Historical Fluxes of Toxic Trace Elements in the Salton Sea Basin

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The Salton Sea is a large, saline lake that is sustained by wastewater and agricultural runoff. As a terminal lake, the Sea is a net sink for toxic elements and compounds. However, the cycling and bio-accessibility of these contaminants and the human and environmental health implications associated with their potential remobilization from lake bed exposure are not well understood. This project uses geochemical data from the analyses of sediment cores and salt crust, including high-resolution age control, to model the historical fluxes, bio-accessibility, and depositional environments of toxic trace elements. Selenium, lead, and mercury are among the critical elements to consider. An important goal of the study is to better characterize the longer-term, natural geochemical and climatic baseline of the basin prior to the profound anthropogenic changes of the last century. The depositional environments and flux of trace elements in the lake have changed substantially under human influence, including flooding and desiccation, as well as dramatic shifts in the fluxes of metals, nutrients, and pesticides. For example, the bottom of the northern lobe of the lake has turned increasingly anoxic, while the oxygen level at the bottom of the southern lobe varies seasonally. Increasing salinity could exacerbate the oxygen deficiencies because of decreasing solubility. Furthermore, receding shoreline has exposed several square kilometers of lake bed, and this trend could continue due to possible reallocation of water from the lake. Therefore, fully understanding the implications of desiccating the lake with respect to potential remobilization of toxic elements, including associated wind entrainment (dust) and the possible role of a widespread salt crust, could be valuable in protecting human and environmental health at the Salton Sea basin.