The Impacts of Water Quality Changes on Aquatic Ecosystems: A Case Study of Clariano River, Spain

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Abstract

Water quality degradation resulting from different anthropogenic activities such as agriculture, deforestation and urbanization is a serious worldwide challenge which have negative impacts on aquatic ecology. Unfortunately, it is still difficult to quantitatively determine the impacts of water quality changes on aquatic communities. The objective of the present research activity is to investigate aquatic ecosystem responses to water quality deterioration using a case study of Clariano River, Spain. The Clariano River faces low water quality and the loss of biodiversity in some parts as a result of agricultural, industrial and livestock activities as well as wastewater treatment plants (WWTP) effluents entering the river. The Soil and Water Assessment Tool (SWAT), an eco-hydrological model, is used in the present study for the modelling of discharge, sediment and nutrients. SWAT-CUP is also used to calibrate and validate the SWAT model. We are currently employing the results from the calibrated model to obtain a better understanding of possible relations between water quality and biodiversity. In fact, the present study will focus on macroinvertebrates as biological indicators of stream health, and the model predictions will be coupled with empirical correlations between stream water quality and macroinvertebrates presence in order to assess the impacts of water quality changes on aquatic ecosystem. In addition, different model scenarios will be compared to explore the potential impacts of changes in land use, climate and WWTPs operation on the aquatic ecosystem.

Keywords: aquatic ecosystem, Clariano River, eco-hydrological modelling, water quality, water

resources management