

BENTHIC FAUNA OF UNGWANA BAY, MOMBASSA (KENYA) – A PRELIMINARY ACCOUNT

Baban S. Ingole

National Institute of Oceanography, Dona Paula, Goa, 403 004, India

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Benthic fauna of two localities in the Ungwana Bay, Mombassa, Kenya, was studied during August 1983. A total of 24 faunal groups was recorded from both localities. Polychaetes were the dominant group in macrofauna and nematodes in meiofauna. The meiofauna was numerically about 76 times of macrofauna. The food requirement of the benthic fauna was 3 times more at shallow station.

Key words: Benthicfauna; Composition; Kenyan Coast.

INTRODUCTION

Studies on the benthic fauna of African waters have largely been limited to that of South African coast [3, 5; 7, 9, 15, 18]. Although, the Mombassa Coast is considered important for the exploitation of fishery resources, very little is known about its living resources [1, 6, 13].

The present paper gives a preliminary report on the composition and abundance of benthic fauna from two different localities in the Ungwana Bay. The vertical distribution of meiofauna is discussed in relation to the substratum composition and prevailing environmental conditions.

MATERIALS & METHODS

Study area. Oceanographic studies were carried out on board ORV SAGAR KANYA under an Indo-Kenyan joint study programme (August 1983). Two stations located in the Ungwana Bay (Fig. 1) were sampled for benthic study. Station 51 was located 31 km away from the coastline (Lat. 02°57'S, Long. 40°26'E) where a depth of 279 m was recorded. Station 52 was at the depth of 48 m. and was 26 km away from the coastline (Lat. 02°49'S, Long. 40°27'E).

Sampling. Benthic samples were collected using a 0.7 m² modified Veen Van grab. Four sediment cores of meiofauna were taken per station from the undisturbed grab sample, using a plastic corer (10 cm length, 4.5 cm inner diam). The cores were divided into slices of two cm thick sections and immediately preserved in 5% buffered formalin-rose Bengal solution (1:500). In addition, sediment samples were collected separately for grain size and organic content analysis.

Replicate sub-samples of macrofauna were collected from grab samples with a 0.04 m² metallic quadrant (10 cm penetration). Laboratory technique used for the analysis of samples is given by Ansari *et al.* [1] and Ingole *et al.* [12]. Analysis for salinity, pH, O₂, NO₃, SiO₂ & PO₄ was carried out on board ORV SAGAR KANYA by standard methods.

RESULTS

Environmental parameters Table 1 gives the details of physical, chemical and sedimentological parameters measured at two stations. The bottom water temperature of 13.5° and 25.2° was recorded at stations 51 and 52 respectively. The values for salinity, pH and dissolved oxygen of the bottom waters showed very little fluctuations between the two stations. Comparatively higher values were recorded at the shallow stations (st. 52). Dissolved nutrients showed the normal distribution of the nitrates, phosphates and silicates. The sediment was muddy with a high percentage of silt and clay having mean grain size of 0.014 and 0.081 mm at stns. 51 and 52 respectively. Organic carbon was high (2.83%) at stn. 52, where a coarse grain fraction was recorded.

Faunal composition

Meiofauna. Population density and biomass of meiofauna are summarized in Fig. 2. The fauna consisted mainly of nematodes, harpacticoides, turbellarians, polychaetes and foraminifers. The total meiofaunal abundance and biomass increased in the shallow water sediment. Meiofaunal biomass, to a sediment depth of 10 cm, averaged 3.619 g⁻² and 11.382 g⁻² at stns. 51 and 52 respectively.

Nematodes formed the largest group numerically at both stations (35.3×10^3 indi./m² and 40.5×10^3 indi./m² at Stns. 51 and 52). Harpacticoid copepods ranked second in the order of abundance, followed by turbellarians, polychaetes and foraminiferans. Archiannelida (13×10^3 ; 26×10^3 indi./m²), decapod (54×10^3 ; 14.8×10^3 indi./m²); gastropods (1.1×10^3 ; 7.7×10^3 indi./m²), ostracods (2×10^3 ; 15×10^3 indi./m²) and crustacean nauplii (7×10^3 , 35×10^3 indi./m²) were recorded at both stations. Other members present included lamellibranchia (6.3×10^3 ; 15×10^3 indi./m²) and kinorhyncha (0 ; 11.6×10^3 indi./m²).

Vertical distribution of meiofauna. Meiofauna numbers decreasing with the depth into the sediment is a general phenomenon [7, 23], this relationship being more pronounced at the Ungwana Bay, where the faunal numbers decreased rapidly below the 4-6 cm sediment layer (Fig. 3). Most of the meiofauna were restricted to the upper 0-4 cm and > 65% fauna was present in the top 0-2 cm layer.

Macrofauna. A total of seventeen macrofaunal taxa was observed. However, only seven groups were found at # 51 and 15 groups at # 52. A faunal list including density (numbers m⁻²) and biomass (g⁻² dry wt.) is given in Fig. 4. Density as well as biomass values were high at # 52 (4381 individuals, 0.594 g). Polychaetes were the best represented group at both stations with the mean density of 1624/m² and 2181/m² at stns. 51 and 52 respectively. Amphipods and gastropods were second and third in order of abundance and their respective densities for stns. 51 and 52 were 40 and 32/m² and 1237 and 341/m², respectively. Bivalves ($362/m^2$), ostracodes ($112/m^2$), decapodes

($59/m^2$), monoplacophora ($21/m^2$), harpacticoides ($16/m^2$), cumacea ($16/m^2$), euphausiids ($5/m^2$), echioids ($5/m^2$), nemertines ($5/m^2$) and pteropods ($5/m^2$) were recorded only at the shallow station (# 52), whereas foraminifers ($32/m^2$) and echinoderms ($24/m^2$) were recorded only from deeper waters (# 51). Isopods and stomatopods

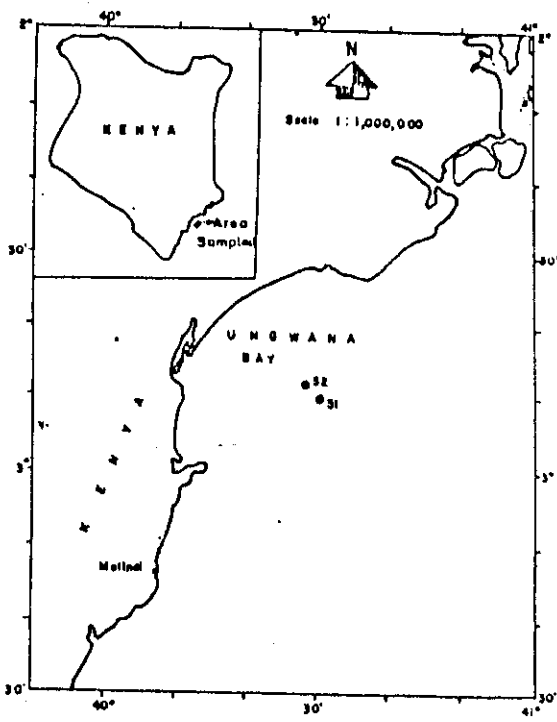


Fig. 1. Location of the sampling stations in Ungwana Bay, Mombassa.

Table 1. Environmental parameters and sediment characteristic at two sampling stations.

	Stn. 51	Stn. 52
Depth (m)	279.00	48.00
Bottom water temperature (°C)	13.8	25.2
O ₂ (ml/l)	03.48	04.25
Salinity (%)	35.203	35.164
Organic carbon (%)	01.35	02.83
pH (bottom water)	08.03	08.26
NO ₃ (µg at ⁻¹)	15.06	0.01
PO ₄ (")	01.32	01.60
SiO ₃ (")	11.00	00.00
Median grain size (mm)	00.014	00.051
Silt clay (%)	89.36	56.06
Type of sediments	clayey silt	sandy silt

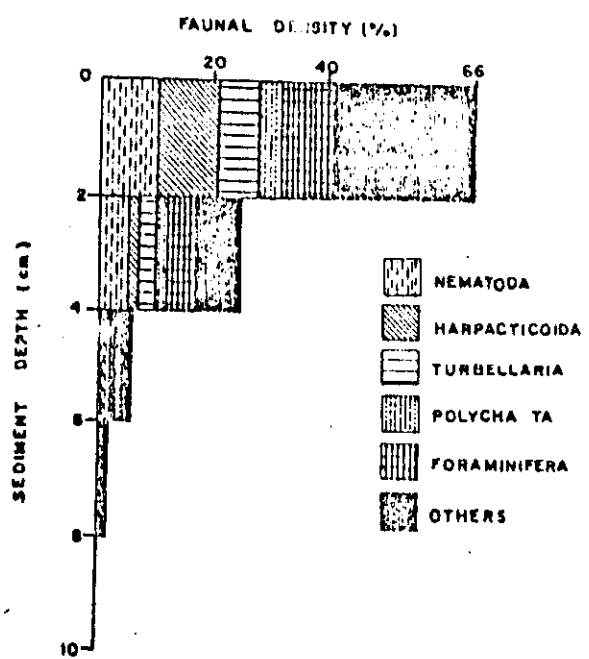


Fig. 2. Meiofaunal density and biomass at the two sites.

were recorded at both localities. However, the isopods density was higher ($8/m^2$) at # 51 than # 52 ($5/m^2$).

The macro/meiofauna density, estimated per m^2 was 1768/132915 individuals for # 51 and 4381/342300 individuals for # 52 (Table 2). The respective values for biomass (g^{-2} dry wt.) were 0.203/3.619 and 0.594/11.882 g. A metabolic index for both macro and meio benthos was calculated according to Gerlach [10]. It is observed that the food requirements of the benthic fauna at # 52

is 3 times more than that of # 51. The ratio for macro:meio benthos was calculated and it has been found that the respective mean density/biomass ratio was 1:75/1:18 for # 51 and 1:78/1:20 for # 52. The benthic standing stock of the two stations varied between 13-40 g/m^2 .

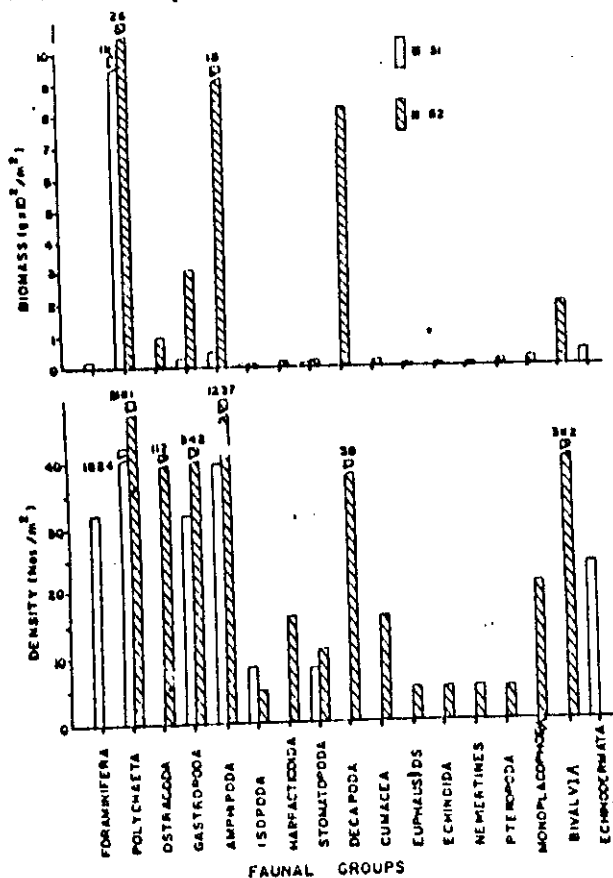


Fig. 3. Vertical distribution of meiofauna.

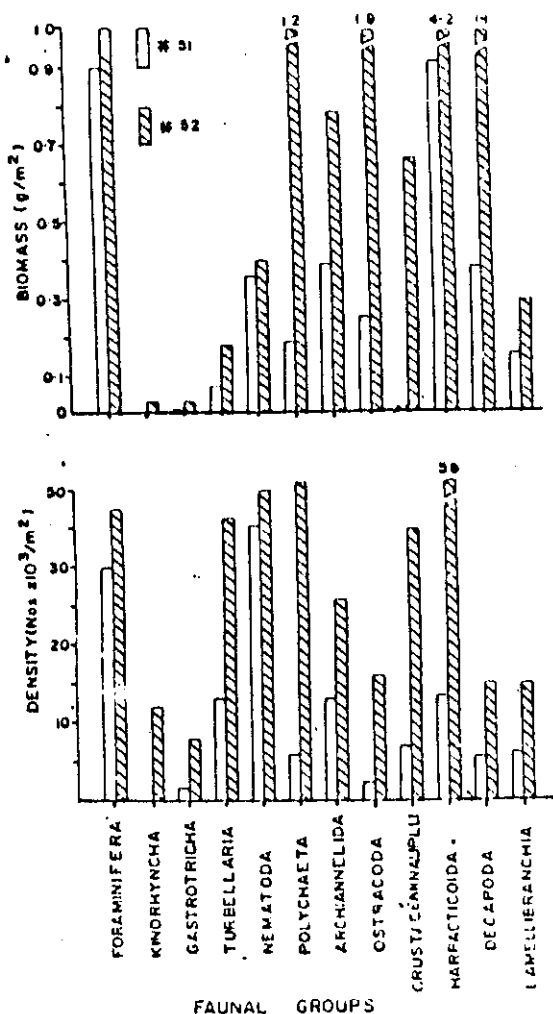


Fig. 4. Macrofaunal density and biomass at the two sites.

Table 2. Benthic metabolic index and Macro: Meio ratio at two stations.

Stn.	Density (No. m^{-2})		Biomass (g^{-2})		Metabolic index			Ratio Macro:Meio (density/ biomass)
	Meio	Macro	Meio	Macro	$\frac{5 \times \text{meio}}{\text{biomass}}$	$\frac{1 \times \text{macro}}{\text{biomass}}$	Σ	
51	132915	1768	3.619	0.203	18.095	0.203	18.298	1:75/1:18
52	342300	4381	11.882	0.594	59.41	0.594	60.00	1:78/1:20

DISCUSSION

Sub-littoral benthic community composition and its production are controlled by physical and biotic factors, such as salinity, temperature, current speed, oxygen availability, sediment characters and predation [24]. The food requirements of benthos mainly comes from the overlying water column [20]. Decrease in the density of benthic fauna with depth in natural sediment is well known [7, 12, 23]. This is true in the present case also. The aggregation of meiofauna in the top layer of the sediment suggests their preference to the particular habitat [16]. The penetration of fewer groups of meiofauna into the deeper layer of sediment suggest their adaptability in such conditions [4].

Teal and Wieser [23] and Ingole *et al.* [12] observed that oxygen and available food are responsible for faunal distribution in the sediment. Organic matter also decreases with the depth in the sediment, due to progressive mineralization [17]. Hence, available food and O₂ may be the chief factors for the vertical distribution of meiofauna.

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There has been an overlapping in the captions of Fig. 2 and 3 which appeared on pp. 129 and 130 of *PJSIR*, Vol. 30, No. 2, February 1987. The correct number of the caption given on pp. 129-130 should be as under:

1. Fig. 2 appeared on page 129 should be amended to read Fig. 3 with caption "vertical distribution of meiofauna."
2. Fig 3 appeared on page. 130 should be amended to read Fig. 2 with caption "Meiofaunal density and biomass at the two sites."
3. The following acknowledgements may also be added on page 131 before the references.

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