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Environmental quality assessment of Zabnah lagoon in Saudi Arabia using living foraminifera assemblages

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We investigated the environmental quality of Zabnah lagoon (Half-Moon Bay, Saudi Arabia) in an integrated approach by elucidating the response of physicochemical parameters, elemental pollution, hydrocarbon content, total organic matter quantification, and eutrophication analysis on the local living benthic foraminiferal community. Zabnah Lagoon is a shallow, semi-isolated part of Half-Moon Bay that experiences higher sea surface temperatures and elevated salinity compared with the open areas of the Arabian Gulf. In the current scenario of global warming, the study of this Lagoon could provide a window into the future of faunal change in the Arabian Gulf.

We observed that the lagoon is moderately stressed, which could be the due to the combined natural and anthropogenic factors. Higher values of salinity (up to 60 PSU), organic matter (423 - 609 mg/kg), hydrocarbon content (39.74 - 66.96 mg/L), and sulfate (2132 - 2673 mg/L) were measured. Additionally, elemental analysis reflects that the level of chromium was higher than the ER-L norms, i.e. 122 ppm; along with strontium i.e. >5000 ppm. The foraminiferal fauna was dominated by the two groups, i.e. peneroplids and rotaliids (40.2%, 36.5% respectively). Many of the peneroplids are morphologically deformed, with up to 11.3% of the total population exhibiting deformities of some kind. The low population of smaller miliolids, previously suggested as indicators of pollution, further confirmed the lagoon is under stress. We concluded that the locality is unique due to its restricted connections with the open sea and can be considered for future biomonitoring studies in the Gulf region.