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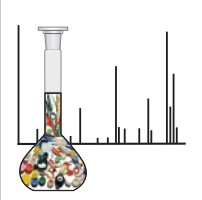
How to cite

FILELLA, Montserrat, TURNER, Andrew. Hazardous Plastics in Swiss Lakes? In: Chimia, 2019, vol. 73, n° 1, p. 91. doi: 10.2533/chimia.2019.91

This publication URL: https://archive-ouverte.unige.ch/unige:114833
Publication DOI: 10.2533/chimia.2019.91

doi:10.2533/chimia.2019.91 Chimia 73 (2019) 91



Highlights of Analytical Sciences in Switzerland

Division of Analytical Sciences

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Hazardous Plastics in Swiss Lakes?

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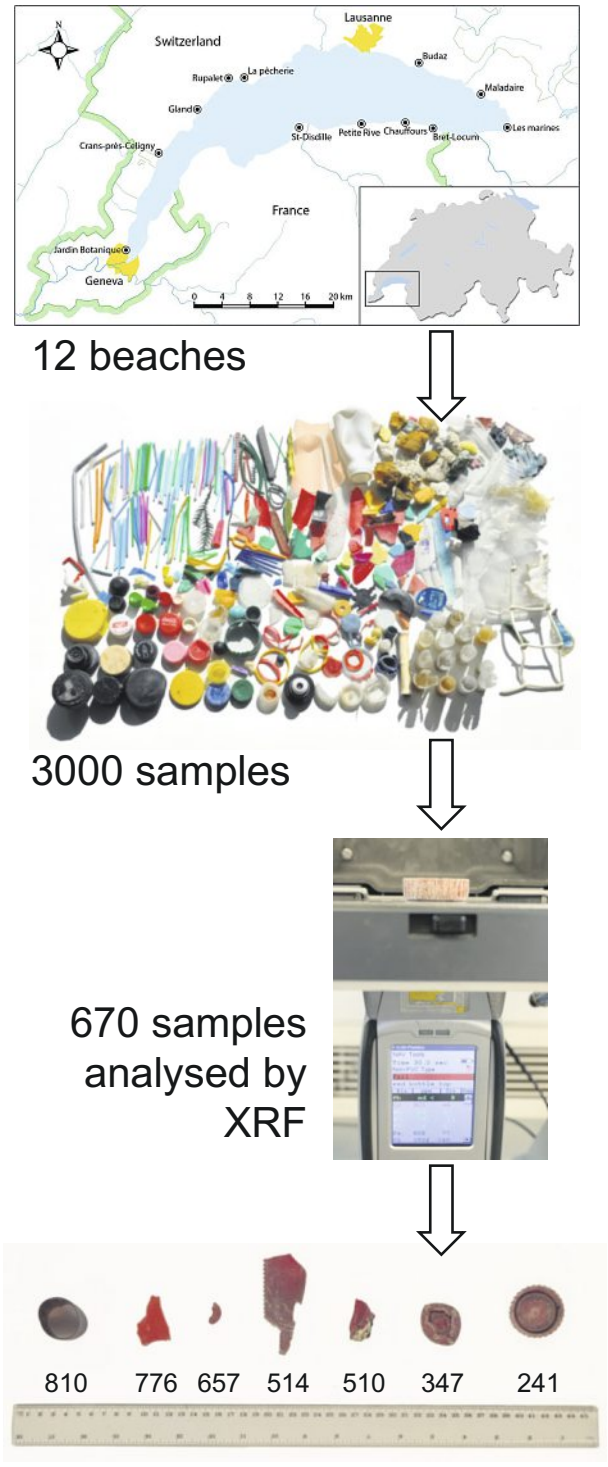
Keywords: Hazardous elements · Lakes · Plastics · X-ray fluorescence spectrometry

The accumulation and impacts of plastic litter in marine environments has received extensive attention over the past decade. In contrast, littering in the freshwater environment has received relatively little study, despite the presence of plastics on the shores and beds of lakes and suspended in the lentic water column that are likely to pose the same problems to wildlife as marine plastics. Regardless of the type of water system, the majority of research in this area has targeted the presence of plastics themselves and, sometimes, their accumulation of persistent organic micropollutants (*e.g.* PCBs, PAHs). Only very recently attention has been paid to the occurrence of chemical elements, like metals, metalloids and halogens, that are either adsorbed to the plastic surface or incorporated into the polymer itself as an additive.

Following initial work on beached marine plastics,[1] we have turned our attention to the presence of chemical elements in plastics on lake beaches.[2] The sampling and measuring workflow is illustrated in the Figure. The plastic stock was collected from the shores of Lake Geneva and consisted of pieces or blocks of expanded polymer (polystyrene or polyurethane foam), identifiable primary objects of various size and color (*e.g.* bottles, bottle tops, cotton buds, pens, toys, straws) and an heterogeneous assortment of secondary fragments whose origin was either discernible or unknown. Several hundred samples were analyzed by energy-dispersive portable X-ray fluorescence (XRF) spectrometry, a technique that is perfectly adapted to this type of study because of its non-destructive nature and high throughput capacity. Significantly, the results revealed high concentrations of hazardous elements or compounds among many of the plastics analyzed; specifically, Cd, Hg, Sb, Pb and Br were frequently detected with maximum concentrations of 6760, 810, 27.100, 23.500 and 27.400 ppm, respectively. The abundance of hazardous elements in beached plastics that have been restricted or banned point to a high residence time of the plastic stock in lakes. **The migratability of hazardous elements from the polymeric matrix is likely to determine their environmental impacts and is recommended as a future area of research**.

Received: November 26, 2018

[1] A. Turner, K. R. Solman, *Talanta* **2016**, *159*, 262.
[2] M. Filella, A. Turner, *Front. Environ. Sci.* **2018**, *6*, 1. doi:10.3389/fenvs.2018.00001.



Workflow of the study in Lake Geneva, Switzerland, showing samples with high Hg contents.

Can you show us your analytical highlight?
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