

**Estimation of sedimentation rates and useful life of lake Nainital in Kumaun Himalayas,
U.P. using radiometric dating techniques**

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ABSTRACT

The neotectonic Lake Nainital is the only source of drinking water supply to the city of Nainital. Publications in the recent past inferred accelerated sedimentation threatening the very existence of lake. The sedimentation rates in lake Nainital have been estimated by the authors using past 36 years lake sounding data for different selected time intervals, sediment balance method and radiometric dating of sediment cores collected from different locations in the lake. The sedimentation rates obtained by lake sounding data vary from 0.014 (1960-1975) to 0.113 (1965-1970) Mm³/yr depending upon the time span selected while it is 0.021 Mm³/yr during the time span 1985-1996. The sediment balance method indicated the present sedimentation rate as 0.69 cm/yr. The radiometric dating of sediment revealed sedimentation rates from 0.48 to 1.35 cm/yr, depending upon the location in lake (Average 0.75 by Cs-137 and 0.86 by Pb-210 dating techniques).

The predicted life of the lake is between 82 years to 380 years by the earlier Investigators using the bathymetric sounding data, collected manually. In the present study, environmental ²¹⁰Pb and ¹³⁷Cs dating techniques have been used to estimate the lake life. Estimated life comes to be 2163 ± 77 years (¹³⁷Cs) and 2479 ± 312 years (²¹⁰Pb). If we take the Average of the life estimated by radiometric dating techniques. it comes around 2200 yr. The life estimated by sediment method comes around 2681 years while the life estimated by the authors using lake sounding data for different time span vary from 39 years. based on the data for 1990-1993 and 590 years based on the data for the period from 1960-1975. However, the critical analysis of lake sounding data implies that the validity of the data is questionable. Radiometric dating of sediment cores from appropriate areas in lakes/reservoirs provides precise record of sedimentation rate.

The details of sedimentation rate/pattern including estimation of life of lake Nainital using conventional and isotopic methods have been discussed in the present report at great length.