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Title: Tracing organic matter sources in aquatic system using molecular proxies :

Other
Titles: a case study from Renuka lake, Central Himalayas

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Abstract: Lake systems are highly sensitive to the changes in regional environmental conditions and preserve information regarding the biotic sources that contribute to the total organic content of the lake. Biotic sources determining the organic matter in the lake include various plants and shrubs of terrestrial and aquatic origin. This also includes different micro-organisms which form an integral part of various biochemical processes occurring within the aquatic system. Micro-organisms also contribute and accelerate the generation of different in situ nutrients from the preserved organic matter in the lake. However, modern aquatic environments are also affected by anthropogenic impacts. The organic content of the lake also constitutes different kinds of contaminants produced by sewage discharge, domestic use, waste discards and other anthropogenic activities. Lake systems form one of the key components of the carbon cycle that regulate the preservation and releasing carbon into the biosphere, owing to the organic inputs from different sources. The ongoing processes and inputs into the lake can affect the balance of this cycle. In order to determine the present status of the lake in terms of organic content and build of management strategies for betterment of the environment, it is crucial to elucidate the organic matter (OM) sources in the aquatic ecosystem and understand factors controlling its spatial distribution. Determining different sources of the organic matter will also help us delineate the anthropogenic inputs from the natural inputs and understand the magnitude of impact of these contaminants on the lake environment. Lipid are products originating from living organisms and are chemically stable during sedimentation and diagenesis. The analysis of these in sediments and organic detritus can help us understand their parent organic molecules that led to their formation. The preservation and distribution of this organic content in a lake is also controlled by hydrodynamic factors of the lake. The particle size distribution is one of such key factors that determines the transportation and binding of the organic matter. Therefore, lipid biomarkers and grain size analysis were used to understand the distribution of organic matter and source apportion within the Renuka Lake system. The saturated and aromatic hydrocarbon fractions extracted from the surface sediments indicated v their respective sources along with few contaminants which were induced by anthropogenic activities. The dominance of microbial activity was observed from the lipid distribution and application of various n-alkane indices compared to other natural sources. The lake is highly eutrophic, owing to its rich nutrients content. The contaminants identified includes Phthalates and Alkylbenzenes which signifies the anthropogenic impact on the lake system.

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