



## **Investigating climate change and groundwater related causes for eutrophication in Lake Lugano**

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The groundwater-surface water interaction of the Lugano lake and the major aquifers within its watershed may be a factor in the total phosphorous load reaching the lake, which is responsible for its increasing eutrophication. Climate change has affected the surface water flows to the lake and surface water- groundwater interaction, thus affecting phosphorus load to the lake. Using the FREEWAT GIS environment, a groundwater flow model was constructed to simulate groundwater-surface water interaction for 5 main porous aquifers intersected by the Lugano Lake. The model simulates the groundwater flow in the porous aquifers, connecting all aquifers through the water level in the lake, as well as the changing surface water flows. Aim of the case study is twofold: firstly to exemplify the participatory approach by including stakeholders in all parts of the process rather than just in the discussion of the results and to focus the case study on areas of interest for all involved stakeholders, particularly climate change and increased eutrophication. Secondly the case study demonstrates the two portions of the FREEWAT environment developed by SUPSI-IST, the Observation Analysis Tool (OAT) and the Lake package. The OAT tool is used to incorporate several online climate and hydrological monitoring stations already existing around the Lugano watershed into the case study model, while the lake package will be used to simulate the interaction between the aquifers and the lake. The model delivers groundwater elevation levels and flow directions for all of the aquifers in relation to time, as well as volumetric budgets of ground and surface water, as well as sources and sinks thereof.