

EGU24-742, updated on 16 Sep 2024

<https://doi.org/10.5194/egusphere-egu24-742>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Impact of human and natural causes on shrinking Burdur Lake in the semi-arid Mediterranean region of Türkiye

Hatice Kılıç Germeç and Hasan Yazıcıgil

Middle East Technical University, Geological Engineering, Türkiye (hakilic@metu.edu.tr)

Lakes are valuable natural indicators, providing insights into the impacts of natural and artificial interventions on the hydrologic system. In arid and semi-arid climates, the global interest in monitoring shrinking lakes is growing to quantitatively reveal the impacts of such interventions. The internationally important Burdur Lake (Ramsar site no. 658), located in the semi-arid Mediterranean region of Turkey, stands out as a noteworthy example, with its water levels decreasing by nearly 17 m since the early 1970s. This study aims to investigate the reasons for the continual decrease in Burdur Lake levels over time and to assess the future impacts of various factors on the lake system, utilizing a 3-D numerical groundwater flow model developed with MODFLOW. The modeling process includes three years of transient calibrations for both initial (1969-1971) and current conditions (2014-2016) by simulating the lake with an incorporated lake package. The successfully calibrated model was then simulated with the future climate change scenarios over a 46-year period. Future climatic data derived from the RCP 4.5 and RCP 8.5 scenarios of the CORDEX Regional Climate Models were incorporated into the simulations to assess the impacts of change in natural climatic conditions. The first scenario was created to assess the impacts of climate change on the lake, whereas the second scenario was simulated to investigate the effects of excessive groundwater pumping under the influence of climate change. The third scenario was generated to simulate the cumulative effects of climate change and the decrease in flows of the streams feeding the lake as a result of the reservoirs constructed. The results indicate that climate change was not the primary driver behind the drop in the lake levels until the end of 2018. However, it may exacerbate the situation in the future, amplifying the negative effects of anthropogenic activities by imposing stress on the lake. An anticipated decline of up to 7 m in Burdur Lake level is projected due to the cumulative effects of climatic variations and excessive pumping. Conversely, despite the influence of climate change, an increase of up to 3 m is expected with the release of surface water flows. These findings underscore the need for a dynamic lake management plan to maintain desired conditions in Burdur Lake and its watershed, ensuring the sustainable management of this vital surface water resource.