
Changes in distribution and types of plastic debris in urban river shores, Ulaanbaatar city, Mongolia

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Abstract

Plastic waste can be transferred to the river by wind, flood, and unexpected artificial disposal, which gives a negative impact on the environment and human health. Rivers collect plastic wastes from their watersheds according to geographical factors. Therefore, characterization of plastic distribution and composition with respect to land-uses can be understandable for fate of plastic wastes. Plastic debris surveyed from the main (Tuul river) and tributary river shores in Ulaanbaatar (UB) city, Mongolia from the upperstream to downstream to understand behavior and control of plastic waste along the major river in the urbanized city. Sampling areas are divided into the apartment and housing/ger (traditional yurt) area, industrial and agricultural areas. The composition of collected plastics along the Tuul river in the UB city was composed of 63% micro, 15% of meso, 18% of macro, and 5% of mega-sized plastics on the number basis. Foam and films were dominant in the material-based fractions. Especially, polystyrene foams occupied 99% of micro and 72% of meso-sized plastic fractions, whereas the film type makes up 55% of macro and 77% of mega-sized plastics. From the viewpoint of sampling location, foam and fiber types of microplastic were less in the upperstream of Tuul River, but higher amounts of foam and fibers were found at downstream of the river. Polystyrene foams transported easily with river flow and wind coupling with their degradation process because of their least density and smaller sizes. Although films were abundant in housing/ger areas, foams distributed everywhere along the rivers. Conversely, industrial areas released the least number of plastic wastes. Plastic waste distribution along branch tributaries was different from the Tuul River shore. Macro and Mega plastics tended to distribute along the shore of tributaries connecting to Tuul river. The size distribution may vary according to catchment area and types of land-uses.

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