THE IMPACT OF AIR POLLUTION ON THE HEALTH OF THE POPULATION AND THE ENVIRONMENT

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Abstract: *In recent decades, anthropogenic factors of air pollution have begun to far exceed the natural ones, gaining a global character. Harmful emissions of harmful substances into the atmosphere not only destroy living nature, adversely affect human health, but also they also have the potential to alter the properties of the atmosphere itself, which can lead to adverse ecological and climatic consequences. By default, pollution involves air pollution and thus any gas or substance that enters the atmosphere can create unwanted imbalances in the medium and long term. Therefore, the thinning of the ozone layer in the atmosphere (which protects us from the negative effects of ultraviolet radiation) caused by air pollution is a major threat to the existence of ecosystems on the planet and is the ultimate challenge that humanity must overcome despite political differences on the international stage. In this paper we will discuss the impact of air pollution on the health of the population and the environment and, at the same time, we will consider the sources of air pollution and its effects and we will discuss the main measures to prevent and reduce air pollution.*
Keywords: *air pollution, atmosphere, ecosystems, environment, human health*

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1. INTRODUCTION

Air pollution is one of the forms of pollution with major, disastrous effects on the environment. From a technical point of view, any physical, biological or chemical change in the atmosphere can be called air pollution and occurs when any harmful gas, dust or smoke enters the atmosphere and affects plants, animals and humans. We observe more and more often using the term pollution in different contexts and we read more and more often in the media about the various types of pollution and the effects that this phenomenon has on the environment as well as on our health - but we all really know what catastrophic effects does air pollution have and what preventive measures can we take to limit it? Approximately 20% of air pollution is the consequence of human activity, the largest sources of man-made pollution being district heating plants, power plants, mines, factories, means of transport, etc. For more than 20 years, the World Health Organization and the United Nations Environment Program have been fighting air pollution. Air pollution is provided for human health and ecosystems. A large part of a population in terms of environmental health, by current standards. In order to be able to pursue sustainable warming, Europe will be able to show ambition and summarize itself in current legislation. In order to better understand the causes of air pollution we need to know what type of pollutants enter the atmosphere, what are the effects of these and how we can prevent certain situations to reduce pollution. Therefore, in this paper we will discuss all these topics in order to accurately understand the impact of both air pollution on the health of the population and the environment. [Callicott, J. B.,1985.

2. AIR POLLUTION, HEALTH AND THE ENVIRONMENT

Air pollution is the process of changing the natural characteristics of the atmosphere as a result of the action of chemical, physical or biological agents that have a harmful effect on the environment. Depending on the concentration and duration of action, air pollution can cause human health disorders, discomfort for the population in a certain area, alteration of the living environment and repercussions on the ecosystem.

Air pollution is a local, pan-European and hemisphere problem. Air pollutants emitted in one country can be transported into the atmosphere, contributing to or leading to low air quality in other areas. Suspended dust, nitrogen dioxide and ground-level ozone are currently recognized as the three pollutants that most severely affect human health. Long-term and maximum exposures to these pollutants vary in severity and impact, from minor effects on the respiratory system to premature death. [Bran et al., 2011].

Atmospheric air, along with other components of the environment, has a very important vital significance for nature. Air is a mixture of nitrogen and oxygen necessary for the vital activity of aerobic organisms, including humans. This mixture also contains a small amount of other gases: neon, argon, helium, krypton, xenon, radon, carbon dioxide, hydrogen, water vapor and other particles, which have virtually no influence on living organisms. But the development of human society, unfortunately, leads to the creation of an impact anthropogenic and technogen negative on air quality.

About 90% of Europe's urban residents are exposed to pollutants in concentrations above levels of air quality that are considered harmful to health. For example, fine dust suspended in the air reduces life expectancy in the EU by more than eight months. Benzopyrene is an increasingly worrying carcinogen that, in several urban areas, especially in Central and Eastern Europe, is present in concentrations that exceed the threshold set for the protection of human health. The climate on our planet is changing. Many gases that cause climate change are also known air pollutants, which affect our health and the environment. In many ways, improving air quality can also stimulate efforts to mitigate climate change and vice versa.

Air pollution is a global problem. Air pollutants emitted in one country can be transported into the atmosphere, contributing to or leading to low air quality in other areas. Air pollution also affects the environment. Acidification was substantially reduced between 1990 and 2010 in areas of Europe with sensitive ecosystems, under the influence of acid deposits of excess nitrogen and sulfur compounds. Eutrophication is an environmental problem caused by excess nutrients entering ecosystems. Less progress has been made in this area. The area of sensitive ecosystems affected by excess atmospheric nitrogen decreased very little between 1990 and 2010.

High concentrations of ozone lead to the destruction of crops. Most crops are exposed to ozone levels that exceed the EU's long-term goal of protecting vegetation. This problem concerns a considerable proportion of agricultural areas, especially in southern, central and eastern Europe.

Air quality in Europe has not always improved with the general reduction of anthropogenic (man-made) emissions of air pollutants. The causes are complex. First of all, there is not always a clear linear link between the decrease in emissions and the concentrations of air pollutants observed in the air. Secondly, there is a growing contribution to the long-distance transport of air pollutants from other countries in the northern hemisphere to Europe. [Giurgiu, 1999]. Therefore, targeted efforts are still needed to reduce emissions in order to further protect human health and the environment in Europe.

Air pollution is mainly caused by energy use and transportation activities. Urbanization, the development of industry and transport cause emissions with high concentrations of pollutants into the

atmosphere, emissions that lead to harmful effects on nature and all living organisms. According to the World Health Organization, about 70% of the world's urban population breathes polluted air and only about 10% of the world's population breathes air, the quality of which is within acceptable limits. [Antonescu, 1992].

2.1. SOURCES OF AIR POLLUTION

First of all, pollution can be:

- physical - thermal pollution - steam spill, hot water, hot water; noise pollution;
- chemical - discharge of pollutants (over 20,000);
- biological - pathogens from animal manure and food industry residues;
- radioactive
- simple, caused by a single pollutant;
- complex, found in industrial and urban areas with heavy traffic.

The sources of atmospheric air pollution are divided into:

- natural (volcanic eruptions, storms of dust and. a.)
- of an anthropogenic nature, related to the vital activity of man.

Natural sources of pollution cause significant air pollution only in exceptional cases.

Volcanic eruptions cause the release into the atmosphere of toxic products in gaseous, liquid or solid state with negative effects on the environment. Volcanic ash, water vapor and emitted gases, in the form of compounds with S, N and C oxides, form thick clouds in the atmosphere which, carried by air currents, can travel long distances from the place where the eruption took place.

Dust and sand storms are an important factor in air pollution. In periods without precipitation, the soil loses the aerial part of the vegetation, remaining exposed to the action of the wind. Some of the component particles rise from the ground and turn into air suspensions retained in the atmosphere for long periods of time.

Natural fires generally occur in particularly dry years when humidity falls naturally below the critical threshold. The fires of the vegetal masses through the large quantities of smoke and ash that they release, through the resulting oxides of S, N, C and through the destruction of the vegetation determine: inhibition of plant development, reducing visibility, the occurrence of respiratory problems and the occurrence of landslides. [Vlad, et al.,1997].

Other natural sources of pollution:

- traffic - release into the atmosphere of CO, NO2, N2O, dust, Pb, SO2;
- petrochemical industry - releases CO, NO2, SO2;
- primary ferrous metallurgy - releases powders containing Fe, NO2, SO2
- non-ferrous metallurgy - releases powders of heavy metals such as Pb, Cd, As, Zn, NO2, SO2;
- construction materials industry - removes dust, CO2, CO, SO2, NO2, F2 in the atmosphere;
- agriculture is responsible for the release of NH3, NO2, CH4, pesticides;
- industries that produce and use ozone-depleting substances such as fluorochlorinated and / or brominated hydrocarbons
- technological accidents triggered by man.

Even if the sources of air pollution can be both natural and artificial, it is easier to intervene on the artificial ones, by identifying them, monitoring and taking legislative, administrative and social measures so that we can reduce the negative impact on the health of the population.

2.2. THE EFFECTS OF AIR POLLUTION

Air pollution is not always visible, but its effects are very real. When air quality is poor, we pay dearly: human lives are lost, medical costs are high and working days are wasted due to disease.

Pollutants emitted into the atmosphere are the cause of serious and current environmental problems, such as acidification, acid rain, the greenhouse effect, the destruction of the ozone layer and climate change, etc.

Among the effects of air pollution, the most serious are:

- Respiratory and cardio-respiratory problems - the effects of air pollution on our health are alarming. They cause respiratory and heart disease, which are the most common medical conditions in these cases. Studies have shown that people in areas with large amounts of air pollutants in the composition of the air are prone to conditions such as pneumonia or asthma, among many others.
- Global warming - high global temperatures, rising sea levels and melting glaciers are alarming signals that if no urgent action is taken to stop air pollution, the environment will suffer irreversibly. Unfortunately, the leaders of the planet do not seem to understand each other and do not reach a consensus when it comes to limiting or preventing the irreversible;
- Acid rain - gases that enter the atmosphere, such as nitrogen oxides and sulfur oxides, mix in the atmosphere with water droplets, resulting in acid rain, with harmful effects on soil and plants.
- Water eutrophication - eutrophication occurs when a large amount of nitrogen is deposited on the surface of the seas favoring the growth of algae that negatively affects the underwater flora and fauna. Green algae that are present on lakes and ponds occur due to the presence of nitrogen in the air, above a certain limit amount.
- The effect of pollution on wild animals - like humans, animals face the devastating effects of air pollution. Chemicals in the air can cause wild animal species to change their habitat, cause disease among animals, and even cause their death in certain circumstances.
- Ozone depletion - ozone exists in the Earth's stratosphere and protects the planet from harmful ultraviolet (UV) rays. The presence of chlorofluorocarbons and hydrochlorofluorocarbons in the atmosphere causes a sharp thinning of the ozone layer. As the ozone layer thins, major imbalances appear due to the penetration of a much larger amount of UV rays into the atmosphere, with the most serious effects on human health, even in the short term. [Merce, 2016]

Air pollution is closely linked to climate change - the main driver of climate change is the burning of fossil fuels, which contribute greatly to air pollution. Rising temperatures are directly linked to poor air quality, which can affect the heart and aggravate cardiovascular disease. For example, climate change can lead to increased pollen levels as a result of plant growth or mold multiplication due to severe storms - both of which can aggravate allergies and other lung diseases, such as asthma.

2.3. AIR QUALITY SCALE

IQA	Health implications	Caution	
0 - 50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk	No one

50 - 100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.	Active children and adults, as well as people with respiratory conditions such as asthma, should limit prolonged outdoor exercise.
100 - 150	Unhealthy for sensitive groups	Members of sensitive groups can have health effects. The general public is unlikely to be affected.	Active children and adults, as well as people with respiratory conditions such as asthma, should limit prolonged outdoor exercise.
150 - 200	Unhealthy	Everyone can begin to experience the effects on health; members of sensitive groups may have more serious health effects	Active children and adults, as well as people with respiratory conditions such as asthma, should avoid prolonged external exertion; everyone else, especially children, should limit prolonged outdoor exercise
200 - 300	Very unhealthy	Health warnings about emergencies. The entire population is more likely to be affected.	Active children and adults, as well as people with respiratory conditions such as asthma, should avoid any outdoor exercise; everyone else, especially children, should limit outdoor exercise.
300 - 500	Risky	Health alert: everyone can have more serious health effects	Everyone should avoid any kind of outdoor effort

Source: Adaptation after www.air-quality.com

2.4. MEASURES TO PREVENT AND REDUCE AIR POLLUTION

In the conditions of technological and industrial development, it is almost impossible for a person not to be exposed to air pollution. It's all around us. Microscopic air pollutants can penetrate deep into the respiratory and circulatory systems, affecting the lungs, heart and brain.

We all have an obligation to contribute to the protection of the environment and to ensure, for us and for future generations, a better air quality. Here are some of the measures that prevent air pollution:

- Use of public transport - the use of public transport considerably reduces air pollution and at the same time decongests traffic; do an imagination exercise - get the 60 occupants of a trolleybus or bus in 60 cars. You will already have a solid road at a length of at least 200 m (compared to the maximum 7 meters of a trolleybus), congested traffic and unbreathable air in the immediate vicinity of the "motorized procession". So try, from time to time, to use the trolleybus or the subway - you will know that on that day you did a little more to protect the environment!
- Energy saving - turn off the lights and any energy consuming appliance when you leave home or when you no longer use it. Electricity seems to be a "green" or non-polluting source when compared to gasoline, for example, if we talk about car fuels, but we forget that it is also produced by processes that generate pollution, as happens during the process of burning of hydrocarbons to obtain electricity.
- Reuse and recycling of materials - by reusing objects or recycling, indirectly save the resources needed to produce them but at the same time contribute to better air quality by eliminating all harmful gases that would have occurred as a result of technological manufacturing processes.
- The use of green energy - solar, wind and geothermal energy contributes to reducing air pollution; the elimination as much as possible of the combustion of fossil fuels for the

production of thermal or electrical energy leads indirectly to the decrease of the gases resulting from the combustion, thus contributing to the preservation of a less polluted air.

- Modernization of installations or closure of non-performing ones
- Using the best techniques available in every type of industry

Of course, everyone, in their home or at work, on the street or wherever they are, can contribute a little to increase the quality of the air we all breathe - but together, all these small efforts can generate major changes in regarding the prevention of air pollution. [Satbyul, et all.,2014].

3. CONCLUSIONS

At European level, major environmental and health concerns are related to indoor and outdoor air pollution, poor water quality, poor hygiene and still chemical hazard. The health impacts can generate various respiratory and cardiovascular aspects, cancer, asthma, allergies.

The environment plays a special role in the status of our health, the choices we make in terms of lifestyle affect us and determine our health to an even greater extent.

Air pollution is not the same everywhere. Various pollutants are released into the atmosphere from a variety of sources, including industry, transport, agriculture, waste management and households. Certain air pollutants are also released from natural sources.

The effects of air pollution on health depend not only on exposure but also on human vulnerability. Vulnerability to the impact of air pollution can increase as a result of age, pre-existing health conditions or the particular behaviors of each person. A large body of evidence suggests that people with lower socioeconomic status tend to live in environments with poorer air quality.

An air pollutant is "any substance in the air which, in fairly large quantities, could harm humans, animals, plants or objects".

There are many pollutants in the air, and the various elements that make up air pollution vary from region to region. However, some pollutants are monitored more closely than others because they are known to be harmful to the environment or health. The main pollutants are ozone, nitrogen dioxide, suspended dust and sulfur dioxide.

The effects of air pollution on breathing depend on type and mixture of pollutants, air concentration, how long you are exposed, how much pollutant inhale and how much pollutant enters the lungs.

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