How much do perfumes pollute? A pioneering study in the canals of Venice

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Researchers at the Ca' Foscari University of Venice and the Institute for the dynamics of environmental processes of the National Research Council (CNR - IDPA) have been investigating the canals to look for traces of these molecules which are referred to as 'perfumes ' in the ingredients of products that we use daily.

Soaps, detergents, shampoos and many other personal hygiene products contain mixtures of 'odorous' molecules that have passed safety tests for human health with little or nothing known about their impact on the environment. Researchers at the Ca' Foscari University of Venice and the Institute for the dynamics of environmental processes of the National Research Council (CNR - IDPA) have been investigating the canals to look for traces of these molecules which are referred to as 'perfumes ' in the ingredients of products that we use daily.

The results were published in the scientific journal *Science of the Total Environment*. The lagoon is thus the first case study on the levels of certain fragrances, chemically produced by humans and widely used in everyday life, in the environment.

Between April and December 2015, scientists repeatedly collected water samples from 22 places between the inner canals in the historic center of Venice, the island of Burano and at two points in the far-north lagoon. They were looking for the presence of 17 fragrances among the most used and chemically stable between the thousands available to the cosmetics industry.

Traces of 'scented' molecules have been identified in all sampling sites, including those more distant from inhabited areas, though illustrating concentrations up to 500 times higher in the inner city canals. Samples collected during conditions of low tide in Venice and Burano showed concentrations comparable to those of untreated waste water.

In Venice, the city without sewers, wastewater treatment through biological tanks which then flow directly into the canals thus seems an insufficient method of lowering the concentration of these molecules. For example, one of the most frequently found compounds in the waters of the lagoon was benzyl salicylate, a known allergenic which has to be indicated on the labels of cosmetic products which contain it.

So why do these fragrances persist in the environment? What is their possible impact on our ecosystems? Questions like these remain open and it is clear that further studies are needed in order to answer them. As stated by Marco Vecchiato, post-doc at the Department of Environmental Sciences, Informatics and Statistics of Ca ' Foscari and research creator; "Ours is a pioneering study on the persistence of a new class of potential contaminants in the environment. The direct connection between the urban and natural environment makes Venice and its lagoon particularly ideal for the study of these compounds".

"After this first analysis - adds the researcher - we can confirm that fragrances are released continuously into the canals of Venice, both during high and low tide and both in the historic center and the lagoon. According to our data, however, the concentrations seem to be below the threshold for acute toxicity to marine organisms. That being said, we do not know the consequences of prolonged exposure to low doses of these substances. This study is thus the first step in gauging an understanding of its environmental fate."

The scientific article with the results from the research concerning

"Fragrances as new contaminants in the Venice lagoon" was signed by the researchers Marco Vecchiato , Simone Cremonese , Elena Gregoris, Elena Barbaro, and professors Andrea and Carlo Gambaro Barbante.

More information: Marco Vecchiato et al. Fragrances as new contaminants in the Venice lagoon, *Science of The Total Environment* (2016). DOI: 10.1016/j.scitotenv.2016.05.198

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