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Impacts on water level fluctuation in Lake Vegoritida: insights for the historical and projected climate period

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ABSTRACT

Lake Vegoritida, one of the largest natural lakes in Greece, has undergone substantial fluctuations in its water level in the past century caused by severe water abstraction directly from the lake. The recent recovery of the water level triggers a discussion on the definition of lake's maximum level which by itself becomes a source of conflict among stakeholders. However, it is still vague if the current and future climatic conditions can provide the available water inflow to the lake to sustain any suggested maximum water level. In this direction, a hydrologic model of Lake Vegoritida catchment has been developed to assess the water inflows and outflows of the lake. In particular, a rainfall-runoff model is used to assess the water inflow to the lake from the catchment, combined with a water balance model of the lake for the simulation of its water level. The hydrologic model was calibrated based on water level measurements in the four lakes located in the catchment, namely Lakes Zazari, Chimaditida, Petron, and Vegoritida. The calibrated model was used to assess the effect of water abstraction by the Public Power Corporation (DEH) in the water level of Lake Vegoritida for the historical period. Furthermore, the application of nine climate scenarios, based on the representative concentration pathways 4.5, 8.5, and 2.6 and driven by three global circulation models, revealed contradictory water balances and associated water level fluctuations in Lake Vegoritida for the projected period 2021–2050. Specifically, three scenarios show that the lake level will remain at its current level or higher while the other six scenarios show that a significant decline of lake level will occur.

Keywords: Lake Vegoritida; Lake level management; Hydrological modelling; Climate change

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