# Environmental impacts on Chilika Lake, India, evaluated using a sedimentologic, chemical and isotopic approach

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Chilika Lake, the largest Asian lagoon on the east coast of India, has a surface area of 1160 $km^2$ or about 900 $km^2$, respectively for the monsoon and the dry winter-spring season. The average depth is about 1.2 m, and it is separated from the Bay of Bengal by a 100 m to 1.5 km wide sand bar of about 30 km length, separating the outer channel that connected the lagoon naturally to the sea but that closed due to long-shore sand drift in 1992, completely isolating the lagoon. The consequence was a reduction in the unique biodiversity and primary production of the lagoon, while eutrophication and siltation increased. As a counter-initiative it was decided to artificially open the lagoon to the sea by dredging. To help evaluate anthropogenic effects on Chilika Lake, a combined sedimentologic, chemical, and isotopic study of the lagoon and its sediments is in progress. Results from the monsoon and following dry season indicate that the chemical and isotopic composition of the lagoonal waters, including the nutrient supply and primary productivity are entirely controlled by terrestrial inputs from the three distinct drainage basins. H- and O-isotope compositions of waters, but also the concentrations and C- and/or N-isotope compositions of DIC, POM and aquatic plants support some seawater influence within the outer channel but very limited mixing via the newly dredged seaward channel. The sediment records indicate an increase in $C_{org}$ and silt and changes in the C-isotope compositions and C/N ratios compatible with increased eutrophication and terrestrial influence over the past 50 to 100 years, while the proportion of “marine” or estuarine-derived POM is higher in the deeper sediment record back to several thousands of years. Hence the three distinct drainage basins must be monitored/controlled if further environmental impacts by the increased population and agricultural activities on the lagoon are to be limited.