



Ministry of Infrastructure
and Water Management

Deltares

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Introduction and a warm welcome



One of the major environmental issues in soil and water management is the presence of plastics. Awareness is growing that pollution by plastics must be prevented and recent research shows that it becomes a bigger issue especially in soil. Knowledge about plastics in the soil is also still a young branch of science while the input sources of plastics into soil are manifold. It is of great relevance to bring experts from different disciplines together for exchanging knowledge, learning through in-depth discussions, and having discussions with decision makers in the sector and politics.

Therefore, Deltares and the Dutch Ministry of Infrastructure and Water management have initiated the organization of this international conference. Thank you for coming to Utrecht and by joining this conference: you will contribute to the understanding of risks and to develop crucial mitigation strategies, and towards limiting and managing the impact on human health and the environment on a national, EU and international level.

This book of abstracts shows that the urgency is internationally felt and that your fellows are working hard to get more in-depth knowledge to support the prospect of action. Please learn and enjoy the scientific presentations, workshops, discussions, and all great network moments here in Utrecht.

The conference chairs,

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P03 Influence of plastic waste on soil properties and microbial activity in three river basins in Serbia

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Microplastic (MP) accumulation in soil may have a detrimental impact on soil quality and biota. The goal of this study was to reveal the impact of microplastic particles on soil chemical, physical and biological characteristics. Alluvial soils from three main river basins (Danube, Morava and Sava) most affected by seasonal flooding were selected in Serbia. Two type of land use were studied: forest soil (MP polluted and non-polluted) and agricultural soil (plastic greenhouse and open crop production). Soil was sampled from two depths 0-15 and 15-30 cm in 2022. Soil electrical conductivity (EC), pH, CEC, content of total carbon, nitrogen, P_2O_5 , K_2O , Cu, Zn, Mn and $CaCO_3$, particle size distribution, volumetric mass, specific mass and porosity, basal respiration and microbial activity measured by alkaline trap method were analyzed. The values of EC and pH were higher in all soil samples from plastic greenhouses compared to the control samples in both depths at both sites, while the measured values of CEC, carbon, nitrogen, P_2O_5 and K_2O were higher in samples from the control arable soils. The content of $CaCO_3$ was higher in the samples from the greenhouse compared to the control at both depths at the site in the Sava basin, while it wasn't significantly different in the samples from the Danube basin. The content of Cu, Zn and Mn was higher in the control samples at both depths in both sites, except for the sample from a depth of 15-30 cm from the location in the Danube basin where the Mn content is higher in the greenhouse. No significant difference in volumetric mass between the samples from the greenhouse and the control samples at both sites was detected. However, the specific mass, porosity, and particles > 0.02 mm were higher in the soil from the greenhouse at both sites. The microbial activity expressed by soil respiration at the Sava basin wasn't significantly different between the plastic house and control arable soil. On the contrary, in the Danube valley respiration was by 78% higher in the control samples compared to the samples from the plastic house. In all studied sites soil chemical and biological properties were significantly affected by the presence of plastic materials in plastic greenhouses. Generally, polluted sites showed elevated microbial respiration and the rates of C mineralization. Wild mixed waste deposits contain a variety of organic substrates including microplastics, which are organic polymers. They can serve as a source of organic carbon for soil microorganisms under laboratory-controlled conditions with optimal temperature and humidity. The changes in soil physical parameters are obviously due to the presence of plastic particles. Further study of differences in the activity of soil microorganisms in polluted and unpolluted areas is necessary in order to identify the threshold level of MP pollution for the optimal amount and activity of soil biota, as well as for soil health and fertility.

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