

Heavy metals contamination potential and distribution in sediments of the River Turia, Spain

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Knowledge on the state of waters and sediments of the rivers in the European Union is compulsory. Identification and quantification and monitoring of contaminants is somewhat established in the Water Framework Directive, so it can be acquired a reliable knowledge of the quality for further application of corrective measures can be developed when required. Heavy metals is one of the groups of contaminants that appear in the list of priority substances and in the legislation, so it is essential to attend its study to provide knowledge on the existing loads in different environmental matrices, such as sediments.

This work presents a procedure that determines the presence and degree of concentration of a group of seven heavy metals (Co, Cd, Cr, Cu, Ni, Pb, and Zn) in the sediments of the River Turia, a typical Mediterranean River, located in the East of the Iberian Peninsula. The methodology includes their identification in two years (2012, 22 sampling points, and 2013, 27 sampling points). Two pollution index, one individual (Geo-accumulation Igeo, Igeo) that estimated the potential contamination of each metal and a synthetic one (Potential ecorisk index range, PERI) which gets the potential contamination of all 7 grouped applied to each set of data. In addition, to establish possible spatial patterns it has been developed an analysis of the distribution of both indicators and on both dates with Geographic Information Systems, for that purpose it has been divided the River into three segments: upper part (represented by 10 points in 2012 and 13 in 2013), middle part (with 7 points in 2012 and 6 in 2013) and lower section (with 5 points in 2012 and 8 in 2013).

Results show that lower concentrations of contaminants were given in 2012 than in 2013. In 2012 the Igeo index, which is distributed in a qualitative range of seven categories ranging from low pollution to very high pollution, are only meaningful for Zn, with "low to moderate" pollution in 13 places (6 points in the upper part, the 4 in the central and 3 in the lower), for Pb (one point with "moderate" contamination in the upper section, and another with "moderate to high" contamination at the lower part), and for Cd with "low to moderate" contamination in the upper section. In 2012 the PERI index obtained for the set of seven metals is not significant in any of the sampled points, with very low risk of potential contamination values. However, in 2013, the results show greater loads of pollution at some points, obtaining values of the PERI index higher in many sampling point, and with two points with "low to moderate" contamination located in the lower part.