning in the open air.
- 15- Reduce the use of perfumes, air conditioners and deodorants.
- 16- Popularizing the use of natural gas as a fuel for cars, trucks, and various vehicles due to its low impact on the environment, which is almost non-existent.
17. Refrain from using heating means based on charcoal and firewood in homes and closed places.
18. Establish laws and regulations for not dumping oil or chemical waste on ships, impose penalties and fines thereon, and treat pollution in all possible ways.
- 19- Warning against the wrong use of pesticides and agricultural pests, preventing their spraying on food or inhaling them, even in small quantities, and using natural alternatives to reduce the damage to the health of the individual and the environment.
- 20- Paying attention to green spaces, expanding parks, afforestation of cities and external roads, with the establishment of a green belt around factories, hospitals and schools because of their importance in absorbing some pollutants, negating the atmosphere, and reducing noise, as it adds an aesthetic to the medium.
- 21- Preventing the conduct of nuclear tests in cities and villages due to the possibility of their damage being transmitted through different countries.
22. Take firm measures in the areas of operation of nuclear reactors to avoid the occurrence of nuclear explosions or radiation leaks.

23. Caution and taking the necessary precautions when using isotopes of radioactive elements in the field of industry and medicine to avoid exposure to the risk of radioactive contamination.
- 24- Not relying on sulfur fuel sources and traditional energy sources (fossil fuels) and turning to clean energy sources such as solar and wind energy because they do not produce any pollutants that harm the environment.
- 25- Moving towards the use of modern means of transportation that run on electricity, such as vehicles, electric trains, and tram vehicles.
26. Imposing strict control over livestock stables and chicken pens, ensuring the conditions of safety and hygiene, and imposing penalties on violators.
- 27- Imposing laws that force factories to transfer a part of their profits to environmental improvement operations in their areas of existence.

## Water pollution

Water is the basis of life and the survival of beings on the surface of the earth, and it is one of the blessings that God has bestowed upon man and earthly life, the Almighty said in Surah Al-Anbiya, "And We made from water every living thing." Water covers about 70% of the earth's surface and is found on land in the form of surface water, represented by lakes, ponds, rivers, and streams, and inside the soil in the form of groundwater, in addition to being an important compound within the bodies of living organisms. (Qa'dan, 2012, 34)(Al-Suwaisi, 2-3)

Water plays an effective role in the digestion and absorption of nutrients, it is a safe medium for getting rid of toxins and wastes, and it is a good solvent of vitamins, salts, amino acids, and glucose, and it is important for energy production. (Zaghloul, 2019, 124-132)

Water pollution occurs as a result of various human activities and the practice of wrong methods against the environment, such as throwing human and animal waste, industrial and agricultural wastes into the water, or the runoff of industrial wastewater without control, or the wrong use of fertilizers and pesticides in agriculture and their access to water, oil, or any other harmful substances. (Qa'dan, 2012, 34)(Al-Suwaisi, 2-3) Water is also contaminated if it is mixed with foreign substances that may be solid, dissolved or suspended, dissolved organic or inorganic substances or microorganisms such as microbes, parasites, bacteria and algae, which makes the water unfit for drinking or domestic use and cannot be used for industrial and agricultural purposes. (Zaghloul, 2019, 124-132)

## Ways to combat water pollution

Work should be done to reduce the phenomenon of water pollution by taking many measures, the most important of which are: (Zaghloul, 2019, 213-219) (Shehata, 2007, 54-57)

1. Emphasizing the prevention of the leakage of wastewater into drinking water and natural water sources and the speed of its treatment before it reaches the soil and water bodies.
- 2- Work on recycling the waste and waste of factories by providing them with waste treatment units and not discharging them into the water before treating them, with penalties being issued to the violating factories.
- 3- Taking the necessary precautions for the operation of giant oil tankers and the speed of movement in the event of any oil spill.
- 4- Treating and disposing of wastes from scientific laboratories and chemical factories, fertilizers and batteries, and not dumping them in waterways, and setting strict penalties for violators.
5. Legislating and imposing laws to prevent the dumping of nuclear and radioactive wastes of some developed countries near the coasts of some developing countries and burying them in some specific deserts.
- 6- Taking appropriate measures to protect streams and water bodies through chemical and biological analysis of water through laboratories and centers to ensure water quality and non-pollution.
7. Preventing agricultural, industrial and construction projects that may harm the safety of groundwater as a safe source of drinking water.
- 8- Reducing air pollution with nitrogen oxides and sulfur, which are the components of acid rain, which poses a serious danger to water bodies.
9. Attention should be paid to the purification of drinking water, and strict control should be imposed on the purification plants and the analysis of samples from them during regular periods.
- 10- Relying on pipes made of plastic instead of those made of iron or lead to reduce pollution with these two elements.
- 11- Purifying drinking water using ozone gas or ultraviolet rays instead of chlorine gas because it is a toxic gas and reacts with organic compounds in drinking water.
- 12- Not to overuse fertilizers and pesticides.
13. Monitoring ships and pontoons and ensuring that they follow healthy methods in disposing of their solid and liquid wastes.
14. Making amendments to the laws related to the environment, especially in the industrial and agricultural fields, with the imposition of continuous control and the imposition of penalties that may reach the suspension of the violating industrial or agricultural activity.

- 15- Spreading health awareness among farmers on the need not to pollute the water streams used for agricultural lands with human and animal waste, not to defecate or urinate, and not to use this water as baths for cleaning animals, bathing, or washing agricultural tools and equipment, as well as not to throw solid or plastic materials or dead animals into them, especially fresh sewage.
- 16- Getting rid of algae and aquatic plants that pollute the water in the right ways.
- 17- Holding programs and seminars aimed at spreading health awareness among citizens and improving the behaviors of the community in general.

## **soil pollution**

The outer layer of the earth's crust is known as soil, which is the productive and life-supporting layer that provides humans with agricultural products, various pollutants reach the soil due to some incorrect practices and methods in agriculture and the need to use chemicals in the development of crops to meet the need of people in the world for food, and the residues of factories, farms and mines such as chemicals or oil spills and others spoil the land and lose its fertility, as these substances work to kill the living organisms in the soil such as bacteria and some Small insects responsible for the decomposition of organic matter and nitrogen fixation in the soil (Nölte, 1988)

Interest in soil pollution has increased in recent times due to the increase in population on a global scale and the decrease in the productivity of the land due to pollution, which has led to the emergence of some problems such as the low standard of living and the transmission of diseases to humans and animals in the event of contamination of agricultural products or may lead to the damage of crops and the occurrence of famines. (Qa'dan, 2012, 22) (Zaghloul, 2019, 24-25)

## **Ways to combat soil pollution**

The process of soil pollution can be reduced and conserved from various toxins if we follow the following activities: (Abou El-Naga, 2012, 146) (Shehata, 2007, 59-61)

- 1- Using natural fertilizers such as livestock manure instead of chemical fertilizers and limiting the use of fertilizers to the lands and soils that need it.
- 2- Disposal of toxic residues and pollutants using modern technical methods such as sound wave technology, which has been used to reduce the half-life of some pesticides in the soil.
- 3- Finding alternative ways to control worms and insects that harm the soil, such as raising some types of birds that work to turn the soil with their beak and rid it of harmful worms that have become extinct due to the use of pesticides and fertilizers.
- 4- Providing practical ways to get rid of the accumulation of salts in the soil by establishing a natural drainage system in agricultural lands so that salts do not accumulate on the roots of crops.
- 5- Adopting appropriate methods of irrigation when using water that contains high concentrations of salts.
- 6- Working to get rid of other types of pollution of all kinds in safe and sound ways, as it reaches agricultural soils and from there to plants that are eaten by humans and animals, so nuclear waste can be disposed of, for example, by burying it in cement or rock tanks in the ground or the seabed.
- 7- Establishing projects to stabilize sand dunes in desert areas by making windbreaks and intensifying vegetation cover.
- 8- Reducing the manifestations of bulldozing and erosion, especially around agricultural lands near deserts, by expanding the planting of trees and preventing the arrival of air currents loaded with dust and sand.
- 9- Preventing and criminalizing the felling of trees, preserving vegetation, avoiding intensive and unfair grazing that damages crops, and preventing the construction of roads over agricultural lands.
- 10- Turning to the use of so-called biological pesticides that do not leave harmful effects on the soil and living organisms.
- 11- Encouraging studies and researches that work to generate new ways to convert waste and waste into fuel and fertilizers that benefit the soil.
- 12- Educating citizens, especially farmers, on how to use pesticides in the proper ways and how to preserve agricultural lands from the risk of pollution.

## **Suggestions and recommendations for a pollution-free environment**

Since man is the main cause of the pollution problem, which makes the solutions to this problem in his hands, as the solution starts from the awareness of all individuals of the problem and knowing how to follow the appropriate methods to prevent the risk of pollution and go to safe options and materials that do not cause any harm to the environment while staying away from factors that cause problems for the environment, and some important points can be summarized that work to preserve the environment: (Abu Saleh, 2019) (AbdulmojoD, 2020) (Maryam, 2019)

- 1- Rationalizing the consumption of energy resources everywhere, whether at work, at home, etc., such as turning off appliances and disconnecting them when they are not needed, reducing lighting during the day and closing them in empty places, closing doors and windows when using

cooling and heating devices, while rationalizing the use of water.

- 2- Broadcasting public awareness programs on the seriousness of pollution and emphasizing the practice of hygienic methods that reduce its occurrence.
- 3- Reducing the use of single-use plastics because of its great damage to the environment, which exceeds decades.
- 4- Using clean energy sources such as solar, wind and tidal energy instead of fossil fuel sources.
- 5- Establishing facilities and industries away from residential areas.
- 6- Throw waste in the place designated for it and not throw it in water bodies or public roads.
- 7- Recycling of waste and various resources in the environment.
- 8- Intensifying the planting of trees and green spaces, especially within cities.
- 9- Paying attention to agricultural lands and not investing them in various projects.
- 10- Producing organic fertilizer from household waste and biodegradable instead of using chemical fertilizers.
- 11- Supporting laws that deter pollution and protect the environment and imposing appropriate penalties for those who practice behaviors harmful to the environment.
- 12- Inspect the cars periodically, promising to recycle the engine oils and ensure that the fuel does not leak from them, as well as make sure that the gas caps are securely locked.
- 13- Reduce the number of times you drive and do all tasks at the same time, or use public transportation or bicycle.
- 14- Use safe and environmentally friendly dyes and cleaning materials.
- 15- Placing sound insulators on the walls of houses to reduce noise.

## Conclusion

God created man and made all that is in the universe subservient to him, including the sky, the earth, the sun, the mountains, the seas, the oceans, the trees, the air, and all the blessings it contains, both outward and inward, and the healthy and good environment that meets all its requirements in a perfect balance, and nothing from within the system affects the environmental imbalance except for one element, which is man, as he was extravagant in dealing with this wealth and did not take into account the rights of successive generations to keep the environment clean as God created it.

After man realized what he had done to the environment, which could lead to a catastrophe with unfortunate consequences in the future, his attempts and efforts to reduce pollution and its dangers began in order to preserve the environment in which he lives and not be the cause of his annihilation, and to work to repair this land according to normal behaviors before it is too late.

In conclusion, the problem of pollution can be considered one of the biggest dangers facing human beings in the long term, as it is incumbent upon human beings of all affiliations and places of existence in this world to find appropriate solutions to reduce the phenomenon of environmental pollution and to work hard with all possible means to apply the correct solutions to reduce various types of pollution in order to maintain the stability of the ecosystem and thus the stability of life in this world.

## References

1. Mohamed Saber, Human and Environmental Pollution. General Directorate of Awareness and Dissemination, 2000.
2. M. A. Qa'dan, Green Life Pollution, 1st Arabic ed. Riyadh, Saudi Arabia: Obeikan Publishing, 2016.
3. R. A. F. Zaghoul, Environmental Pollution Problems and Solutions. Benha, Egypt: Faculty of Agriculture, Benha University, 2019.
4. A. A. Hussain, Environment Problems and Solutions. Amman, Jordan: Al-Yazouri Scientific House for Publishing and Distribution, 1997.
5. H. Abou El-Naga, Risks of Environmental Pollution. Cairo, Egypt: Academic Library, 2012.
6. M. K. Al-Mufti, Renewable Energies and Environmental Issues. Paris, France: University of Paris and United Nations Expert on Regional Planning.
7. R. Al-Khalidi, Fundamentals of Ecology Air Pollution. Gaza, Palestine: Islamic University of Gaza, Faculty of Science, Department of Environment and Earth Sciences, 2007.
8. S. Ahmed, "Causes of Global Warming," 2020.
9. H. A. Shehata, Environment Pollution and Confrontation. 2007.
10. I. Al-Suwaisi, Water Pollution and the Environment.
11. R. Abu Saleh, "How to Reduce Environmental Pollution," 2019.
12. M. Abdel Mawoud, "Causes of Environmental Pollution and Its Solutions," 2020.
13. M. Qasem, "How to Preserve the Environment from Pollution," 2019.
14. N. Gupta, "Environmental Awareness Policies and Its Effectiveness: A Study of Ludhiana City (India)," Environment

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and Urbanization ASIA, vol. 5, no. 1, pp. 147–160, 2014.

15. S. S. Shetty, D. Deepthi, S. Harshitha, S. Sonkusare, P. B. Naik, and H. Madhyastha, “Environmental Pollutants and Their Effects on Human Health,” *Heliyon*, vol. 9, no. 9, 2023.
16. S. Gao, L. Meng, X. Ge, Y. Li, Y. Yang, Y. Duan, Q. Fu, S. Zhang, X. Yang, W. Fei, and Z. Jiao, “Role of Garbage Classification in Air Pollution Improvement of a Municipal Solid Waste Disposal Base,” *Journal of Cleaner Production*, vol. 423, p. 138737, 2023.
17. S. L. Wear, V. Acuña, R. McDonald, and C. Font, “Sewage Pollution, Declining Ecosystem Health, and Cross-Sector Collaboration,” *Biological Conservation*, vol. 255, p. 109010, 2021.
18. J. Nölte, “Pollution Source Analysis of River Water and Sewage Sludge,” *Environmental Technology*, vol. 9, no. 8, pp. 857–868, 1988.