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Benthic foraminifera as tracers in one of Africa's most polluted water bodies: The Lagos Lagoon (Nigeria)

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The Lagos Lagoon is among Africa's largest estuarine ecosystems. It is bordered by one of the fastest growing megacities in the world (Lagos) and the ultimate repository of contaminants carried in industrial, municipal and agricultural wastes. The high levels of pollutants have progressively deteriorated the water quality, adversely affected marine ecosystems, impacted the livelihood of the coastal population and pose serious risks to human health. Benthic foraminifera are excellent proxies and sensitive bioindicators of environmental disturbances but comprehensive studies on the structure, distribution, diversity and impact of pollution upon foraminiferal communities have not yet been conducted. In order to demonstrate the potential of foraminifera as proxies of environmental perturbations, benthic foraminifera were investigated on a lagoon-wide basis.

Lagos Lagoon has areas that range from low levels of direct impact to severely affected by various forms of anthropogenic disturbance. The goal of this study was to elucidate foraminiferal community structure, to analyze patterns of distribution and species richness and to identify taxa that track documented records of pollution in Lagos Lagoon sediments. The sediments were analyzed for a range of physicochemical properties via a multi-parameter sensor probe-device including temperature, pH, depth and total dissolved solids (TDS) measurements. Quantitative analysis of 24 sediment samples yielded a total 3872 individuals of benthic foraminifera that belong to 42 species and 25 genera. They comprise 10 porcelaneous, 22 hyaline perforate and 10 agglutinated species. *Ammobaculites* aff. *A. exiguus*, *Ammotium salsum*, *Ammonia tepida*, *Ammonia parkinsoniana* and *Trochammina* sp. have been found to be the most abundant species.

Heat maps were generated from abundance records for selected species to illustrate environmental preferences and relative resistance levels to individual forms of anthropogenic disturbance. The features recorded allow to delineate the spatial effects of hydrocarbon and heavy metal pollutants, urban sewages, and sand dredging activities. The data generated may ultimately form the basis to assess the progressive deterioration of Lagos Lagoon environments from cores by using benthic foraminifera as bioindicators of environmental perturbation.