

## **Estimation of Sedimentation Rate and Expected Life of Lakes in India Using Cs-137 and Pb-210 Radiometric Dating Techniques of Sediment**

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A large number of natural lakes occurring in India are famous for their picturesque view and most of them are being used for drinking and irrigation, pisciculture etc. purposes. However, the increasing anthropogenic activities in lake catchment after the independence of the country have accelerated the rate of sedimentation of these lakes. As the accurate sedimentation rate is of vital importance not only for estimating the useful life of the lake but also to prepare strategies for management and conservation of the lakes. Therefore, it is a matter of great concern to the authorities to know the accurate sedimentation rates and causes of higher rate of sedimentation in order to save the lakes of Himalayan region from diminishing.

In the present study, environmental <sup>210</sup>Pb and <sup>137</sup>Cs dating techniques were employed to determine the recent sedimentation rates of Nainital, Bhimtal, Sat-tal, Naukuchiyatal of Uttaranchal, Mansar and Dal-Nagin lake of Jammu and Kashmir, Sagar and Bhopal lake of Madhya Pradesh and Barapani reservoir of Meghalaya. The expected useful life of these lakes have also been estimated. These lakes are representing mainly Himalayas and Central India.

The weighted mean of sedimentation rates i.e.,  $1.44 \pm 0.18$  cm/y in Bhimtal lake,  $0.74 \pm 0.04$  cm/y in Naukuchiyatal lake,  $0.84 \pm 0.05$  cm/y in Sat-tal lake,  $0.80 \pm 0.05$  in Nainital lake and  $0.23 \pm 0.03$  cm/yr in Mansar lake were observed. The average rate of sedimentation in Dal lake was  $0.52 \pm 0.04$  cm/y since 1964 that stands reduced to  $0.22 \pm 0.03$  cm/y since 1987. Similarly, the rate of sedimentation in the Nagin lake was  $0.41 \pm 0.05$  cm/y since 1964 and  $0.34 \pm 0.03$  cm/y since 1987. The rate of sedimentation showed two types of sedimentation pattern in the Barapani reservoir located in north-east Himalaya. One part of the reservoir receiving the sediment at higher rate, weighted mean  $1.76 \pm 0.16$  cm/y while the other part comparatively at lower rate of  $0.72 \pm 0.16$  cm/y (weighted mean). In Sagar lake, the sedimentation rate was found between 0.14 to 1.68 cm/y (weighted mean  $0.956 \pm$  cm/y) in different parts of lake. The average rate of sedimentation in upper Bhopal lake was estimated 2.07 cm/yr.

The expected useful life of Nainital, Bhimtal, Sat-tal, Naukuchiyatal, Mansar, Dal, Nagin, Barapani Reservoir, Sagar and Bhopal lake is 2160 years, 661 years, 3161 years 1357 years, 9110 years, 155 years, 318 years, 1609 years, 281 years and 96 years, respectively, computed on the basis of average rate of sedimentation after 1964. In case of Dal-Nagin lake the expected useful life has also been computed on the basis of post 1986-87 sedimentation rate which comes about 360 years for Dal and 376 years for Nagin.