# Comparative analysis of atmospheric microplastics in urban centers of Sri Lanka: insights from Colombo, Kandy, and Kurunegala

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Atmospheric microplastics (AMPs) have emerged as a significant environmental pollutant with potential risks to human health and ecosystems. This study provides a comprehensive assessment of atmospheric microplastic pollution across three districts in Sri Lanka; Colombo, Kandy, and Kurunegala. These sites were selected due to their contrasting levels of urbanization, industrial activity, and population density, offering a representative cross-section of Sri Lanka's urban landscape. Microplastic particles were collected using passive air sampling from 15 locations (five sites per district) over three biweekly sampling rounds, covering residential areas, high-traffic zones, and industrial areas. The rigorous sample preparation, including pre-filtration and organic matter digestion was conducted to isolate microplastic particles for analysis. Optical microscopy and Raman spectroscopy were used for particle identification and characterization. Raman spectroscopy was preferred for its higher spatial resolution and ability to detect finer particles (<20 μm). The results showed average AMP counts of 5.8 ± 0.4 particles per sample in Kandy, 5.33 ± 0.47 particles per sample in Kurunegala, and 5.33 ± 0.29 particles per sample in Colombo, with higher counts observed in industrial zones and high-traffic areas. The selected industrial zones included Homagama, Getambe Junction, and Malkaduwawa, known for waste dumping, vehicular congestion, or nearby manufacturing activity. Fragments were the dominant type (61%), followed by fibers (18%), flakes (6%), and microbeads (1%). Spectral analysis identified polyethylene terephthalate (PET), polypropylene (PP), and polyethylene (PE) as the primary polymers. Meteorological parameters including temperature, wind speed, humidity, and rainfall showed no significant correlation with AMP counts ($P > 0.05$). This study highlights the urgent need for pollution control measures and targeted policies to manage microplastic pollution in Sri Lanka's urban environments, given the high prevalence of inhalable microplastic particles in these regions.

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