

Pharmaceutical substances found in waters of Donana

September 28 2010



Pharmaceutical substances have been found in the waters of Doñana. Credit: Esteban Alonso

Researchers from the University of Seville (US) have detected active pharmaceutical substances for the first time in the waters of the Doñana National Park and its surrounding areas. The results suggest ecotoxicological risks for aquatic organisms. The scientists recommend that advanced technologies should be used to treat urban waste water in order to remove these compounds.

Five anti-inflammatory drugs (diclofenac, ibuprofen, ketoprofen, [naproxen](#) and [salicylic acid](#)), a nervous system stimulant (caffeine), two [antibiotics](#) (sulfametoxazol and trimethoprim), two [lipid](#) regulators (clofibric acid and gemfibrozil), an anti-epilepsy drug (carbamazepine),

a beta blocker (propranolol) and four hormones (three natural: oestrone, 17 β -oestradiol and oestriol; and one artificial: 17 α -ethinyloestradiol) have all be found in Doñana.

"Ibuprofen is the compound we found at the highest concentrations. Each year, 140 kg of this drug are discharged into the main Doñana tributaries via urban waste water from the surrounding area", Esteban Alonso, lead author of the study and a researcher at the Department of Analytical Chemistry at the US, tells SINC.

This pioneering study, which has been published in the *Journal of Hazardous Materials*, shows that "the primary source of these drugs in the waterways flowing into Doñana (the Guadiamar river, Partido stream and La Rocina stream) is treated [waste water](#) from nearby towns", points out Alonso.

These compounds, consumed and metabolised by people, are discharged in the form of urine and faeces via the sewerage systems in towns surrounding Doñana into water treatment plants.

"These are discharged into the Park's water resources, inevitably, 24 hours a day, 365 days per year", the researcher adds. According to the scientist, the technologies used to treat water are "insufficient", and currently only remove rather more than 60%, "with significant variations from one drug to another".

In order to eliminate these kinds of compounds and other associated ones from the waters of Doñana, the scientists recommend implementing tertiary treatment systems at the existing treatment plants, based around oxidation processes or membrane systems.

A threat to aquatic ecosystems

The research team has carried out a preliminary estimate of the ecotoxicological risks, and has found that certain levels of drugs pose a risk to [aquatic organisms](#) such as *Hydra attenuata*.

Previous experiments carried out by the team, in collaboration with the University of Stirling (United Kingdom), have shown that exposure over the course of five days to different drugs causes alteration in various genes in the liver and brain of the Atlantic salmon.

Now, the scientists will transfer these results to native species living in the water systems of Doñana in order to "better understand the way these compounds influence genetic expression", says Alonso.

More information: References:

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Provided by FECYT - Spanish Foundation for Science and Technology

Citation: Pharmaceutical substances found in waters of Donana (2010, September 28) retrieved 11 May 2024 from <https://phys.org/news/2010-09-pharmaceutical-substances-donana.html>

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