
First evidence of microplastics in the Chili, Vitor and Quilca river basin in the city of Arequipa - Peru

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Abstract

The expansion in the knowledge about the occurrence of microplastics is growing pointing to a major global concern which affects all ecosystems and the Souther Peruvian riverine system is not the exception. Tackling the null information regarding the occurrence and distribution of microplastic in the Arequipa watershed, for the first time, we assessed the presence, abundance, distribution and identification of the micro polymers from the Chili River basin, a river which runs along the city of Arequipa and flows into the Pacific Ocean at Camaná. The sampling locations included Uchumayo, Tiabaya Yura and Sigüas. Samples were digested by KOH (10 %) and H₂O₂ (30%, 40°C) and counted under Zeiss, Discovery V8, Objective 1.5X, Camera 0.5X, Zoom 1X-8X). Chemical identification was performed by microATR (Perkin Elmer, Spotlight 200i). All the collected samples showed the occurrence of microplastics. The overall mean concentration was 6.50 MPsm-3, with a minimum value of 4.06 MPsm-3 and a maximum value of 9.56 MPsm-3, with Sigüas > Uchumayo > Yura > Tiabaya (9.56 MPsm-3, 6.55 MPsm-3, 5.82 MPsm-3 and 4.06 MPsm-3, respectively). Among the recorded MPs, microfibers were dominant, representing 63.15% of the total, followed by films (19.84%), fragments (8.37%) and sheets (7.91%). In regards to the chemical identification of microplastics, Polyethylene(35.71%)> Styrene(28.57%)> Polypropylene(21.43%) while Polystyrene and olefin microfiber accounted for 7.14% each. The evaluation of putative microplastic sources pointed to littering and urban inputs and the strong agricultural activities in the catchment area. Results in this study set the baseline for the area and rise a concern for the area outlying the need to control urban and rural waste disposal to abbate microplastic riverine pollution.

Keywords: quantification of microplastics, FTIR, infrared, microplastic, River Chili, Arequipa, microATR, stereo microscopy, infrared microscopy, microplastic sampling, digestion of microplastics

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