



## **Incidence and interactions of heavy metals and pharmaceutical products in surface waters of a Mediterranean coastal wetland.**

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Heavy metals have been during decades a result of the human fingerprint on the ecosystems, mainly in waters, soils or vegetation, being considered as a major threat also on human health. However, the increasing in human population shows other aspect, such as the so called “emerging contaminants”. They constitute an increasing group of compounds that includes, among others, personal care products, drugs of abuse and pharmaceuticals. These contaminants have become, in recent years, of great concern for researchers and, even, for the population. Among these substances, the presence of pharmaceuticals in the ecosystems compartments has becoming an increasing problem for environmental sustainability, and also for human health, with consequences very scarcely known. They reach the nature from waste waters treatment plants, industrial waste effluents, uncontrolled landfills, etc. affecting particularly the fauna in its different levels. Some pharmaceuticals have shown toxicity not only to bacteria, algae and invertebrates but also to fish, mollusks, etc.

This work is focused on the study of the presence of 17 relevant pharmaceuticals and 7 heavy metals (Cd, Co, Cr, Cu, Ni, Pb and Zn) in surface waters of the irrigation channels and the lagoon of the Pego-Oliva Marsh Natural Park (Valencian Community, Spain), which is characterized by a long history of human pressures, such as marsh transformation for agricultural uses, urbanization, etc. In this area, 34 sampling zones were selected, covering the main land uses. The interactions and possible relationships between both groups of contaminants were studied, together with the influences of the source of water samples, land uses and their spatial distribution.

All water samples appeared contaminated with at least with two compounds. Ibuprofen and codeine were the compounds more frequently detected in concentrations between detection limit and a maximum of 59 ng/L and 63 ng/L respectively. Regarding the studied metals, Zn showed values under the detection limits in all samples, the remainder metals appeared in concentrations surpassing the WHO and EU limits for drinking waters, and all except Pb exceed the limits established for irrigation waters.

Ni showed significant direct correlations with diazepam (DZM), norfloxacin (NFX), ofloxacin (OFX) and fenofibrate (FNF), and inverse relationships with ibuprofene (IBP) at 99 and 95% of significance. Pb and Co also showed significant correlations with some pharmaceuticals.

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