

## Seasonal Variations, Environmental Parameters, and Standing Crop Assessment of Benthic Foraminifera in Western Bahrain, Arabian Gulf

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**Abstract :** We conducted a survey of living benthic foraminifera in a relatively unpolluted site of Bahrain in the Arabian Gulf, with the aim of determining the seasonal variability in their populations, as well as various environmental parameters that affect their distribution. The maximum standing crop was observed during winter, with highest population of rotaliids, followed by a peak in miliolids. The highest population is attributed to an increasing number juveniles observed along the depth transect. A strong correlation between sediment grain size and the foraminiferal population indicates that juveniles were most abundant on coarser sandy substrate and less abundant on fine substrate. In spring, the total living population decreased, and lowest values are observed in the summer. The population started to increase again in the autumn with highest juveniles/adult ratios. Moreover, results of relative abundance and species consistency show that *Ammonia* is found to be consistent from the shallowest to the deepest station, whereas miliolids start appearing in the deeper stations. The average numbers of *Peneroplis* and *Elphidium* also increases along the depth transect. Environmental characterization reveals that although the site is subjected to eutrophication caused by nitrates and sulfates, pollution caused by hydrocarbons and heavy metals is not significant. The assessment of 63 heavy metals showed that none of the metals had concentrations that exceed internationally accepted norms [the devised level of Effect Range-Low], with the exception of strontium. The lack of a significant environmental effect of heavy metals is confirmed by a Foraminiferal Deformities Index value of less than 2%. Likewise, no hydrocarbon contamination was detected in the water or sediment samples. Lastly, observations of cytoplasmic streaming and pseudopodial activity in Petri dishes suggest that the foraminiferal population is not stressed. We conclude that the site in Bahrain is not yet adversely affected by human development, and therefore can provide baseline information for future comparison and assessment of foraminiferal assemblages in contaminated zones of the Arabian Gulf.

**Keywords :** Arabian Gulf, benthic foraminifera, standing crop, Western Bahrain

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020