ABSTRACT

The rapid increase of plastic production and disposal into the environment has resulted in anthropogenic litter (i.e., trash; AL) becoming a global problem. In aquatic ecosystems, macro- and microplastics are long-lived, mobile, and interact with the physical and chemical components of aquatic ecosystems. Our objectives were to: (1) assess the impact of microplastic pollution on the ecosystem processes of ecosystem metabolism and N_2 flux in an oligotrophic lake and (2) to assess the abundance and assemblage of anthropogenic litter in a large urban river. For objective (1), we added microplastics at a range of concentrations to littoral mesocosms. Ecosystem metabolism rates were low, as expected for an oligotrophic lake, and showed no difference across microplastic treatments. N_2 flux was also not affected by microplastic concentrations, with N_2 being at saturation in the mesocosms. Our results suggested a minimal impact of microplastic on these ecosystem processes in an oligotrophic lake. For objective (2), volunteers collected litter along marked reaches signifying different habitats of an urban river over the course of three summers. The abundance and assemblage of AL was calculated and compared to scientist generated data from a similar site with similar habitats. Our results from both scientist and volunteer collected data showed that more complex habitats retained more trash and that the most common items found were plastic, including food-related items and fragments. This study provides insights on the ecological impacts of plastic pollution in urban rivers and on ecosystem-scale processes through in situ microplastic addition.