

EVALUATION OF URBAN GREEN AREAS AS SINKS FOR POLYCYCLIC AROMATIC HYDROCARBONS BASED ON SOIL ENVIRONMENTAL ANALYSIS

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INTRODUCTION

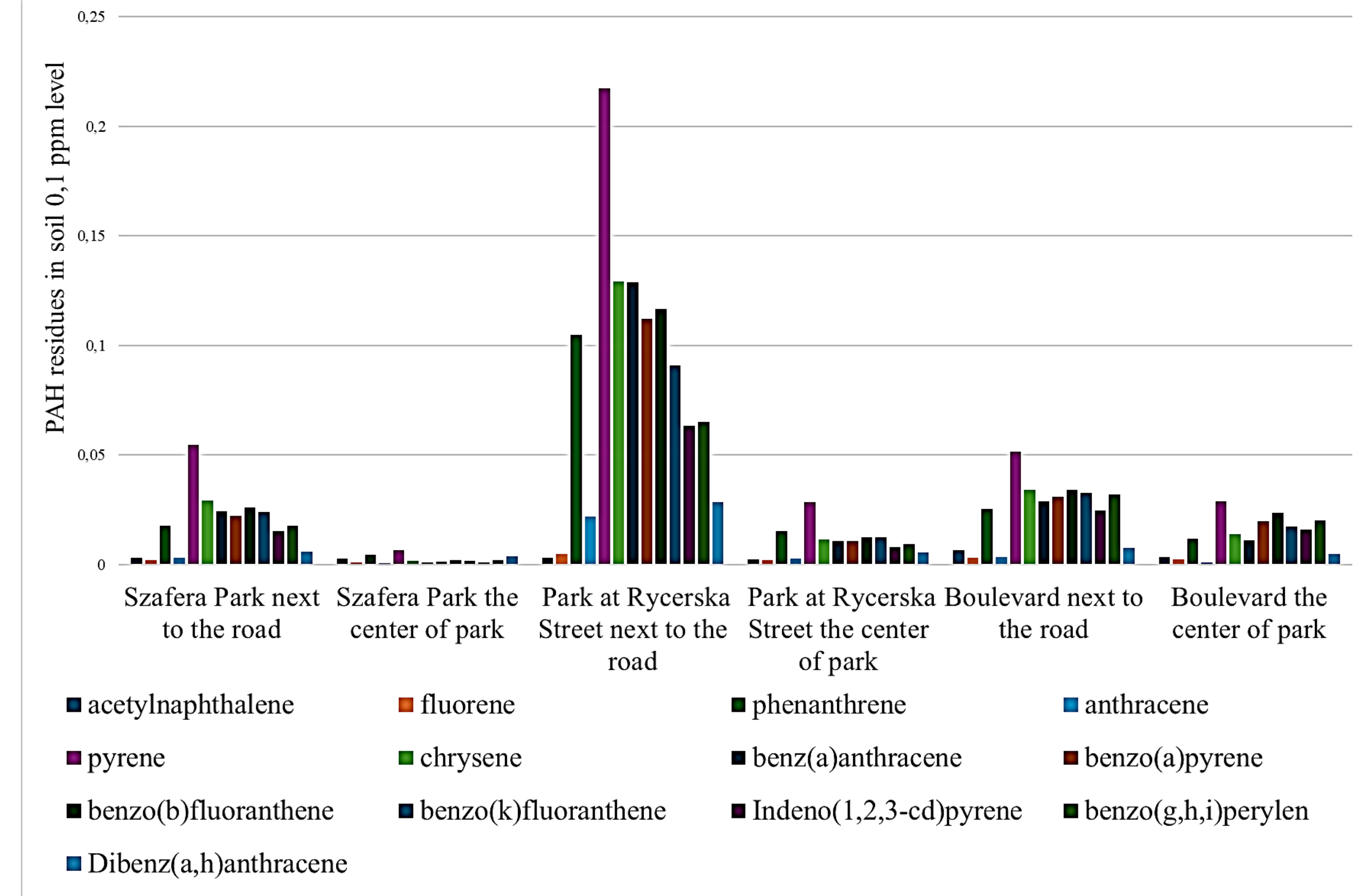
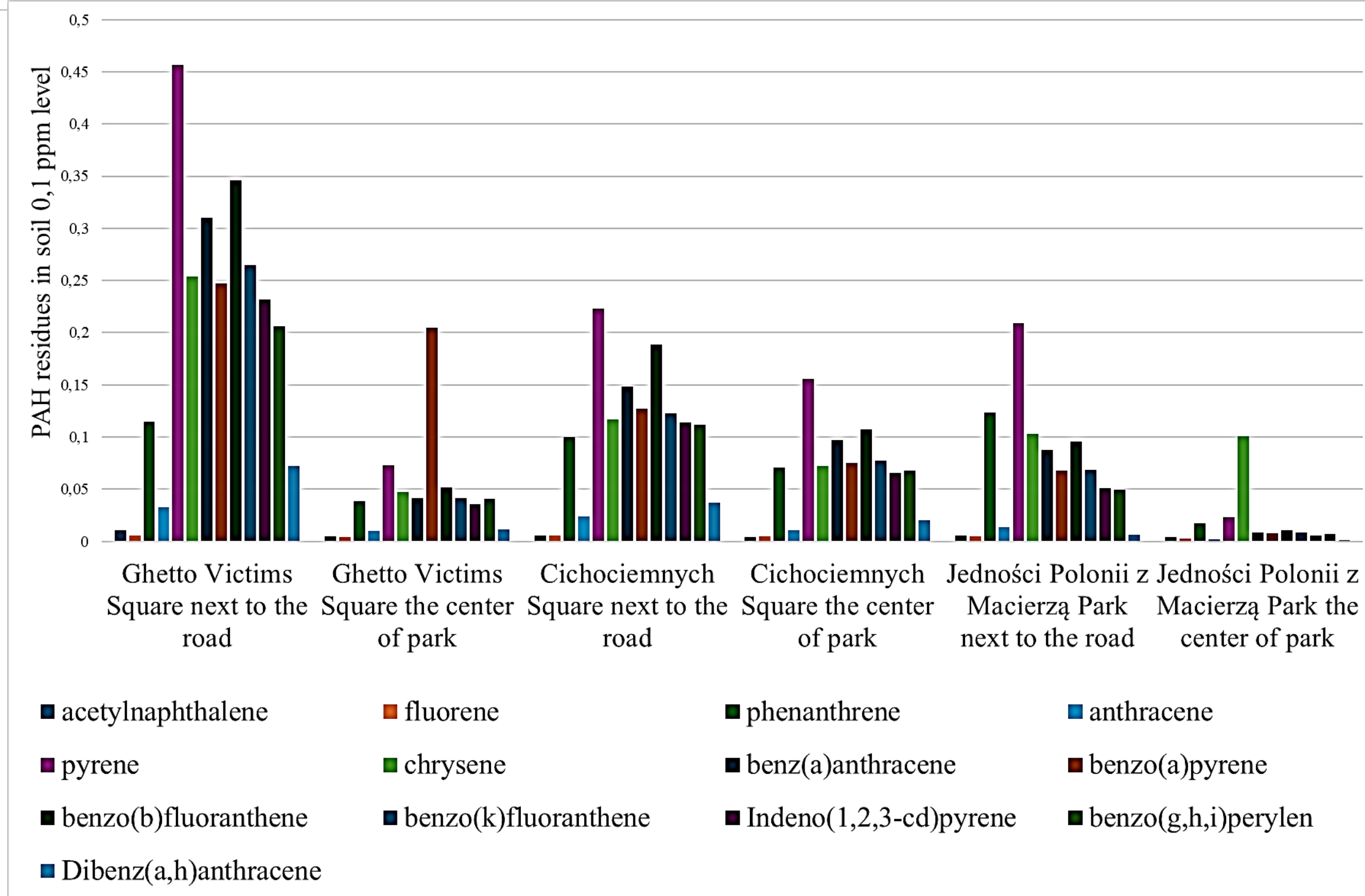
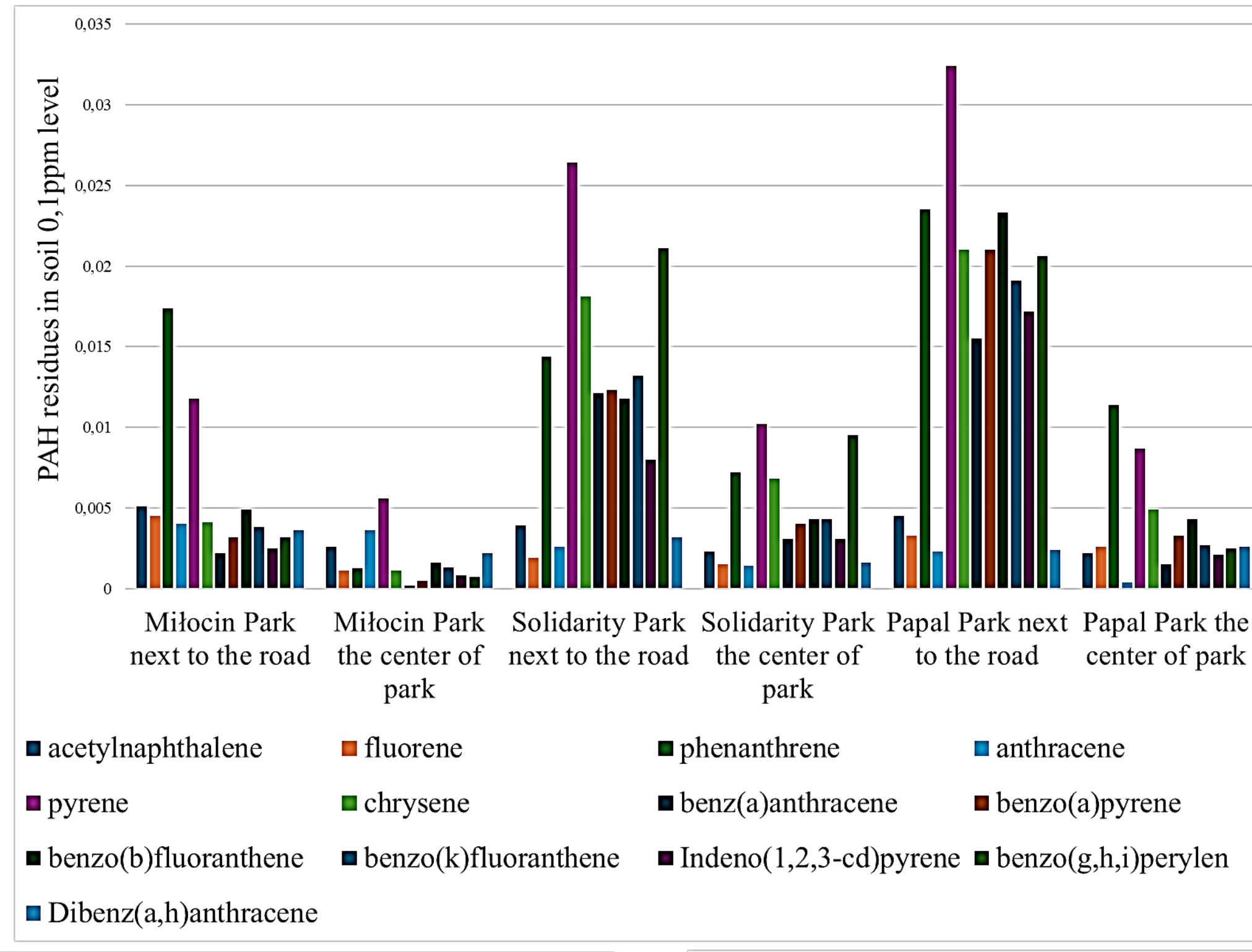
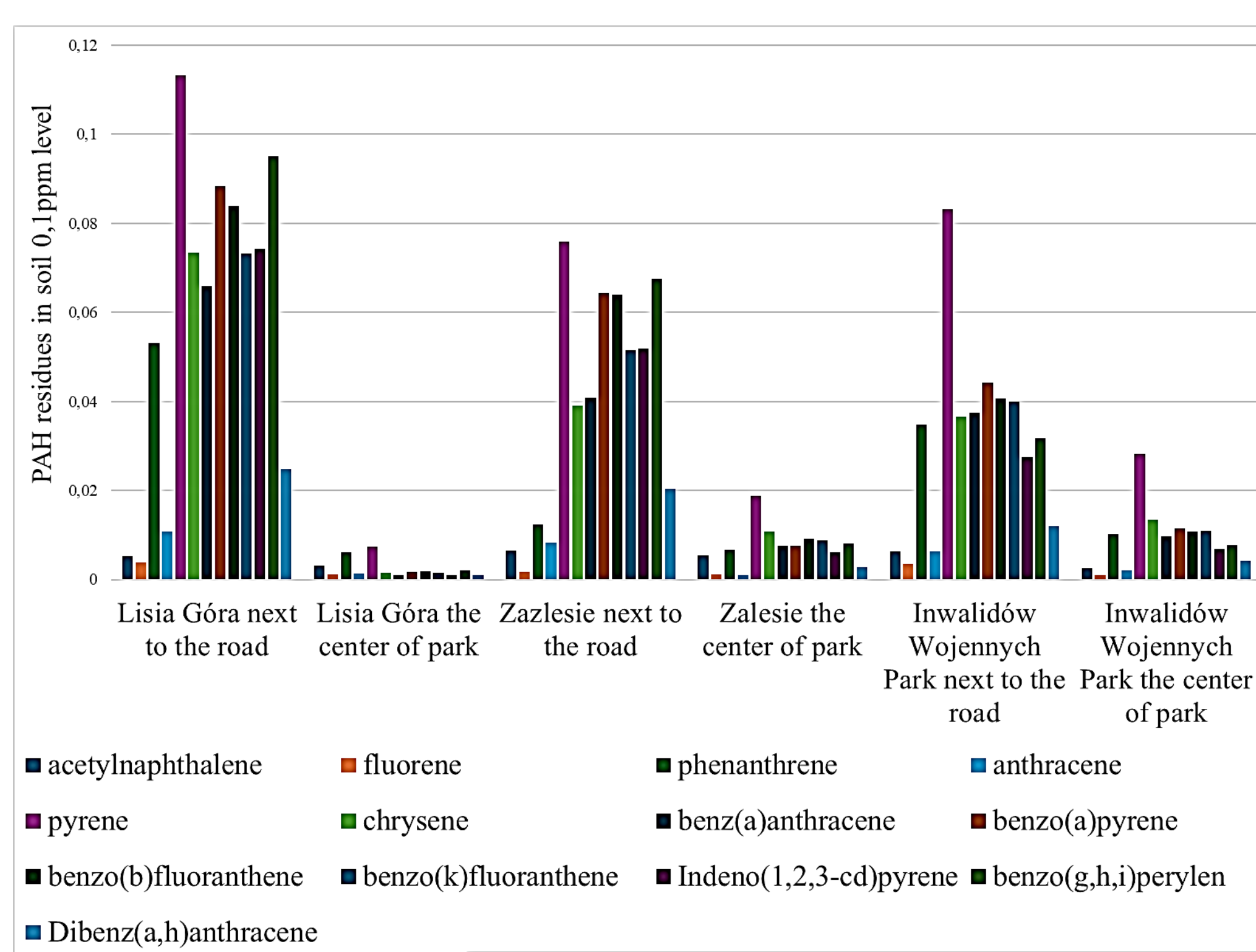
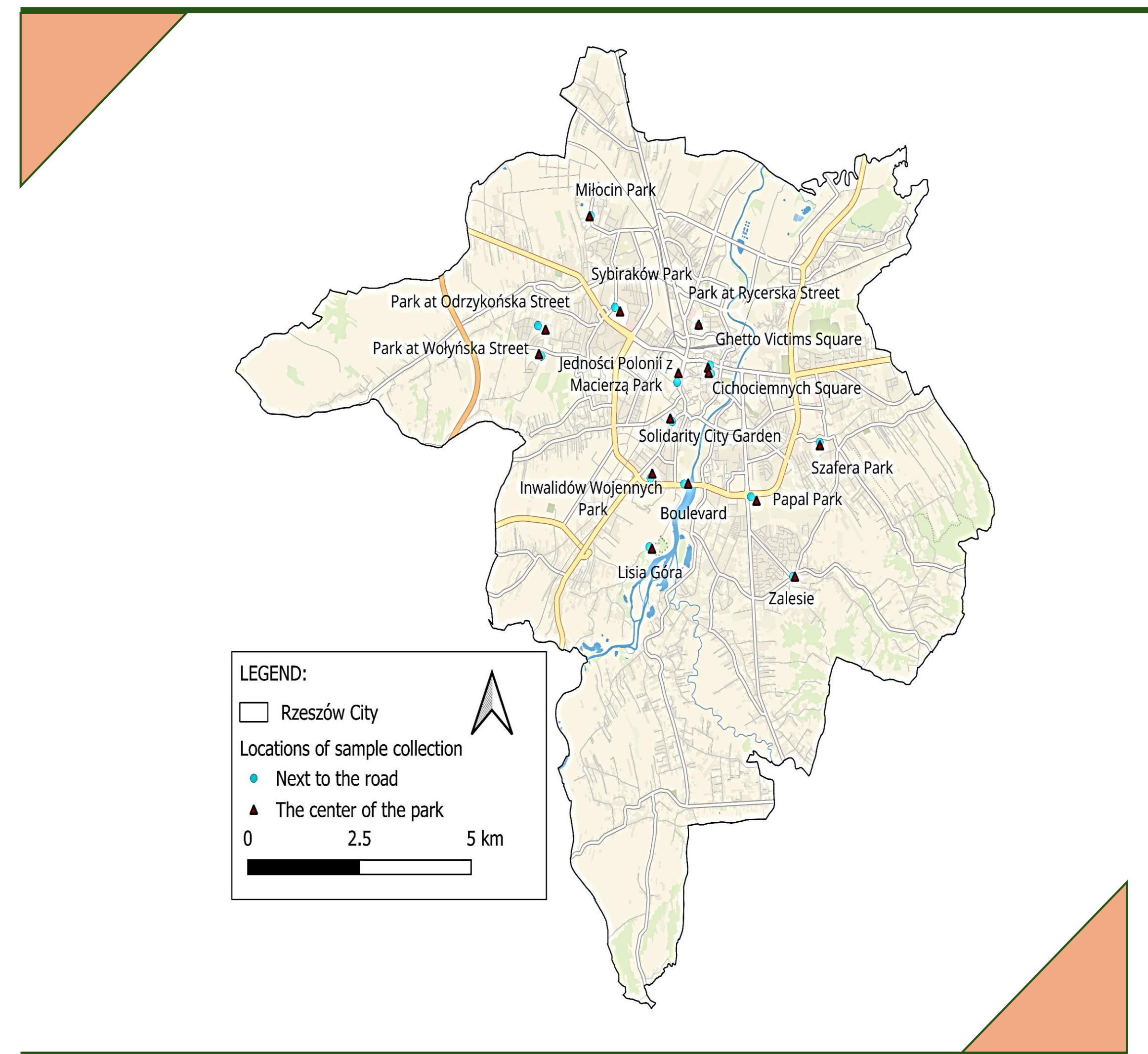
Urban green areas play a significant role in reducing environmental pollution by retaining and accumulating harmful substances, including polycyclic aromatic hydrocarbons (PAHs). **The presence of polycyclic aromatic hydrocarbons (PAHs) in the environment is widespread. These pollutants are primarily generated through the incomplete combustion of organic matter. Such processes occur naturally, for example, during forest fires, as well as in human activities, including waste incineration, motor vehicle emissions, and industrial operations.** They exhibit toxic, mutagenic, and carcinogenic properties, making their presence in the soil a threat to human health and ecosystems.

OBJECTIVE OF THE STUDY

The aim of the study was to assess the ability of urban green areas in Rzeszów to retain pollutants, particularly polycyclic aromatic hydrocarbons (PAHs). Environmental soil samples were analysed to determine the extent of accumulation of these substances and their potential impact on urban environmental quality. Soil samples were collected from both the center of the parks and near the streets within the same parks.

METHODOLOGY

The PAHs content in soil was assessed with the QuEChERS multiresidue method, combined with gas chromatography coupled with tandem mass spectrometry (GC-MS/MS). For this purpose, 5 g of each soil sample was weighed. Then 10 ml of water and 10 ml of acetone and hexane mixture (1:4 v/v) were added to each sample. The contents of the samples were mixed for 1 minute. To each one buffering salts were added, consisting of 4 g of anhydrous magnesium sulfate, 1 g of NaCl, 1 g of anhydrous trisodium citrate, and 0,5 g of disodium hydrogen citrate. The mixture was shaken for 1 minute and then centrifuged. 5 ml of each extract were taken and added to purification dispersion salts consisting of 150 mg PSA and 900 mg MgSO₄. The mixture was shaken for 1 minute and then centrifuged. The extracts were collected in chromatographic vials for further analysis of PAHs using gas chromatography coupled with tandem mass spectrometry (GC-MS/MS).



Polycyclic aromatic hydrocarbons (PAHs) residues in soil samples collected from 15 parks in Rzeszów, both from the park center and next to the road locations.

CONCLUSIONS

Great majority of soil samples have PAH levels lower than the limit and the ones that do cross it are the samples from areas near communication routes on the peripheries of green areas. Samples from three green areas had levels of PAHs over the acceptable limit (Polish Dz.U. 2016 poz. 1395 states that limits for PAHs in soils are: 0.2 mg/kg for anthracene, chrysene, indeno(1,2,3cd)pyrene and benzo(g,h,i)perylene and 0.1 mg/kg for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and dibenzo(a,h)anthracene). Comparing PAH levels from peripheral and centre samples results in the emergence of a pattern that is true for most samples. The ones from the peripheries of green areas have significantly higher levels of PAHs than the ones from the centres. The results showcase the green area's abilities to retain PAHs that come from urban pollution.



PARK AT RYCERSKA STREET