Wastewater plant discharge's hazard potential assessment – a Portuguese case study

Albuquerque, M.T.D., Antunes, I.M.H.R., Silva, A.C.G.

IPCB – Polytechnic Institute of Castelo Branco, Portugal

ABSTRACT

Water resources management must contemplate water's quality monitoring taking into account its different sources and final uses. To fulfill this issue it is essential the study of rivers and streams natural conditions as well as identify the most important anthropogenic impacts.

Characterization, monitoring and control of the impacts due to several wastewaters treatment plants discharges on water quality is of crucial importance.

The herein presented case study focus on the Alcains wastewater treatment plant which discharges directly into the Líria River, an Ocreza's tributary. Eighteen georeferenced water samples were collected downstream at approximately equal distances between the sewage effluent discharge and the Ocreza river confluence. The water samples were collected in three different months of 2010 hydrological year; rainy conditions (January), intermediate conditions (March) and dry conditions (June). The following chemical parameters were analyzed: pH, temperature, biochemical oxygen demand (BOD), dissolved oxygen (DO), dry residue, P_{total}, N_{total} and microbiological parameters. DO, BOD and microbiological parameters were used as indicators to the presence of organic matter in the water and as parameters for evaluating the environmental pollution associated to wastewater plant discharges.

The spatio-temporal evaluation of pollutants dispersion in the Líria river was performed with a coupled multivariate statistical approach using the Principal Components Analysis (PCA) as an exploratory methodology and the Cluster Analysis (CA) as a classification methodology aiming the characterization of the relationships between the measured attributes and water's quality, downstream the impacting discharge.

The results demonstrate a suitable approach for evaluating the environmental impact due to sewage discharges and showed generally a low impact downstream the river. However dry residue, BOD, N_{total}, P_{total} and microbiological parameters showed some outliers above the legal Portuguese parametric values for water quality. Feasibility studies of different treatment schemes and the development of specific monitoring activities are required.