



**POLITECNICO
DI TORINO**

Dipartimento di Ingegneria
dell'Ambiente, del Territorio
e delle Infrastrutture

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

Hamed Vagheei, PhD Student, Politecnico di Torino

hamed.vagheei@polito.it

Co-authors:

- ❑ Prof. Fulvio Boano, PoliTo, Italy
- ❑ Prof. Paolo Vezza, PoliTo, Italy
- ❑ Prof. Guillermo Palau-Salvador, UPV, Spain

EGU General Assembly 2020



WHAT IS THE AIM OF THIS STUDY?

- To investigate aquatic ecosystem responses to water quality deterioration

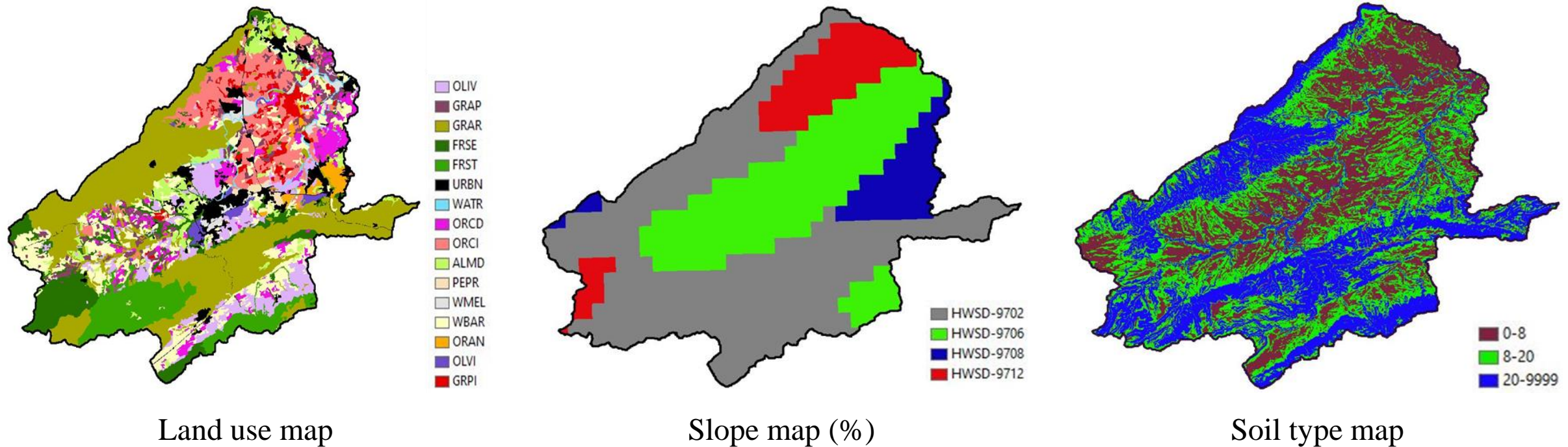


The location of Clariano River Basin

- The Clariano River faces low water quality and the loss of biodiversity in some parts due to agricultural, industrial and livestock activities as well as wastewater treatment plants effluents entering the river.
- The region is characterized by a semi-arid climate.
- The mean annual precipitation is about 450 mm.
- The mean monthly maximum temperature ranges from 15°C in January to 30°C in August.
- The mean monthly minimum temperature ranges from 5°C in January to 20°C in August.

Soil & Water Assessment Tool (SWAT) ...

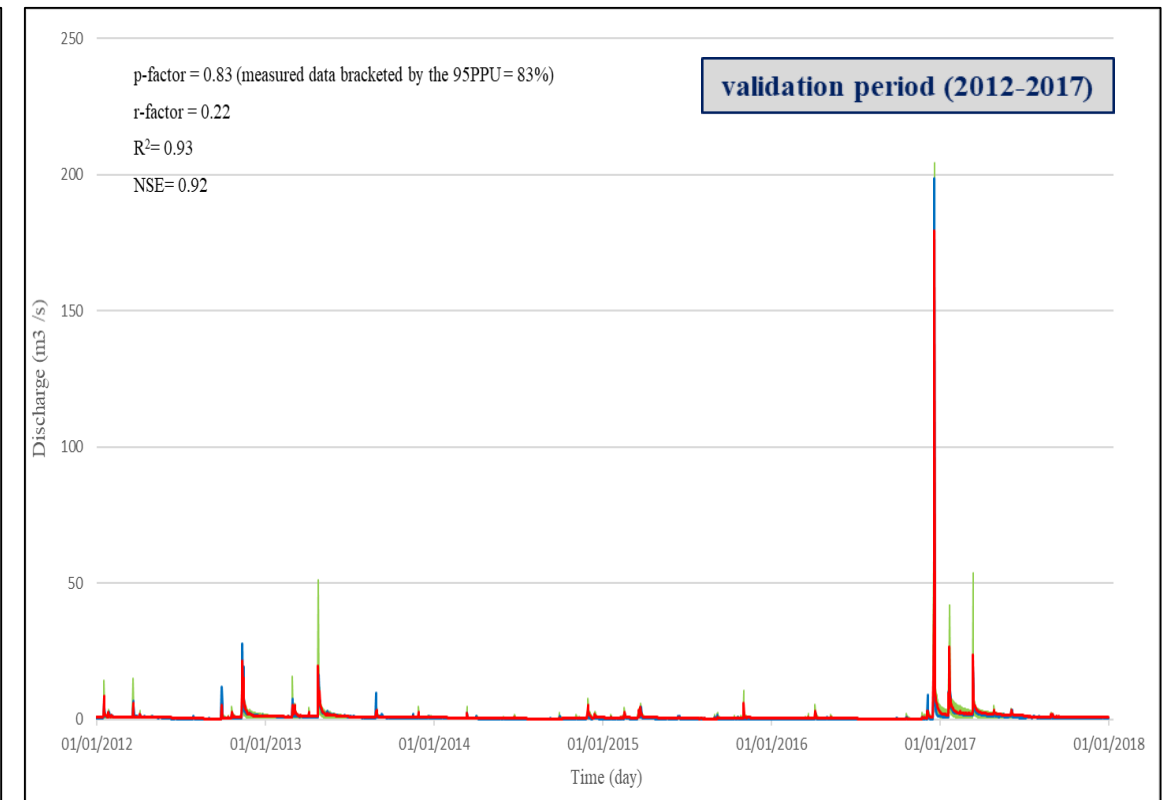
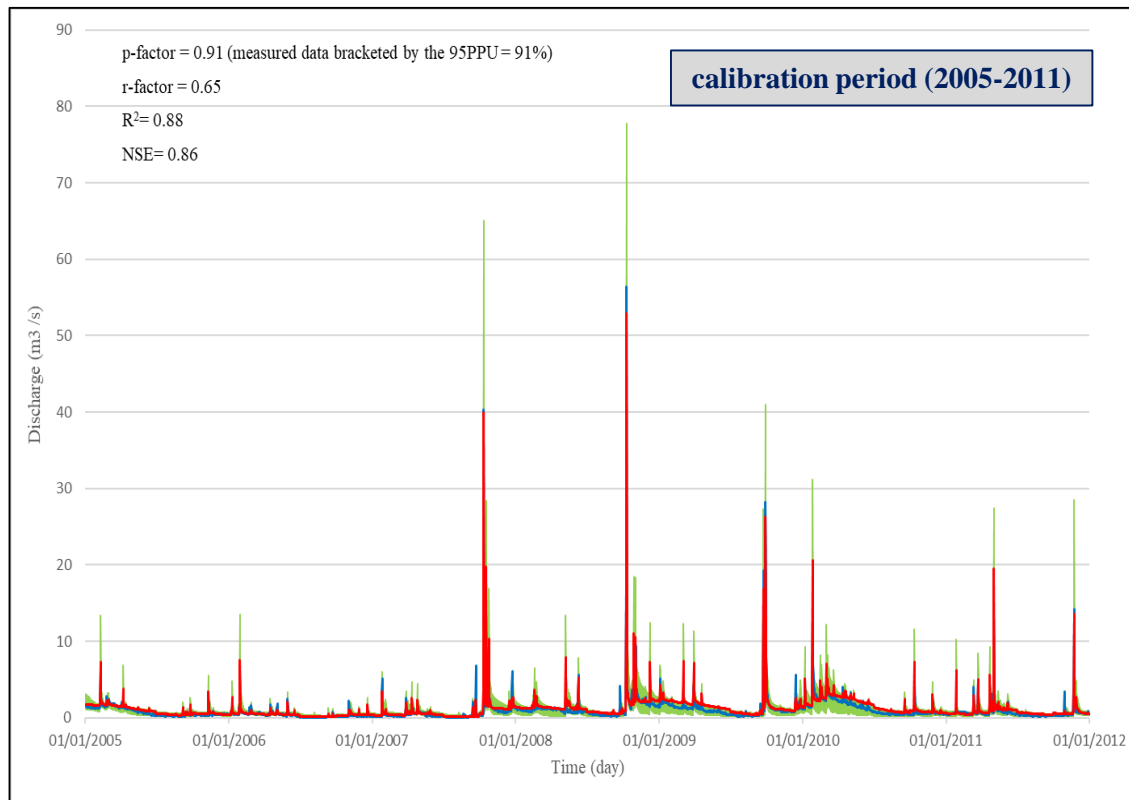
- SWAT is used for hydrological, sediment and nutrients modelling.



- SWAT-CUP-SUFI2 is used for calibration of SWAT model.

HYDROLOGICAL MODELING OF CLARIANO RIVER BASIN ...

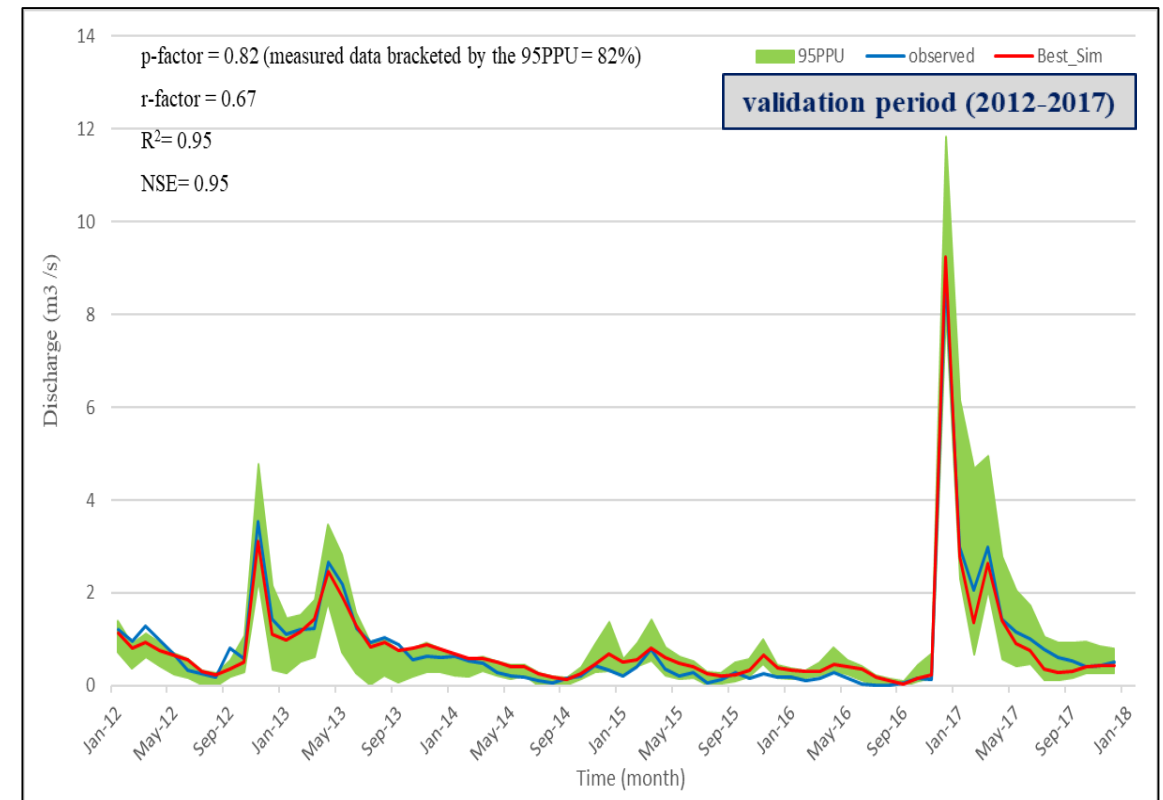
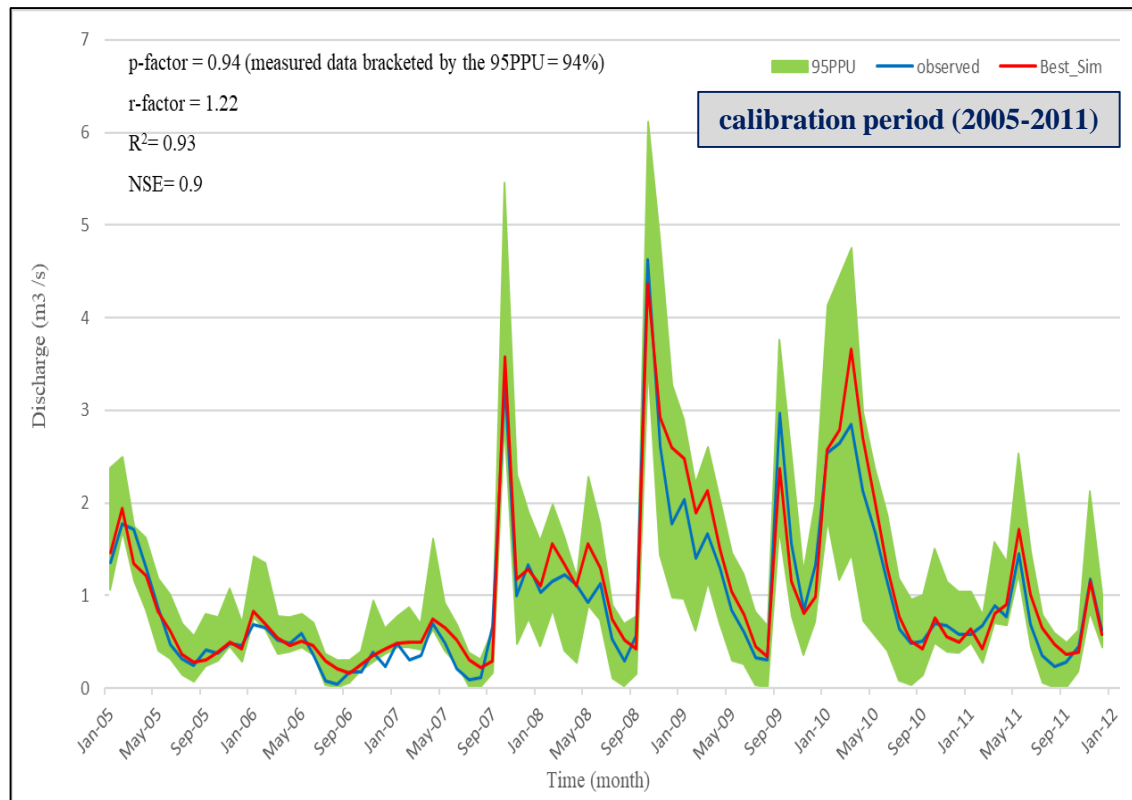
- SWAT works very good in **daily** streamflow simulation.



The comparison of **daily** observed and simulated streamflow for calibration and validation periods

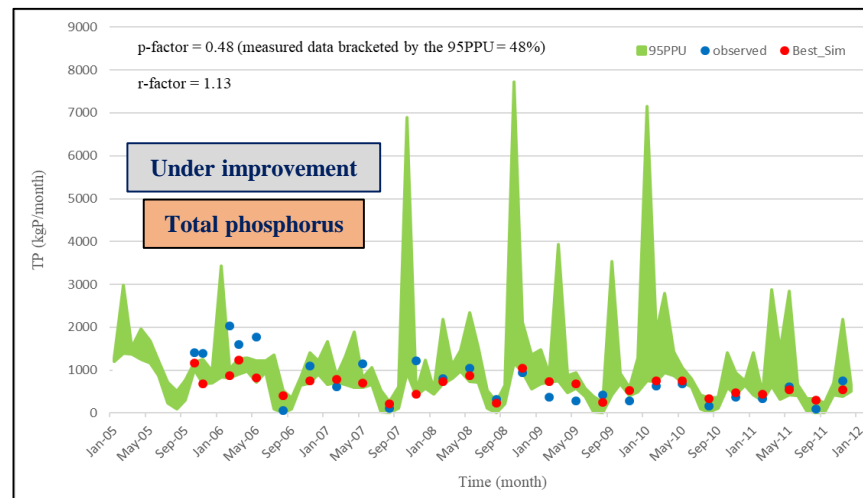
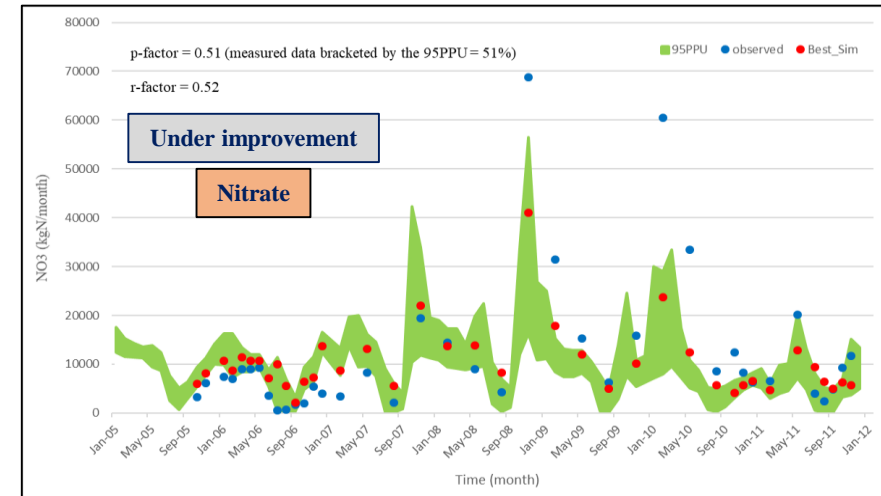
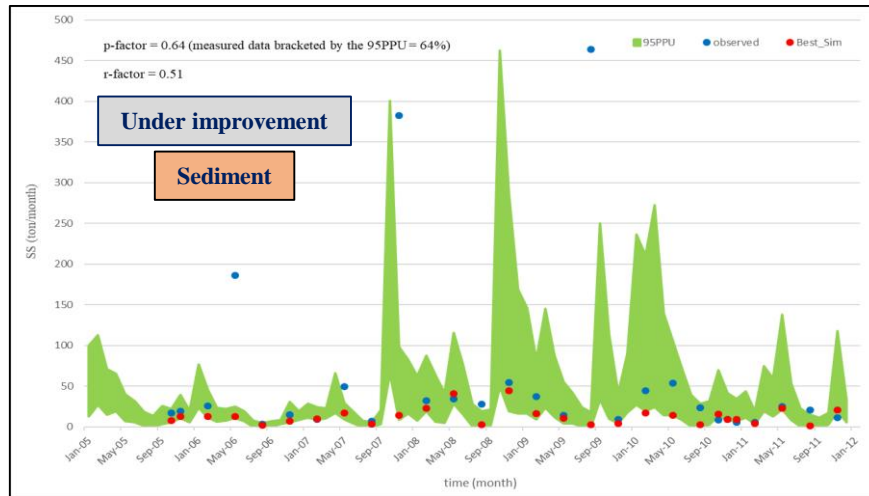
HYDROLOGICAL MODELING OF CLARIANO RIVER BASIN ...

- SWAT works very good in **monthly** streamflow simulation, as well.



The comparison of **monthly** observed and simulated streamflow for calibration and validation periods

SEDIMENT AND NUTRIENTS MODELING (UNDER IMPROVEMENT)



The comparison of **monthly** observed and simulated sediment, nitrate and total phosphorus for **calibration period (2005-2011)**

WHAT ARE THE FOLLOWING STEPS?

- The improvement of sediment and nutrients modelling
- The assessment of possible relations between water quality and biodiversity by focusing on macroinvertebrates as biological indicators of stream health
- Evaluating the impacts of changes in land use, climate and WWTPs operation on the aquatic ecosystem