

## **AIR POLLUTION: A THREAT TO THE EFFICIENCY OF POROUS PAVEMENTS**

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**ABSTRACT** - *Over the years the world has been detecting and monitoring the increase in surface temperature. The vast majority of scientists have named it the phenomenon of global warming resulting in climate change. The Metropolitan Region of the State of Rio de Janeiro, in recent years, accompanied the increase in air pollution by the transport sector and concluded that the sector contributes to these climatic phenomena in local and global levels. Many strategies have been developed to minimize the impacts of this and other sources of emissions to the environment. New research and technological advances must be deployed immediately to try to mitigate the adverse effects of climate on Earth and prevent natural disasters, such as happens quite often nowadays. This study draws attention to another type of pollution, extremely dependent on air pollution: impacts of the use and occupation. Nevertheless, it highlights the importance of monitoring the temperature of the earth's crust, to confirm that surface temperatures and below increased proportionately. The porous pavements, even in small patches, are important to contribute to the balance of the ecosystem but the quality of air we breathe is both harmful to health on the ground that receives it. So educate the public about the harmful effects of air pollution unimaginable is the bottleneck for the replacement of traditional waterproof decks for porous pavements and as a consequence, facilitate the exchange liquid and gas, so necessary in the process of cleaning up and slowing global warming.*

**KEYWORDS:** Air Pollution, Surface Temperature, Natural Disaster, Climate, Earth Crust

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### **INTRODUCTION**

Pollution is considered any change in physical, chemical or biological environment caused by any form of matter or energy resulting from human activities that directly or indirectly:

- Be offensive or harmful to health, safety and welfare of the population;
- Create conditions, inadequate use of the environment for public, domestic, agricultural, industrial, commercial and recreational;
- Damages to fauna, flora, ecological balance to the public and private properties or the aesthetics;
- Do not be in harmony with the natural climatic phenomena.

Thus, the pollutant is any substance or agent that causes means, directly or indirectly, any form of harm or disrespect to the quality of life and air pollution is the introduction of any matter or energy, which would change the properties of the atmosphere (PORTUGAL, 2009). Modes of anthropogenic pollution mean an introduction, directly or indirectly, of substances or energy into the air, sea or land, resulting in adverse effects so as to endanger human health, living resources and ecosystems, as well as material goods, compromising aesthetic values and other legitimate uses (Available at: [www.unece.org](http://www.unece.org)).

The contamination of air by gases, solid particles, liquid suspension, biological material or energy, among other pollutants, the degree of pollution, depending on their chemical composition. Concentrations in the air mass, depending on weather conditions, can influence the dissipation of pollutants, as well as for reaction pathways may give rise to new pollutants (Available at: [www.qualar.org](http://www.qualar.org)).

Previous studies has been identifying increases in greenhouse gas pollutants, particularly greenhouse gases, being primarily responsible for the effect: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), chlorofluorocarbons (CFCs) and ozone (O<sub>3</sub>). These gases have increased their concentrations due to human action and it is estimated that if current rates of increase of greenhouse gases, global average temperatures will rise 0.3 ° C per decade, with 0.2 ° C below or above (EUROPEAN COMMISSIONS, 1997).

By mid-1980, urban air pollution was mainly attributed to industrial emissions. In Brazil, most industrial facilities such as refineries, petrochemical, power generating plants and steel companies, responsible for emissions of pollutants into the atmosphere is concentrated in urban areas. Over the years, due to the requirement of environmental permits, there is a tendency for modernization of industrial plants, aiming to reduce and control atmospheric emissions. However, it has been observed that the rapid growth of vehicle fleet has been significantly increasing the contribution from this source in the degradation of air quality, especially in metropolitan areas. Air pollution caused by motor vehicles in addition to being an environmental challenge for the inhabitants of cities, the heavy flow of vehicles is primarily responsible for the emission of toxic gases, pollutants in the atmosphere of cities (FELZENSZWALB, 2010).

The large urban centers, with some frequency, exceed the permitted levels of air pollution. The city of Rio de Janeiro, the population density, the topography and it has the second largest vehicle fleet in the country and twenty of the world, advances in atmospheric degradation and deposition of pollutants contributing to global and local.

In the state, air quality is monitored since 1967, when they were first installed monitoring stations. These stations are a useful tool to enable analysis on the benefits of sanitation and predispose specific interventions to happen in the case of pollutants exceeding the levels established by legislation (SMITH & Tirabassi, 2004).

Thus, urban environmental pollution are no longer restricted only to the quality of air we breathe or the water quality we use. Atmospheric deposition, solid waste, storm water and silt are present currently decanted and tend to increase with the years (PRODANOFF, 2005). To the pollution of soil and water pollution, unlike what happens with air pollution, were not found during analysis of air quality monitoring in the same proportion, water quality data and data from temperature rise and concentration of pollutants in soil.

Logically, the temperature below the surface should increase with the temperature above the surface. The use and land cover are factors accelerating this increase, whereas the vast majority of buildings and pavements are waterproof, and ignoring the fact that ecosystems were created to be in constant balance. The surface soil water deposits and organic matter necessary for the survival of all living beings on the planet.

The strategy of porous pavements is necessary and constitutes an alternative to alleviate the growing and changing global climate conditions, which has been causing disasters and

succumbing to the existence of populations of entire cities. However, one of the unique and essential obstacles to the strategy is the quality of water beyond the pavement and into the soil and the amount of garbage that deposited the Earth's surface are carried by runoff. This obstacle, however, is a necessary challenge to be overcome, because it is a bottleneck that is no longer to be effective barrier to quality of life on the planet. It is looking at air pollution, currently, only one context and as a technological problem to make it a social problem that is only resolved when the company is involved and wishing every one in particular, participate in the process of cleaning up.

### **Objectives and background**

This study aims to evaluate the harmful effects of air pollution on water and land, functioning as a barrier to the effectiveness of permeable pavements.

Air pollution, road conditions, traffic and quality of life inch in degradation and not realize effective measures to reverse this situation of environmental calamity. Part of the problem is a consequence of urban development, which encourages the use and land cover in a disorderly way and ongoing.

Thus, the product of this work meets the guidelines of the Ministry of Science and Technology, in the process of implementation of public policies for building sustainable cities. Search environmental sustainability and rational use of soil to promote technological development aimed at the security and preservation of species on the planet.

### **REVIEW**

For many years science has used the natural resources to ensure most of the technological innovations and progress in the history of nations. In the early flora and fauna were necessary to the consumption of basic life, such as eating and produce (subsistence agriculture), and get healing for ailments and diseases through herbal medicine. After some time and this scenario "natural" has become inconvenient when the innovation required the space that was occupying the nature of land use or even good, widely used as raw material.

The development process by providing disproportionate growth of population, has increased the demand for travel over long distances, a fact that also resulted in disproportionate growth of all modes of transportation. Nowadays this problem is still evident and trivial. Large urban centers are home to most jobs, and for the vertical structure of the infrastructure company, do not harbor any manpower. The population settles in more distant locations, needing to travel daily. Main event which brings the vehicle fleet of a region and affects the quality of air.

The development is occurring in order to suppress the natural resources as to make it scarce or nonexistent. This gave rise to the reverse process, ie part of the scientific and technological society has been working on strategies that facilitate reverse this reality. In the transportation sector, the focus of this work, it is necessary that technological innovations will bring the expected benefits to the country, in the automobile industry and the infrastructure works, while they worry about the company and the quality of air, water and soil in which it is inserted.

The Metropolitan Region of the State of Rio de Janeiro (Metro Region) has a large concentration of emission sources of pollutants that affect the atmosphere of harms way.

Mobile sources, made by motor vehicles, by their quantity and spatial distribution of sources are highlighted in urban areas.

In the Metro Region is the second largest concentration of vehicles, industries and sources of air pollutants in the country. And even that power has physical problems related to air quality, rugged topography, the presence of the sea of Guanabara Bay, which act directly in producing an airflow complex and heterogeneous as the dispersion of pollutants, and the tropical climate, which operates in the photochemical processes and other reactions in the atmosphere, generating secondary pollutants in general greenhouse gases besides the physical factors add to the intense land use.

In this study, to manage air pollution has become of paramount importance not only to define the areas most impacted, but also the identification, localization and quantification of the main sources of air pollutants from motor vehicles from circulating in the main streets of the Metro Region .

A total of eight routes (Avenida Brazil, Rodovia Presidente Dutra, Rodovia Washington Luis, Red Line, Yellow Line, Avenida Ayrton Senna, Avenue of the Americas and Ponte Rio - Niterói) seen as the most significant as the volume of traffic in the Metro Region and accountable as the principal that most contribute to vehicular emissions source, accounting for approximately 2 million mobile sources each year.

Each type of road, depending on traffic characteristics, has its own profile as the emission of pollutants. Avenida Brazil has the largest volume of traffic in the metropolitan region, with over 300,000 vehicles per day and is responsible for more than 25% of emissions of all pollutants measured besides contributing to emissions from diesel vehicles, which emit sulfur dioxide.

The Avenue of the Americas, in relation to other routes, has the peculiarity of having traffic during weekdays compatible with the observed traffic volume on weekends, including overnight.

It is considered CO and HC characteristics of all types of vehicles, but their quantities are allocated primarily to light vehicles. However, in the case of HC, whether delivered in smaller quantities by diesel vehicles, their specification and analysis are extremely important, compared to their effects considered carcinogenic. The same concept applies to the MP and are still observed higher emissions on roads with more traffic flow, Brazil Avenue and Main Roads.

The contribution of ways even exceeds the 100% limit established by the National Council of Transit in the Metropolitan Region of the State of Rio de Janeiro. These high values to generate heat and acid rain, phenomena known by most researchers, whether they are major environmental areas.

It appears however that the investigation into the pollution from urban runoff has been studied in some countries. In the United States in the decade of 60 were identified as water quality, especially from the floods in urban centers accounted for sources of pollution of water bodies.

Environmental education and maintenance of air quality are important to the entire region succeeds in water quality and soil that receives leachate.

From the standpoint of engineering or management of the road works should prioritize water quality in urban runoff. Activities anthropogenic to much already recognized as the most important affecting quality, such as urbanization and agriculture. In fact, most human activities seriously impacting the flow due to the sealing surfaces.

- The success of a program to control pollution is, among other things, the systematic collection of environmental data and also consistent modeling of processes generation, accumulation and transport of pollutants (PRODANOFF, 2005)

## CONCLUSION

Understand the needs and the factors that interfere with daily movements, which affect the perceived attractiveness of the urban environment is of fundamental importance to plan and design spaces more suitable for regular users of the system, prioritizing the improvement of urban facilities in order to make more people will join the practice of walking and cycling.

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