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from various sources of pollution including WWTPs, agricultural and industrial activities as well as septic tanks. Consequently, the river faces low water quality and the loss of biodiversity in some parts.

In the present study, the climatic data from Valencian Institute for Agricultural Research (IVIA, Spain), the hydrological and water quality data from the Júcar Hydrographic Confederation (CHJ, Spain), the Digital Terrain Model (DTM) from the Spanish National Geographic Institute, the land use and crop map of Spain (MCA 2000-2009) from the Ministry of Agriculture, Fisheries and Food (MAPA, Spain), the data of WWTPs from the Public Entity for Sanitation of Wastewater (EPSAR, Spain), and the Harmonized World Soil Database (HWSD) were used. Figure 1 shows the location of the Clariano River Watershed (the study area: 320 km^2), hydrological, water quality and meteorological stations, and wastewater treatment plants.

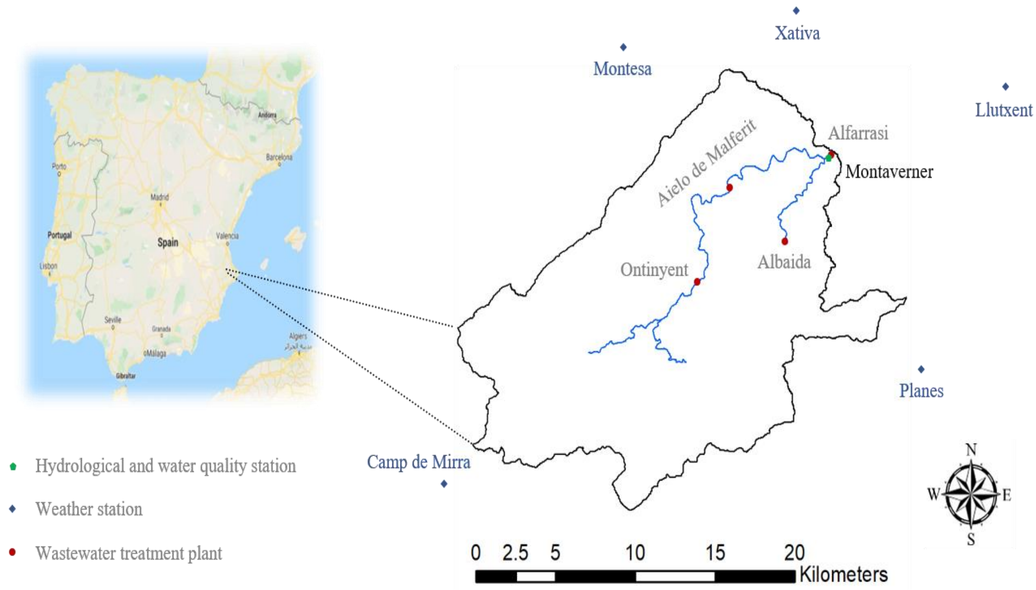

Figure 1. The location of the study area, hydrological, water quality and meteorological stations, and wastewater treatment plants

2.2 SWAT MODEL

SWAT was predicted to be a suitable tool for the modelling of discharge, sediment and nutrients within the Clariano River Watershed. SWAT which was developed by the United States Department of Agriculture, is a comprehensive model that requires a diversity of information including topography and climatic data as well as land use and soil maps in order to run (Arnold et al., 2012). To develop the watershed model, daily precipitation, minimum and maximum air temperature, solar radiation, wind speed and relative humidity of five stations (Planes, Llutxent, Xativa, Montesa and Camp de Mirra), the DTM with a resolution of 25 meters, the land use and crop map of Spain and the HWSD v1.21 were used. Agricultural management operations such as planting, harvesting, fertilization and irrigation have been derived from indications by local farmers and IVIA. As WWTPs effluents affect the hydrology and water quality of the river, effluent and water quality data of four WWTPs (Aielo de Malferit, Albaida, Alfarrasi, and Ontinyent) were also added to the model.

3 RESULTS AND DISCUSSION

The measured streamflow, sediment and nutrients data are required for calibration and validation processes. Hence, the Montaverner Station data including river discharge, and sediment, nitrogen and phosphorus loads were collected for the years 2002 to 2017. Water discharge was measured continuously, but sediment, nitrogen and phosphorus loads were measured irregularly during this period. A 3-year period was considered as warm-up period (2002-2004), a 7-year period was considered as calibration period (2005-2011), and a 6-year period was considered as validation period (2012-2017). The SUFI-2 algorithm in the SWAT-CUP program was used for the model calibration, validation, sensitivity, and uncertainty analysis. P-factor and R-factor were used to quantify the fit between simulation result (95PPU: the 95% Prediction Uncertainty) and observation data (Abbaspour et al., 2007). Table 1 presents the suggested reference values for P-factor and R-factor. R^2 (coefficient of determination) and NSE (Nash & Sutcliffe Efficiency) were also used to further quantify the goodness of fit between the observations and the best simulation. As figures 2 and 3 illustrate, SWAT has an acceptable performance in streamflow, sediment and nutrients modeling of Clariano River Watershed in both calibration and validation periods.

Variable	P-factor	R-factor
Discharge	P-factor > 0.7	R-factor < 1.2
Sediment	P-factor > 0.45	R-factor < 2.4
Nitrate	P-factor > 0.55	R-factor < 1.8
Phosphorus	P-factor > 0.4	R-factor < 2.8

Table 1. Recommended reference values for P-factor and R-factor (Abbaspour, 2020)

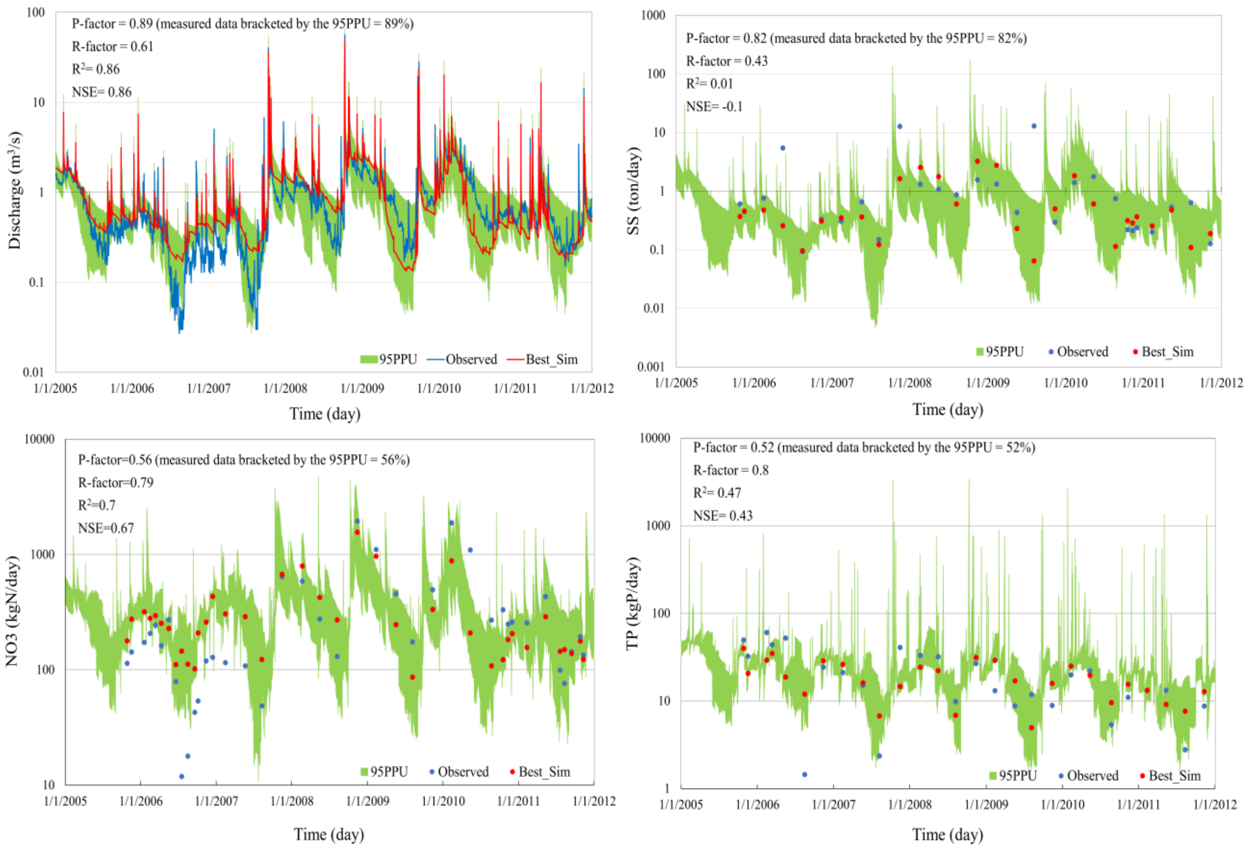

Figure 2. SWAT-CUP outputs showing the observed, the 95PPU and the best simulation for discharge, suspended solids, nitrate and total phosphorus **(calibration period: 2005-2011)**

4 CONCLUSIONS

At present, we were able to reproduce observed loads of total phosphorus, nitrate and suspended solids in our case study. Afterwards, the results from SWAT will be employed to obtain a better understanding of possible relations between water quality and biodiversity. This will be done by using correlations between concentrations of nutrients and biological indicators of stream health (i.e. macroinvertebrates) and coupling them with concentrations simulated with SWAT for different scenarios. Using the analysis of Pearson's correlation and data from the six sampling sites along the Clariano River, relationships between nutrients concentrations and values of macrobenthic metrics (Camargo et al., 2004) are currently being examined. In the following steps, the potential impacts of changes in land use, climate and WWTPs operation on water quality and biodiversity will be evaluated.

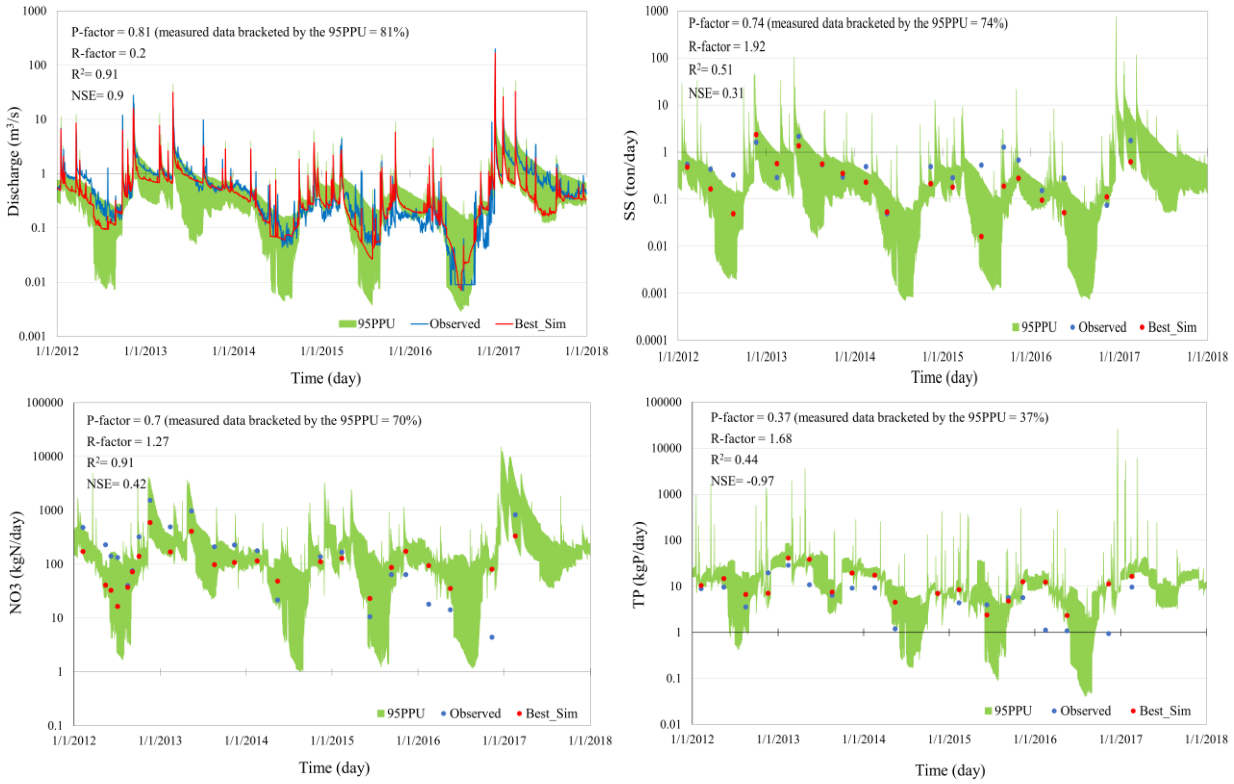

Figure 3. SWAT-CUP outputs showing the observed, the 95PPU and the best simulation for discharge, suspended solids, nitrate and total phosphorus **(validation period: 2012-2017)**

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