

## **THE SPATIAL DISTRIBUTION OF THE SOURCES OF ENVIRONMENTAL DEGRADATION IN DISTRICT 4, CITY OF BUCHAREST, IN RELATION WITH THE URBAN ENVIRONMENT**

**Cornelia Dincă**

**Key words:** environmental degradation, pollution sources, polluting emissions

**Abstract.** The pollution sources produce noxious emissions, harmful to the environment and the public health. District 4 of the city of Bucharest is considered to be very polluted due to factors such as industry, heavy traffic, building sites, thermoelectric power plants, sources of diffusive combustion, and also the reduction of green spaces. These sources produce both noxious emissions and noise pollution. The air contamination, the water and soil pollution contribute to the deterioration of public health. Keeping a record of all the pollution sources, being aware of all their characteristics and the emissions they produce, as well as keeping them under strict control can be considered the necessary premises for maintaining a satisfying quality of the environment.

Though regarded as a big metropolitan area, Bucharest city is characterized by favorable environmental conditions, but pollution still represents a problem, since it is an obvious effect of anthropization and urbanization.

The pollution sources produce noxious emissions, which are harmful to the human health and comfort. The negative consequences of the sources of environmental degradation are the result of the ineffective management of the city development in time, because a balance between the population growth and the urban planning was never taken into consideration. Moreover, another fact not taken into account was that there should be a balance between artificial and natural factors, so that the population would not be vulnerable to the newly created urban conditions and the human health would not be affected.

In order to make a classification of the sources of environmental degradation, several criteria are used:

By the *way they are generated*, there are *permanent, seasonal and accidental pollution sources*.

By the *character of the source*, there are *natural sources* and *anthropic sources*.

By the *place where the polluting substances are accumulated*, there are *sources that cause the pollution of air, water, soil and the biotic layer*.

By the *type of releases introduced into the environment*, there is *emission pollution and noise pollution*.

In Bucharest, the sources of environmental degradation have increased in number, becoming more and more aggressive

Situated in the southern part of the capital (which has a total area of 228 km<sup>2</sup>), district 4 of the city of Bucharest has an area of 32 km<sup>2</sup>, a built up area of 25 km<sup>2</sup> and a population of 301,172 inhabitants. From the point of view of the territory occupied, district 4 is delimited by: the Unirii Embankment in the North-East and East (Dâmbovița River), the Highway Belt of Bucharest in the South and Giurgiului Highway in the East.

Among the districts of the capital, district 4 is a polluted one, as a result of the changes undergone by the environment due to different causes: the increase in the number of industrial buildings and buildings designed for dwelling to the detriment of green spaces, the presence of a large network of arteries with heavy traffic and emission releases, the continuous growth of the number of inhabitants etc.

## 1. Sources of air pollution

Air pollution represents the release into the atmosphere of pollutants, with noxious effects on the environment and the people.

**1.1. Emission pollution.** Air contamination causes substantial changes in the urban thermal potential, with influences on the health of the population, plants and animals. The main sources of air pollution are: *industrial sites, road traffic, thermoelectric plants and the sources of diffusive combustion*, which release emissions into the atmosphere.

In district 4, pollutants come from:

- **industrial sites**, which represent the most noxious source of pollution due to the diversified range of pollutants from: metallurgy and car manufacturing, chemical, light and food industries. The substances released represent organic dust and inorganic substances, some of them containing metals: Pb, Zn, Al, Fe, Cu, Cr, Ni, Cd, gases and vapors: oxide (CO) and carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), hydrogen sulfide (H<sub>2</sub>S), nitrous oxide (N<sub>2</sub>O), smoke, soot, ash, pesticides, organic solvents, ammonia, bad smells.

The following industrial sites are present in district 4:

- IMGB, with: Admeb SA, General Turbo SA, ICPET SA, Kvaerner IMGB SA, Kvaerner FECNE SA, Metallum SA, Nuclear Montaj SA, Romenergo Castumag SA, UMUC SA, Univers SDV SA, Upetrolam SA.

- Progresul, with: Celpi SA, Energo-utilaj SA.

- Splaiul Unirii, with: Dîmbovița SA, Cotton Industry SA, Pionierul SA, Splai SA.

- Candiano Popescu-Mărășesti, with: Adesgo SA, Concordia SA, Flamura SA, Elco SA, Electroconstrucția, Remero SA, Transporturi Auto Filaret SA.

- G. Cosbuc – Carol I Park, with: Ascensorul SA, Aroconstruct SA, Apollo SA, Consal SA, Concordia construcții SA, Hesper SA, Ipac SA, The Institute for Astronomy and Metrology, Procas SA, Sacin SA.

- Berceni-Nițu Vasile, with: Amiro SA, the Bread Factory Berceni SA, Rompita SA, Romprim SA.

- **road traffic.** Transportation contaminates air with the discharged combustion products: greenhouse gases: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, heavy metals: Cd, Pb, acidifiers: NO<sub>2</sub>, SO<sub>2</sub>.

The strongest effects of pollution from mobile sources can be felt in the big crossroads and on the congested arteries. In district 4, there are 557 traffic arteries, categorized as follows: embankment, avenue, highway, frontage road, street, alley, driveway, road, square (table no.1).

Tab. 1 - The categories of traffic arteries in district 4 of the city of Bucharest

<i>Category</i>	<i>Number of arteries</i>	<i>Name</i>
embankment	1	Unirii Embankment
Avenue	12	D. Cantemir, C. Brâncoveanu, George Cosbuc, Regina Maria, Abatorului, Alexandru Obregia, Tineretului, Libertății, Gh. Șincai, Mărășesti, Metalurgiei, Unirii
Highway	4	Oltenitei, Giurgiului, Berceni, Vitan Bârzești
frontage road	2	Șerban Vodă, Văcărești
Street	389	
cul-de-sac	70	
Road	23	
Square	6	Bucur, Carol I, Concordiei, Gara Filaret, Națiunile Unite, Regina Maria

Source: District 4 Local Administration

- **building sites and concrete transport trucks.** There are many activities taking place in the construction field, so building sites and concrete transport trucks represent sources of air pollution, especially because of the silica dust that affects the inhabitants, causing health problems.

In district 4, many building sites were opened in 2007 in order to construct residential quarters, designed to start functioning in 2008: City Center Residence (Carol I Park area), Confort City (Unirii Embankment - Vitan Bârzești), Mayer

Residence (Giurgiului), Tineretului Residential (Tineretului), Asmita Gardens (Unirii Embankment). There are also buildings sites for the construction of shopping centres in the area of the following streets: Brâncoveanu-Secuilor, Turnu-Măgurele, Văcărești. On these sites, pollution is increased by the equipments and machines used for constructing and assembling.

- **thermoelectric plants** represent major air pollution sources in urban areas, because they work on liquid fuels with a high sulfur content and they release into the atmosphere sulfur dioxide, nitrous oxide, carbon monoxide, carbon dioxide, dust, smoke, ash. CET Progresul is the third thermoelectric plant in size in Bucharest.

- **sources of diffusive combustion:** thermal systems for factories, central heating systems for blocks of flats, unauthorized burning of domestic waste, delayed garbage collection. They cause pollution with organic dust, noxious gases, smoke, soot, bad smell.

The information provided by the Agency for the Protection of the Environment in Bucharest reveal that, for district 4, the highest degree of air pollution, specific to urban areas (road traffic, central heating, industrial activities, thermal power plants etc.) is recorded in the central area – Unirii Square, extending towards the South-West (Coșbuc Avenue), towards the South (Dimitrie Cantemir Avenue, Eroii Revoluției, Giurgiului) and towards the South-East (Timpuri Noi, Unirii Embankment, Văcărești Road)

**1.2. Noise pollution** is the result of producing loud or medium intensity noises by various generating sources. The consequences are: creating considerable discomfort to the inhabitants, affecting public health, diminishing the capacity of performing various activities. The sources of noise pollution are stationary, of industrial or human origin, and mobile, that is, the means of transportation.

## **2. Sources of water pollution**

The main source of water pollution is industrial activity, as a result of the fact that, together with the wastewater discharges, the water bodies are also polluted with a great variety of chemical pollutants, biological residues, decaying organic substances, metal salts, hydrogen sulfide, acids, pathogenic bacteria, cyanides. Other sources of pollution are represented by: wastewater from dwellings, public wastewater (hotels, restaurants, institutions), from street washing or green spaces irrigating, unsuitable industrial and domestic storages.

### **2.1. Sources of soil pollution**

Soil can be affected by pollution due to the following causes: wet and dry deposition from the atmosphere, improper disposal of industrial and domestic waste, the discharge of industrial and domestic wastewater that must be treated etc.

As a result, there is a big number of sources and the pollutants are discharged either on the soil directly, or very close to the soil level.

### **Conclusions**

Analyzing all these categories of sources of pollution, both natural and anthropic, reveals that in the urban area they are very numerous and extremely varied. That is why keeping a record of all the pollution sources, being aware of all their characteristics and the emissions they produce, as well as keeping them under strict control is becoming more and more difficult, although these are the necessary and compulsory premises for maintaining a satisfying quality of the environment.

As for the stationary sources of pollution, both district 4 and the whole capital have been characterized by a decrease of the emissions in the last few years, but, on the other side, the increase in the number of transit or resident vehicles has begun to create serious problems from the point of view of traffic fluency, noise pollution and air quality.

### **References**

- Ioja C. (2005), *Mijloace și tehnici de evaluare a calității mediului în aria metropolitană a Municipiului București*, teză de doctorat
- Mănescu S., Sumitrache S., Cucu V., Furvagă E. (1981), *Igiena mediului*, Editura Medicală, București
- Pârvu C. (2001), *Ecologie generală*, Editura Tehnică, București
- Rey V., Patroescu M. (2006), *Atlas*, Editura Enciclopedia Rao, București
- \*\*\* (2005), *Planul de Dezvoltare Regională*, Agenția de Dezvoltare Regională București-Ilfov, internet