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Diatom response to climate change in the past 170 years from Renuka Lake, Northwest Himalaya, India

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In the present study climatic and ecological changes in a two meter 210Pb-dated sediment core (1840-2011 AD) retrieved from the Renuka Lake, Northwest Himalaya were investigated using multiproxy approach, e.g., diatoms, Chysophycean Cyst (C.C), grain size, and elemental geochemistry. The core contained seven benthic (Navicula, Gomphonema, Cocconeis, Rhopalodia, Cymbella, Eunotia, and Mastogloia) and one planktonic (Aulacoseira) diatoms. It has been observed that the lake was not favourable for the growth of diatoms from 1840 to 1900 AD, probably due to low productivity or inability to preserve. The first appearance of the diatoms recorded from 1903 AD corresponds to an increase in the rainfall, whereas a drastic increase in diatoms and the C.C population is observed in 1940 AD, which coincides with “the great acceleration of the 1940s” when a rapid increase in temperature was recorded worldwide. The mean grain size and elemental geochemistry also support the response of diatoms. Aluminium ascended and reached its maxima (7.76%) in the core exhibiting high terrigenous input from the catchment. The mean grain size shows an increasing trend with an average of 13.34 μm during this period, which is slightly higher than the average value of the sediment of the core. A phase of increasing productivity after the 1940s up to 1972 AD is inferred from the expanded population of Aulicoseira favours warm water condition and eutrophic–mesotrophic lake condition. The recent decrease in the diatom population from 1972 to 2007 AD seems to be associated with the anthropogenic activity near the lake, such as the construction of retaining wall in the periphery of the lake that prevented the nutrient input to the lake from the catchment. The response of diatoms of the Renuka Lake to climatic changes during the 1930s and 1940s also correlates with the global records. This study explores the potential of diatoms as proxy indicators in the Himalayan lakes and response towards global warming-related climatic change after industrial growth.