

SPATIAL ANALYSIS OF THE RELATIONSHIP BETWEEN EMISSIONS AND THE MAIN RECIPIENT COMPONENTS

Petru Bacal¹

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Abstract. In this study are spatially analyzed the relations existing between the emission and main recipient components: land occupied by forests, green areas, protective strips and the number of inhabitants. The values of these ratios depend on traffic intensity, the degree of industrialization, the presence of mining and construction materials and the degree of forestation.

Ecological situation of the aerial space is conditioned by the intensity and frequency of various forms of pollution. At the same time, the ability to assimilate atmospheric air is influenced by spatial relationships between sources of pollution impact, road network density and intensity, surface distribution of forest areas and green space etc. Also, a great influence on the neutralization and removal of toxic effects is held by the specificity of weather processes and elements, mainly the direction, intensity and frequency of prevailing winds, thermal stratification and air turbulence.

Emissions of NO₂ and CO₂ reflect the evolution of both total emissions from stationary sources, as well as mobile ones. Since 1998, following the massive shift from coal and oil boiler rooms gas emissions from stationary sources of SO₂ was reduced about 8 times. On mobile sources, replacing gasoline with lead and the increase in supplies of qualitative gasoline generated the considerable reduction of lead and volatile organic compounds emissions (by 4-5 times). In 2008, of the 179 thousand tons of emissions, 88 thousand tons (49%) were released in the Central Region, 66 thousands tons (38%) - in the Northern Region and 23.3 thousand tons (13%) – in the Southern Region (3).

About 160 thousand tons or 89% of the total emissions mass is generated by mobile sources, which predominate, with more than 80% in the absolute majority of administrative units. The volume of emissions from these sources will also condition the spatial distribution of total emissions. Thus, the maximum volume of

¹ Academy of Economic Studies of Moldova, p_bacal@yahoo.com

emissions is testified in Chisinau (48 thousand tons) and Balti (26 thousand tons), in the districts Drochia (9.1 thousand tons), Orhei (7.8 thousand tons), Hincesti (8.2 thousand tons), Ungheni (6.2 thousand tons), Cahul (6.8 thousand tons) and Gagauzia (5.7 thousand tons). The minimum volume is estimated in the districts Dubasari (478 tons), Basarabasca (698 tons), Taraclia (609 tons) and Cantemir.

In the current study were drafted maps designed to reflect the existing relationship between the emission and main components containers: land occupied by forests, green areas, protected areas and also the population number. Maximum values of the ratio between maximum total emissions and land protection are mentioned in Balti (15447 kg/ha) and Chisinau (6772 kg/ha) and also in Drochia (1574 kg/ha), Floresti (1313kg/ha), Rezina (864 kg/ha), Briceni (708 kg/ha) and Gagauzia (694 kg/ha). These are generated by maximum fuel consumption, increased traffic intensity, higher degree of industrialization, high proportion of mining and construction industry, while in Drochia and Gagauzia by the low level of forestation. Average values from 300 to 600 kg / ha are registered in 6 districts with an average level of industrialization and forestation (Donduseni, Glodeni, Rascani, Anenii Noi, Cahul and Basarabasca). A relatively small percentage, of 150-300 kg / ha was determined in 15 districts with a moderate volume of emissions and a higher degree of forestation. Minimum values, up to 150 kg/ha, are observed in 4 forested districts from the Central Region (Calarasi, Straseni, Orhei and Telenesti), also in Cantemir and Soldanesti, with a lower level of industrialization (fig.1, fig. 2).

Maximum ratio of total emissions and population is registered in Rezina (164 kg/capita) and Floresti (107 kg/capita). In the second category, with a pressing from 55 to 100 kg/capita are Chisinau (75.4 kg/capita), Balti (91.5 kg/capita), Gagauzia (75.6 kg/capita) and also the districts Briceni (86.5 kg/capita) and Glodeni (61.2 kg/capita). In these administrative units the maximum volume of emissions is generated by transportation (in the fuel supplied), by the building materials industry and in Chisinau also by the energy industry. A moderate ratio, of 40-44 kg/capita is certified in 7 districts including Donduseni, Drochia, Ungheni, Hancesti, Anenii Noi, Cimislia and Cahul. A less pressing ratio, of 25-40 kg/capita, is certified in 13 districts, including 6 northern districts, 4-southern and 3-central. Minimum values, up to 25 kg/capita are observed in 5 districts (Edinet, Telenesti, Orhei, Straseni and Cantemir). Minimum and average values of the ratio of total emission amount and number of population are due to emissions from motor transportation in those regions.

The ratio of total emissions from stationary sources of pollution and forest areas is conditioned, first of all, by the volume of emissions, especially in energy, mining and construction, the agribusiness complex and marketing fuel stations. The level of forest land assurance has a much smaller influence on southern steppe

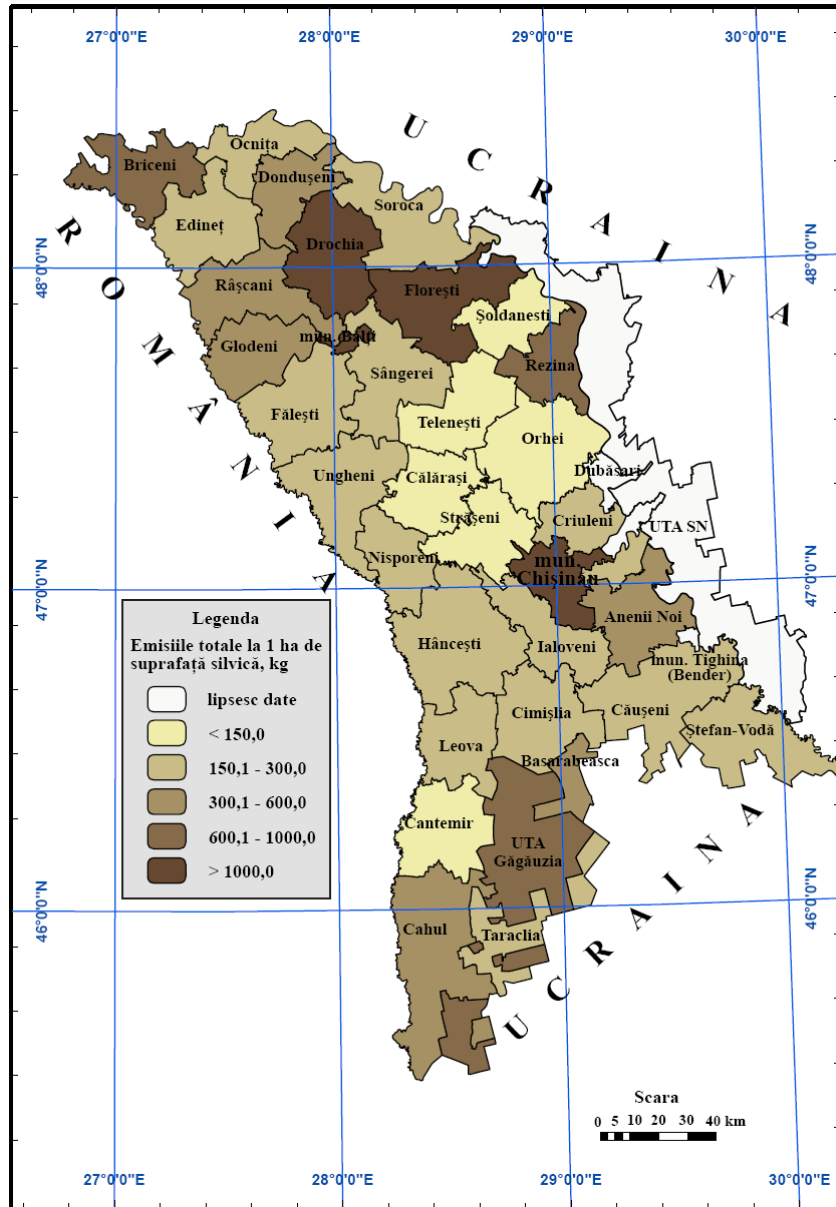


Fig. 1 - Total emissions reported to the forestry areas, in kg/ha (1; 2)

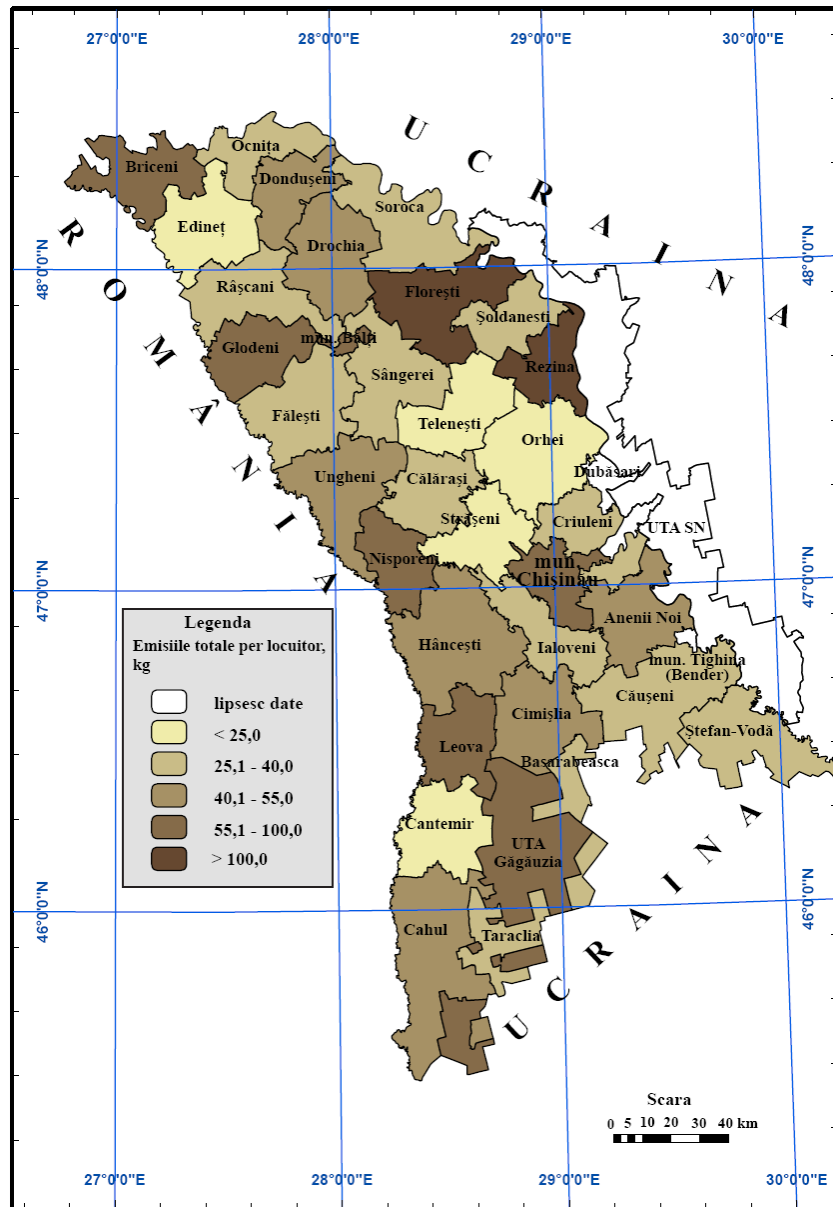


Fig. 4 - Total emissions reported to the number of population, kg/loc (1, 2)

districts, which have a lower industrialization level. Thus, minimum values of the ratio are registered in cities like Chisinau (319 kg/ha), Balti (205 kg/ha) and districts Falesti (653 kg/ha), Anenii Noi (215 kg/ha), Rezina (191 kg/ha), Edinet,

The ratio of total emissions from stationary sources of pollution and forest areas is conditioned, first of all, by the volume of emissions, especially in energy, mining and construction, the agribusiness complex and marketing fuel stations. The level of forest land assurance has a much smaller influence on southern steppe districts, which have a lower industrialization level. Thus, minimum values of the ratio are registered in cities like Chisinau (319 kg/ha), Balti (205 kg/ha) and districts Falesti (653 kg/ha), Anenii Noi (215 kg/ha), Rezina (191 kg/ha), Edinet, Singerei and Hancesti (each 140 kg/ha). An average pressing of 50-100 kg/ha is being registered in 7 districts- Donduseni, Drochia, Floresti, Glodeni, Straseni, Cimislia and Cahul. A 30-50 kg/ha ratio is registered in districts Soroca, Calarasi, Ungheni, Causeni and Stefan-Voda. A relatively small pressing, of 15-30 kg/ha is seen in 6 districts (Briceni, Ocnita, Soldanesti, Ialoveni, Criuleni and Leova). Minimum ratios (< 15 kg/ha) are characteristic for Gagauzia and districts Telenesti, Orhei, Nisporeni, Basarabasca, Cantemir and Taraclia.

The values of the ratio of total emissions of fixed sources and number of population also varies depending on the volume of emissions, while population number has a secondary influence, but higher compared to forest areas. Maximum values of the ratio are registered in districts Rezina, Donduseni, Floresti, Sangerei, Straseni, Anenii Noi, Hancesti, Stefan-Voda, Leova and in cities like Balti and Chisinau, while average values, of 5-6 kg/capita- in 10 districts including 5 from the Northern Region. A relatively small ratio, of 2-4 kg/capita states in 8 districts and a ratio less than 2 kg/capita- in Gagauzia, Nisporeni, Orhei and Cantemir.

Values of the ratio of emission volume and the main containers (forest land and number of population) can be useful for the application of appropriate rules and air pollution stationary sources emissions payment, as well as for auto tax, depending on the situation of the administrative units and geoecologic areas.

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