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The Impact of Urban Environment on the Atmosphere

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Abstract
Atmospheric pollution is one of the most serious environmental problems of modern times. To prevent it, it is necessary to reduce industrial emissions, switch to environmentally friendly energy sources, and apply advanced air purification technologies. Environmental sustainability can be achieved only with the participation of every person: it is essential to plant trees, rationally use transport, reduce waste, and promote recycling. Maintaining clean air plays a vital role not only for human health but also for the well-being of future generations.

Keywords: human, atmosphere, ecology, gases, nature, carbon dioxide, nitrogen oxides, hydrocarbons, dust.

Introduction
This topic is one of the most pressing problems today. The atmosphere is not only a source of oxygen for living organisms, but also a protective shell of the Earth. The atmosphere has several protective functions.

1. The atmosphere, by exerting pressure on the Earth, protects existing objects from flying away.

2. The ozone layer in the atmosphere traps 5% of the ultraviolet rays of the sun falling on the Earth, preventing living organisms on Earth from burning.

3. The presence of oxygen in the atmosphere causes meteorites flying towards the Earth to burn, protecting the Earth from strong impacts.

4. The presence of the atmosphere prevents the solar energy collected on the Earth from dispersing into open space. If there were no atmosphere, the Earth would be hot up to 1000 degrees during the day and cold up to 1000 degrees at night. No living organism can adapt to such temperature changes.

Urban ecology is the study of the interaction between human activity, industry, transport, population density and the balance of nature in cities. It is these factors that have a strong impact on the atmosphere.

Factors affecting the urban atmosphere

1. Vehicles: Cars, buses and trucks emit carbon dioxide (CO_2), nitrogen oxides (NOx) and particulate matter (PM2.5). These substances **pollute the air** and negatively affect human health.

2. Industrial enterprises: Smoke from factories and factories emit sulfur dioxide (SO_2), methane (CH_4), and other harmful gases into the air. These gases increase the greenhouse effect and cause acid rain.

3. Households and heating systems: Air is polluted by burning coal, gas or other fuels. Smoke is especially high in winter.

4. Construction: Construction sites release particles such as dust, lime, cement into the air.

- This reduces air quality and increases the risk of respiratory diseases.

Main pollutants in the atmosphere: Substance

- CO_2 (carbon dioxide)
- NOx (nitrogen oxides)
- PM2.5 / PM10
- SO_2 (sulfur dioxide)
- CH_4 (methane).

Main pollutants in the atmosphere: Source

-Transport, industry
- Cars, power plants
- Coal combustion
- Acid rain
- Dust and smoke
- Waste, industry Greenhouse effect.

Main pollutants in the atmosphere: Impact

- Global warming |
- Respiratory problems
- Lung diseases, allergies |

Dangerous consequences of urban ecology for the atmosphere. Climate change - greenhouse gases increase, global temperatures increase. Health problems - allergies, asthma, heart and lung diseases are increasing among people. Acid rain - damages plants and water resources. Smog (hazy clouds) reduces visibility, people feel a lack of air.

The impact of anthropogenic factors on the atmosphere remains one of the main environmental issues of the 21st century. The atmosphere functions not only as a source of oxygen and climate regulator but also as a protective shell of the Earth, performing several essential roles — maintaining pressure, retaining heat, filtering ultraviolet radiation, and burning meteoroids in the upper layers.

Modern cities — with their industry, transport, and dense population — significantly affect the chemical composition of the air. This leads to atmospheric degradation, climate change, and the spread of diseases among urban populations.

Purpose and Objectives

Purpose: to scientifically justify the impact of the urban environment on the atmosphere and to develop practical recommendations for reducing air pollution.

Objectives:

1. Identify the main sources of anthropogenic air pollution.
2. Assess the effects of urban factors on air quality and public health.
3. Propose strategies for improving atmospheric conditions in cities.

Methodology

The study applies analytical, comparative, and empirical methods. It includes environmental data analysis, examination of atmospheric physicochemical processes, and assessment of factors affecting urban air pollution.

Results and Discussion

Main sources of atmospheric pollution

1. Transport — emissions of CO_2, NO_x, and PM2.5 particles degrade air quality and cause respiratory diseases.
2. Industrial enterprises — release sulfur dioxide (SO_2), methane (CH_4), and hydrocarbons, which intensify the greenhouse effect and lead to acid rain.
3. Household heating systems — the burning of coal and gas during winter increases smog formation.
4. Construction activities — dust, lime, and cement particles worsen air quality and irritate the respiratory system.

Major pollutants and their impact

Substance	Source	Effect
CO_2	Transport, industry	Global warming
NO_x	Vehicles, power plants	Respiratory diseases
SO_2	Coal and fuel combustion	Acid rain
CH_4	Industrial and domestic waste	Greenhouse effect
PM2.5 / PM10	Dust, soot, smoke	Allergies, asthma, lung diseases

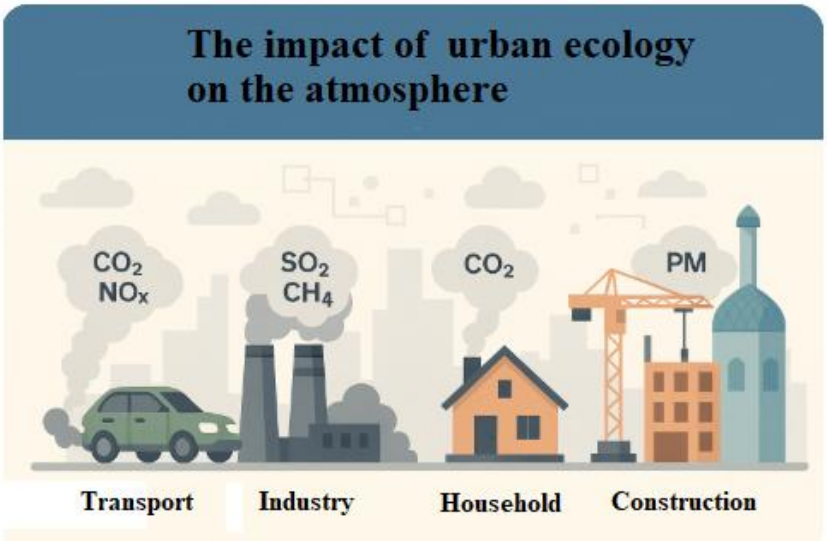
Consequences of atmospheric pollution

Increased greenhouse gases contribute to climate change and global temperature rise. Polluted air lowers photosynthetic activity, reduces agricultural yields, and decreases the lifespan of vegetation.

Research shows that elm trees living 300–400 years in the wild survive only 120–200 years in parks and 40–50 years near roads

Solutions and Recommendations

- Transition to electric vehicles and development of public transport.
- Greening urban spaces and creating “green belts” around cities.
- Implementation of energy-efficient technologies in industry and housing.
- Installation of air filtration systems at industrial facilities.
- Promotion of environmental awareness and education among citizens



Conclusion

Atmospheric air is a gaseous layer surrounding the Earth - one of the natural factors. Atmospheric air consists of several gases, the main of which are nitrogen, oxygen, carbon dioxide, hydrogen, argon and other inert gases. According to data, the air layer above the Earth extends upwards to 1500 km. This is, of course, a conditional limit. Atmospheric air transmits and stores the sun's heat. Clouds form in the atmosphere, from which rain and snow are formed, and wind is generated. In turn, the atmosphere provides moisture to the Earth, transmits sound, and is a source of life-giving oxygen. It is a reservoir space that receives gases formed during metabolism, affects heat exchange and other physiological processes in the animal world and the human body. Therefore, physical, chemical and biological changes occurring in the atmosphere can have an impact on living organisms, including human health.

Each gas in the atmospheric air has its own physical and chemical properties, which are distinguished by their specific place in nature.

The atmospheric air, which gives life to humanity and all living things, is currently polluted mainly by two sources: natural factors and anthropogenic sources, the products of human activity.

Anthropogenic pollution occurs mainly as a result of the release of harmful substances into the air basin from industrial enterprises, automobile, air, railway and water transport, as well as from the use of various fuels.

In an era of advanced science and technology, atmospheric air pollution is becoming increasingly severe. While permanent (stationary) pollutants of atmospheric air include industrial enterprises, utilities and power generation facilities, mobile pollutants include automobiles, railways and air transport.

During crushing, sorting, burning and other types of processing of ores, about 500 mg of dust is released per 1 m3 of air.

Atmospheric pollution refers to the change in its physical and chemical properties as a result of the addition of toxic compounds to the air. Anthropogenic pollution occurs mainly through the release into the open air of waste from road and air transport, railway and water transport (40%), waste from the energy industry (20%), waste from industrial enterprises (14%), agricultural and household waste (26%).

In recent years, as a result of increased human influence, a change in the gas balance has been observed. It has been determined that a change in the constant amount of gases in the atmosphere has negative consequences for our planet.

Physical, chemical and biological changes occurring in the atmosphere have their own effects on living organisms. As the great thinker Abu Ali Ibn Sina said, “If there were no dust and smoke in the air, a person would live a thousand years.”

Severe air pollution has a negative impact on human health, as well as on all living things. A person breathes an average of 25 kg of air per day. Harmful dust, soot, and harmful gases in the air accumulate in the human body. As a result, it causes an increase in diseases such as skin and eye diseases, liver cirrhosis, high blood pressure, chronic bronchitis, emphysema, shortness of breath, and lung cancer. An increase in general morbidity among children has been noted.

As a result of the high content of sulfur oxides in the air, people develop bronchitis and gastritis.

Atmospheric air pollution also harms plants and animals. Polluted air damages plants and disrupts their metabolism of substances and energy. Agricultural crops and fruit trees also become less productive. Harmful gases from industry and transport negatively affect the photosynthesis process, reducing transpiration by up to 3 times.

Urbanization has a profound effect on atmospheric quality and ecological stability. Uncontrolled emissions from industry and transport pose a significant threat not only to the environment but also to human health.

- Reducing air pollution requires a unified effort across government, science, and society. Everyone must take responsibility for maintaining clean air, as it ensures the health and longevity of all living beings on Earth.

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