

# Research on the Impact of Urban Environmental Pollution and Countermeasures

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**Abstract.** The process of economic building and growth, as well as human production and living, results in a significant amount of pollutants and trash generation as urban populations become denser. Urban environments can only self-purify so much before being severely polluted and degraded, which has a negative impact on both human health and urban landscape. The contradictions between population, resources, environment, and economic development have become more pronounced with the speeding up of industrialization, and the quality of the urban environment has also shown a trend of gradual deterioration, which severely limits the sustainable growth of cities. Due to this, the issue of urban environmental pollution has drawn increasing attention, and a growing number of urban environmental pollution management methods have been implemented. In this context, this paper briefly introduces the types of urban environmental pollution such as air pollution, water pollution, etc., and mainly introduces the impact of various pollutions, among which the impact on human health is the most serious. And pointed out various measures to control pollution. Finally, this paper emphasizes that the current methods of controlling urban environmental pollution are not perfect, and more experimental research is needed to obtain more efficient treatment methods, so that urban environmental pollution can be controlled more efficiently in the future.

**Keywords:** Urban environmental pollution, water pollution, Pb pollution, noise pollution, impact.

## 1. Introduction

The urban ecological environment has become unbalanced as a result of people's frequent disregard for environmental protection during China's current significant period of rapid social and economic development. This has a significant negative impact on people's health and has caused environmental governance issues to gradually come to the attention of all spheres of society. The national sewage discharge has surpassed 70 billion tons in recent years, industrial wastewater has reached about 20 billion tons, and urban domestic sewage discharge has been over 50 billion tons. In addition, with the continuous acceleration of urban construction and development, the environmental pollution problem caused by domestic waste is also becoming increasingly serious, according to statistics, 244 large and medium-sized cities generated 168.161 million tons of domestic waste in 2015. Therefore, the problem of urban environmental pollution is imminent.

In recent years, to be able to guard against and manage urban environmental pollution, the government of China has successively issued a number of legal measures. In 1983, the Chinese government announced that protection of environment was an important national policy, and advanced the strategic idea of incorporating financial, social, and environmental gains into the process of economic growth. Agenda 21 was created by the Chinese government in 1994, a guide for future China's environmental protection work, which stated that "It is now necessary to find a sustainable development path that balances population, economy, society, environment, and resources in order to meet the needs of the present generation without endangering the ability to meet the needs of future generations. The traditional development model of pursuing economic quantitative growth and "pollution before treatment" through high consumption is no longer suitable for the requirements of present and future development". In fact, large as the national and society, as small as the individual, can make corresponding measures to prevent and control environmental pollution in cities.

This paper briefly introduces the types of urban environmental pollution, mainly introduces the impact of various pollutions, and points out various measures to deal with pollution.

## **2. Urban Environmental Pollution**

Urban environmental pollution is a phenomenon in which people directly or indirectly release substances or energy into the environment that is greater than the environment's own purification capacity. Urban environmental pollution reduces the quality of the environment and adversely affects the survival and development of people, ecosystems and property. These include air pollution, photochemical pollution, water pollution, noise pollution, etc.

### **2.1. Air Pollution**

The occurrence of specific compounds entering the atmosphere due to human activities or natural processes, reaching sufficient concentrations, and remaining there for a long time. This phenomenon endangers the comfort, health, and welfare of humans as well as the environment is known as air pollution, also known as atmospheric pollution. That is, there are one or more pollutants in the air, and depending on their quantity, type, and duration, they could endanger human life, the lives of plants and animals, cause property damage, or even make it uncomfortable to live in, as in the case of odors.

### **2.2. Photochemical Pollution**

Automobile and industrial exhaust emissions are the principal contributors to photochemical smog. Olefin hydrocarbons and nitrogen dioxide from exhaust are released into the atmosphere and absorb solar energy when exposed to high UV radiation. The molecules of these chemicals become unstable after absorbing solar energy, and the original chemical chains are broken to create new substances. The outcome of this chemical reaction, known as a photochemical reaction, is a smoke that is extremely poisonous.

### **2.3. Water Pollution**

Water pollution is a phenomenon that occurs when a substance changes a water body's chemical, physical, biological, or radioactive pollution characteristics. This can affect how effectively water is used, endanger human health, or have negative effects on the environment's ecology, and resulting in a decline in water quality.

Domestic wastewater and industrial wastewater are the two types of water pollution sources. Domestic sewage is wastewater which is discharged from people's daily activities, primarily from toilets in homes, institutions, schools, hospitals, retail establishments, and public spaces (such as protein, carbohydrate, fat, urea, ammonia nitrogen, etc.) and a significant number of harmful microorganisms (such as parasite eggs and intestine infectious viruses) make up the majority of the pollutants found in domestic sewage. sewage contains organic material that is exceedingly unstable, quickly decomposes, and smells bad. Sewage also contains nutrient- rich organic waste that encourages the growth of numerous bacteria and pathogens, which can spread infectious diseases. Industrial wastewater refers to the wastewater and waste liquid generated in the industrial production process and contains industrial production materials, intermediate products, by-products, and pollutants produced in the production process that are lost with water. It also includes production wastewater, production sewage, and cooling water. Industrial wastewater comes in a wide variety and has a complicated makeup. For instance, the industrial wastewater from the production of electrolytic salt contains mercury, the wastewater from heavy metal smelting contains Pb, cadmium (Cd), and other metals, the wastewater from electroplating contains cyanide and other heavy metals, the wastewater from petroleum refining contains phenol, and the wastewater from pesticide manufacturing contains a variety of pesticides. The pollution loads of industrial wastewater pollutants and other standard in NeiJiang City in 2020 is shown Table 1.

**Table 1.** Industrial wastewater pollutants and other standard pollution load in NeiJiang City in 2020 [1]

Pollutant name	Equal standard pollution load	Equal standard pollution load ratio (%)	Cumulative percentage (%)
Ammonia nitrogen	59.489	34.44%	34.44%
Chemical oxygen demand	53.472	30.96%	65.40%
Total phosphorus	49.255	28.51%	93.91%
Petroleum	10.520	6.09%	100%

## 2.4. Noise Pollution

Noise pollution is the term used to describe the sound made when an emitter vibrates erratically. An object's vibration produces sound, which moves as waves across a particular medium (such as solids, liquids, or gases) as it vibrates. Noise pollution is a term used to describe artificial noise.

## 3. The Impact of Urban Environmental Pollution

Both the direct and indirect effects of urban environmental pollution on ecosystems, such as desertification and forest loss, would be detrimental to both ecosystems and human society. Sometimes the adverse indirect environmental impact is more detrimental than the immediate direct environmental impact and more difficult to undo.

### 3.1. Impacts of Lead (Pb) Pollution on Soil and Plants

In addition to changing the soil's physical and chemical characteristics, poisoning soil organisms and plants, heavy metals are one of the polluting substances that are difficult to leach and degrade after entering the soil environment. These pollutants can also be absorbed by plants, enriched in various tissues and organs, and then endanger the health of human through the food chain [2].

#### 3.1.1 Impacts of Pb pollution on soil

Pb is a crucial component of soil environmental monitoring, and it can come from a variety of sources, including soil parent material, surface runoff, the discharge of Pb-Zn ore minerals, industrial wastewater, household trash, solid waste, and vehicle exhaust emissions during production. According to the study, the primary causes of Pb contamination in urban soil are the combustion or wear of fuel, engines, tires, lubricating oil, industrial waste, and household trash [3]. On the one hand, the introduction of Pb into the soil environment may have a significant impact on the structure, diversity, and behavior of soil organisms (microorganisms, animals, and plant communities), which in turn may have an impact on the stability and function of ecosystems. According to studies, while Pb pollution at high concentrations has inhibitory effects and can raise microbial basal respiration and lower microbial biomass, Pb contamination at low concentrations benefits soil microorganisms. Additionally, a secondary succession tendency of community succession is the reduction in community diversity and protozoan species due to soil Pb poisoning [4].

#### 3.1.2 Impacts of Pb pollution on plant growth

Through their roots, plants take in and fix heavy metal ions in the soil. It is challenging to move the Pb absorbed by plant roots to the surface when the soil is polluted with Pb due to the absorption, passivation, or precipitation of Pb by plants, and the majority of the Pb (>50%) remains in the root system [5]. As a result, on the one hand, the action of Pb on plants mostly consists of inhibiting or abnormally promoting the activity of particular enzymes, so disrupting physiological processes like photosynthesis and respiration and making it difficult for plants to absorb nutrients. Pb, on the other hand, can lower the amount of water that plants absorb, increase the amount of oxygen they need, impede plant growth, even result in plant death, and eventually put the environment in risk.

### 3.1.3 Impacts of Pb pollution on plant photosynthesis

By interfering with electron transport during photosynthesis and damaging photosynthetic systems including chloroplasts and chlorophyll, Pb pollution has an adverse effect on plant photosynthesis [6].

## 3.2. Impacts of Urban Pollution on Human Health

### 3.2.1 Impact of air pollution

The harm to the immune system, respiratory system, and other systems that can result in cardiovascular illnesses and are also the primary causes of asthma are the health repercussions of air pollution. According to statistics from 11 Canadian cities, 8% of deaths are caused by air pollution [7].

### 3.2.2 Impact of noise pollution

Noise is a term used to describe sounds that, in people's subjective opinions, are unnecessary, annoying, or that pollute the environment by emitting chemicals. It is currently recognized as a regulatory object under environmental protection efforts, with noise emission norms and environmental acceptable levels specified. The term "environmental noise pollution" describes noise levels in the environment that are too high for most individuals to tolerate. Although the range of noise pollution is far wider than that of chemical pollutants, there is no remnant or accumulation when the noise source ceases making noise. The main sources of noise in the environment are the noises produced by trains, cars, planes, and other types of transportation, the noise produced by various industrial and mining operations, the noise produced by construction sites, and the noise produced by various social activities. The majority of urban noise pollution comes from these sources, with transportation noise making up around 70% of urban noise. Noise stimulation that is repetitive, prolonged, and excessive can harm the central nervous system of humans and result in aberrant conditioned reflexes, cerebrovascular dysfunction, changes in brain potential, and neurasthenic symptoms as headache, vertigo, and tinnitus. Rapid heartbeat, irregular beating, elevated blood pressure, decreased cardiac output, myocardial ischemia, hypoxia, and severe cases might result in myocardial infarction are all signs that the cardiovascular system is involved. Chromosome mutations, teratogenicity, and disturbances in the sexual cycle can all result from an endocrine reproductive system issue [8]. Additionally, long-term exposure to noise can cause hearing loss and possibly deafness. People's sleep and rest will be impacted by noise levels above 50dB; Long-term employment or residing in a place with noise levels exceeding 90 dB will adversely impair hearing and increase the risk of developing other ailments [9]. Table 2 shows the 4a equivalent continuous sound level Leq/dB in each township street in Pudong, Shanghai.

**Table 2.** 4a equivalent continuous sound level Leq/dB for each township street [10]

Township streets	minimum	maximum	rangements	average value
Jinqiao Town	52.41	60.41	8.00	56.34
Huamu Town	42.29	58.15	15.86	52.69
Beicai Town	46.35	70.55	24.20	58.58
Sanlin Town	45.18	72.71	27.53	59.88
Tangqiao Street	54.84	59.22	4.38	57.08
South Pier Street	55.39	62.27	6.88	58.29
Dongming Street	45.51	64.49	18.98	54.20

## 3.3. Impacts of Urban Pollution on Economy

According to the research of relevant experts, a country's annual economic losses caused by environmental pollution and ecological damage account for about 6% of GDP in one year.

Urban environmental pollution may lead to problems such as depletion of natural resources and loss of biodiversity, which in turn affects the distortion of industrial structure. In some regions and industries, there may be a pattern of economic activity that has long relied on environmental

destruction and pollution. These industries can be unsustainable and unsustainable, negatively impacting the local economy. On the other hand, urban environmental pollution might necessitate more money to address related problems, like cleaning up water, air, and soil pollution and enforcing environmental protection laws, which might hurt other areas of economic development. There may be some financial challenges if the expense of addressing environmental issues exceeds the budgets of enterprises and local governments.

## **4. Measures to the Urban Environmental Pollution**

### **4.1. Government**

Government agencies should improve environmental pollution monitoring and management, environmental protection legislation enforcement, and the ability of laws and regulations to deter environmental pollution. All those accountable for harming the environment and ecosystem will be brought to justice by the environmental protection department. In line with the requirements for enhancing urban environmental quality, the state shall develop and put into effect management mechanisms for the control of the total quantity of pollutants, and shall determine the amount of pollutant discharge from pollutant discharging units [7]. As soon as possible, equip major pollutant discharge companies with automatic continuous testing equipment. Daily environmental oversight and verification should also be strengthened. Implement criteria for significant industries' pollution emissions, conduct research to create guidelines for the management of poisonous and dangerous substances.

### **4.2. Enterprise**

Based on the total amount of pollution discharged that has been authorized by the government's environmental protection department, the technical level of the enterprise's production equipment, and the processing capacity of the environmental protection device, businesses should reasonably determine their own environmental protection index targets. They should also decompose the environmental protection objectives layer by layer and sign the environmental protection responsibility letter step by step. To effectively implement environmental responsibility, the environmental responsibility letter should be indexed, assessed each month, and the results of the assessment should be tied to the pay and bonuses of the employees and the person in charge of the assessment unit.

The actual operation effect of pollution control devices is particularly challenging because many of them lack a ledger, operating guidelines, operation records, and special management. The only way pollution control facilities, like production equipment, can produce realistic outcomes is by setting up accounts, operating procedures, and operation records, as well as by designating a specific person to be in charge of operation management.

### **4.3. Person**

Because water is essential to life, protecting it is everyone's duty as a citizen. In order to avoid wasting our few water resources, we should make it a habit to save water in our daily life. Reduce the usage of plastic bags and try to use biodegradable plastic bags while making purchases at the supermarket. Plastic bags are particularly destructive to environmental pollution, therefore try to bring your own shopping bags wherever possible. In order to reduce car exhaust emissions, go as far away as possible to take the bus, get some exercise, and drive less frequently. Car exhaust is one of the major causes of environmental pollution, and almost every household now owns a private vehicle. These emissions have a significant impact on the air quality in which we live on a daily basis.

## 5. Conclusion

This study found that urban environmental pollution will cause direct damage and impact on the ecological system, and also cause indirect harm to the ecological system and human society, and the harm of this indirect environmental effect is sometimes greater than the direct harm caused at that time, and it is more difficult to eliminate. Of course, the most direct and easily perceived consequence of environmental pollution is to reduce the quality of the human environment and affect plant growth, human health and economic development. Therefore, we must pay special attention to the governance of urban environmental pollution. In light of the current situation of urban development, we must actively summarize and learn from foreign advanced environmental pollution governance concepts, accumulate valuable experience, and continuously strengthen environmental protection against air pollution, photochemical pollution, water pollution, and air pollution. Protect and supervise, increase investment in environmental governance, and while maintaining rapid economic growth, solve environmental pollution problems step by step and take multiple measures to achieve sustainable development. Of course, the current method of controlling urban environmental pollution is not very effective and perfect. As for more effective methods of preventing and controlling urban pollution, scientists still need to conduct more experimental research to obtain. It is believed that urban environmental pollution will be more effectively controlled in the near future.

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