

ICSD 206

**A REVIEW ON MICROPLASTIC CONTAMINATION IN GROUNDWATER:
SOURCES, PATHWAYS, AND IMPACTS ON PLANT AND HUMAN HEALTH****S.M.A.B.K. Samarakoon^{1*}, N. Saheedha², J.A.S.G. Randimali², R.M.B.M. Rathnayaka²,
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Abstract: Microplastics (MPs) are increasingly detected in soil and groundwater sources across various regions, often originating from agricultural, industrial and urban activities. Although microplastics are extensively studied in soil, sediments, marine and freshwater ecosystems, there has been less research on their presence in groundwater. PRISMA protocol was used to conduct this systematic review, aimed to (a) explore the main sources and type of MPs in groundwater with their transportation pathways, (b) identify the impact of MPs contaminated groundwater on human health and plant productivity and (c) discuss the potential strategies for eliminate MPs pollution in groundwater. This review was conducted using 32 peer-reviewed, English language articles, published between 2012 to 2025 on science direct, springer, AGRICOLA, FAOSTAT, Wiley online library with keywords including “microplastic”, “groundwater”, “contamination”, “Agriculture”, “Industrial and urban Activities”, “human/ plant health”. The findings reveal that major sources of MPs were from the industries that release unpurified wastewater, sewage sludge, agricultural inputs such as mulches, compost, plastic pots/trays/ greenhouse polythene, agrochemicals, seed encapsulating agents, machineries, livestock farming and irrigation. These pollutants degrade within the soil by UV radiation, mechanical stress, chemical and microbiological activities and then reach groundwater systems via leaching, infiltration via surface water and percolation through soil pores. Due to the Use of MPs contaminated Groundwater as irrigation water for plants and direct ingestion by humans may lead to the accumulation of MPs in edible plant parts, with potential risk via bioaccumulation and biomagnification to human health. MPs have been linked to oxidative stress, endocrine disruption and chronic inflammation. MPs inside plants can disrupt normal physiological processes, causing disorders and reducing plant growth by blocking water and nutrient uptake. Pyrolysis, substituting plastics with biodegradable alternatives, plastic filtration, and subsequent chemical or biological degradation are suggested to reduce the MPs contamination in soil and groundwater. Addressing microplastic contamination in groundwater is crucial for safeguarding water resources, protecting public health, and promoting environmental sustainability.

Keywords: Environmental sustainability; Groundwater contamination; Microplastic pollution; Plastic waste; Remediation strategies; Water quality