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Title:	Molecular markers for natural and anthropogenic organic matter sources and distribution in aquatic systems from the Indian Subcontinent
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Abstract:	Abstract The aquatic ecosystems play critical role in Indian Subcontinent by acting as carbon sink and providing innumerable services to local and regional livelihoods. However, these various ecosystems involving lakes and estuaries are subjected to environmental degradation driven by natural and anthropogenic stressors. Therefore, comprehensive understanding about contribution of organic carbon components from multiple sources will help to propose monitoring programs and management strategies. In the thesis, multiproxy approach involving lipid biomarkers, geochemical, sedimentological and environmental contaminants was used on the surface sediments collected from three study sites (Mandovi estuary, Ashtamudi estuary, Rewalsar lake) to understand the organic matter source apportionment along with various factors controlling OM distribution followed by extent of human intervention. Our investigation on surface sediments collected from Mandovi estuary, west coast of India used geochemical (TOC, □ 13 C org), sedimentological (grain size) and molecular proxies (n-alkanes) to identify sources contributing OM to the estuarine ecosystem. The proxy data (□ 13 C org , terrigenous/aquatic ratio and P aq) suggest dominance of higher plants in the upper estuarine region and aquatic productivity in the lower end while data retrieved from carbon preference index, average chain length, natural n-alkanes ratio and pristane/phytane ratios mark high level of anthropogenic activities in the marine influenced region. Further, the presence of unresolved complex mixture and petroleum compounds such as hopanes further confirm the human influence in the lower end of the estuary. Additionally, depositional pattern (grain size) and circulation dynamics (δ 18 O) suggest high energy conditions and saline water circulations in the lower estuarine region respectively. Moreover, land use and land cover changes (LULC) were also investigated in the study site for the period 2001-2019 and the LULC demonstrates rising built-up area and suggest high rates of urbanization, tourism and oil pollution. Further, extensive information about anthropogenic stressors was derived from Mandovi estuary and compared with the Ashtamudi estuary (RAMSAR site). The study was based on examination of phthalate compounds and petroleum compounds so as to understand the extent of plastic and petroleum pollution in both the estuaries. The intercomparison based on phthalate compounds suggestphthalate concentrations were higher in the Ashtamudi estuary while the petroleum hydrocarbons (hopanes, steranes and diasteranes) were abundant in the Mandovi estuary. Further, the role of anthropogenic stressors such as Microplastics (MPs) and the derived chemicals i.e., phthalic acid esters (PAEs or phthalates) were delineated from the Rewalsar lake, Himachal Pradesh (India). The MPs comparison data with other lakes and environment risk assessment of phthalates highlight that Rewalsar lake is highly impacted by microplastic and phthalate pollution. Overall, my work emphasized on understanding the impact of natural-human changes around the aquatic ecosystems using OM derived biogeochemical proxies along with concentration levels of contaminants. The outcomes from this thesis will serve as an important baseline for future investigations in the aquatic environments and help in framing monitoring programs and management strategies in order to reduce anthropogenic pressure on the various similar ecosystems worldwide.
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