EGU25-21807, updated on 15 Mar 2025
https://doi.org/10.5194/egusphere-egu25-21807
EGU General Assembly 2025

The urban microplastic footprint: investigating the distribution and transport

Inês Leitão, Loes van Schaik[1], Antonio Ferreira[2], and Violette Geissen[1]

[1]Soil Physics and Land Management Group (SLM), Wageningen University & Research, P.O. Box 47, 6700 AA, Wageningen, Netherlands

[2]Research Centre for Natural Resources, Environment and Society (CERNAS), Polytechnic Institute of Coimbra, Escola Superior Agrária de Coimbra, Bencanta, 3045-601 Coimbra, Portugal

Plastic pollution has become an escalating global issue, with large quantities of plastics being produced and taking a long time to degrade in the environment. Once in the environment, plastics break down into microplastics (<5 mm), which have been detected in various environmental compartments worldwide. Microplastics contribute to pollution in water, air, and soil, with consequences for the normal functioning of the ecosystems, and have been linked to human health concerns. The growing urban population has exacerbated pollution, particularly in cities. Urban areas are significant pollution sources, with roads, industrial activities, wastewater and landfills serving as key hotspots. Pollutants like microplastics are transported from these sources through pathways such as wind and rain, making it difficult to quantify, manage, and remediate them – an ongoing challenge recognized by the European Commission.

Experts emphasize that green urban areas can act as natural filters for pollutants, including microplastics, by capturing them in vegetation. These areas can help control the transport of pollutants. While much is known about microplastic contamination, further investigation is needed into their presence in soils, their transport mechanisms, and the role of vegetation in filtering microplastics, particularly in urban environments.

This study focuses on (1) the spatial distribution of microplastics in urban soils across different land uses, and in runoff and streams waters, (2) their transport via atmospheric deposition and wind erosion, and (3) their deposition in vegetation, including grass and tree leaves. Coimbra, a medium-sized city in central Portugal, serves as the case study. Soil, sediment, water, and vegetation samples were collected from Coimbra and analyzed at Wageningen University & Research labs. Microplastics were extracted using density separation with Sodium Phosphate solution (~1.4 g cm−3) and filtration methods, then visualized under a stereo microscope and identified using u-FTIR.

How to cite: Leitão, I., van Schaik, L., Ferreira, A., and Geissen, V.: The urban microplastic footprint: investigating the distribution and transport, EGU General Assembly 2025, Vienna, Austria, 27 Apr–2 May 2025, EGU25-21807, https://doi.org/10.5194/egusphere-egu25-21807, 2025.