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Anthropogenic landscapes and pesticides distribution in waters of the river Júcar, Spain

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The quality of river flows may be affected by farming activities whenever dissolve substances persist as nonpoint source pollutants. Among contaminants, the group of pesticides is associated to farming activities. Their extended use depends on the dominant farming practice and the type of crop that, in turn, will be reflected on the specific pollutants and concentrations found. Their identifation in surface waters may also depend on the size and structure (to landscape scale) of the agriculture land. Thus, to understand surface waters transport and hydrological connectivity of contaminants in river flows research to large basin scale is needed.
In this work it is assumed that at large geographical scale pesticides and herbicides are related to major landscape land use-cover types. The methodological framework developed consisted on the application of environmental forensic criteria combining laboratory analytical water samples and cartographic analysis using Geographical Information Systems (GIS). To the detection and quantification of pesticides, the sampling strategy consisted in the collection of 15 water samples distributed alongside the River Júcar and its two main tributaries (River Cabriel and Magro), located in the River Júcar drainage Basin, Spain. 50 pesticides were identified and quantified by liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS). Geographical analysis were performed after geo-location of sampling points analytical results and integration in the GIS environment using land use-cover digital layers, togeheter with soil, lithology and topography layers.
Out of 50 pesticides 20 were identified and 18 presented concentrations higher than the Limits of Quantification. Values ranged from 0.04 ng/L (Terbuthylazine-2 Hydroxy) to 79.39 ng/L (Carbendazim), 150.75 ng/L (Thiabenzadole) and 222.45 ng/L (Imazalil). Contaminants identified more frequently were Chlorpyriphos, Ethion, Chlorfenvinphos and Imazalil, found in 15, 13, 12 and 10 sites respectively. There is a clear geographical trend in the number of pesticides found and their concentrations. Three main land use-cover areas where stablished, according to the dominant vegetation cover: natural surfaces, rainfed agriculture and intensive irrigation farming. The number of pesticides incrise from natural areas (28 incidencies in 6 sites) to rainfed (37 detections in 5 sites) and irrigation agriculture (50 incidencies in 4 sampling points). Higher concentrations area also found in the sector with intensive irrigation agriculture.

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