Indian Journal of Marine Sciences
Vol. 13, September 1984, pp. 147-149

Textural Studies on Beach Sands of Someshwar, West Coast of India

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Received 5 *April* 1984; *revised received* 9 *July* 1984

The Beach on the southern part of the study area was relatively more stable throughout the year with lesser foreshore slopes. Mostly the sorting coefficient values were < 2.5 in the study area indicating that the beach sands in this part were well sorted during most of the time of the year. Higher mean grain size and associated higher sorting coefficient values during southwest monsoon months were found related to high energy of the steep waves.

Several coastal strips of Karnataka are affected by sea erosion[1,2]. Reddy *et al.*[2] have studied beach characteristics, waves and littoral currents in relation to the beach stability along the Mangalore coast. The present work is a continuation of the study on the littoral and rip currents off Someshwar[3]. In this communication, textural characteristics of beach sands of Someshwar are reported.

The Someshwar coastline, 8 km south of Mangalore, is rather straight and extends in an almost north-south direction facing the Arabian Sea (Fig. 1). The bottom topography off Someshwar is rather smooth without much relief. The Netravathy - Gurpur rivers confluence is situated north of the study area.

Five stations were established (Fig. 1) at about ½ km interval and beach profile along a traverse perpendicular to the beach at each of these stations was measured regularly once every month (Jan. to Dec. 1976) by ordinary survey techniques to understand the seasonal variation in beach configuration[4]. Sediment samples were collected simultaneously along the profiles at the backshore and foreshore regions. The point at a distance of 5 m from the fixed reference point was taken to represent the backshore, while the region at and around the mean low water was considered to represent the foreshore region.

For the textural analysis of sand, coned and quartered samples were washed free of salt and treated with dilute HCl to remove shells. They were then rinsed with water to free the sand grains from acid traces and oven dried. The sand samples (250) were subjected to granulometric analysis following conventional sieving procedure. Median grain size and sorting coefficient of samples from the foreshore and backshore regions were determined as per Krumbien's[5] method.

Seasonal variations of average grain size and sorting coefficient values of the sediments at the foreshore and backshore regions at various stations are given in Fig. 2. On the southern side of the Someshwar Central rock (Fig. 1) there is a conspicuous increase in the average median grain size of the foreshore sediments at st 3 in contrast to the sts 4 and 5. During the surveys, the waves have been observed to break at some distance away from the shore at the southern stations. Thus this is related to the energy input at the breaking zone[6].

Variations in grain size at sts 1 and 2 have greater amplitude but follow closely those at sts 3-5. The dominance of a particular textural size in any area of a beach is known to reflect on the dominance of this size in the source area[7].

Sorting coefficient values are mostly < 2.5 indicating that the beach sands during most of the time of the year are well sorted. Relatively higher sorting coefficient values at sts 1 and 2 also support the fact that the materials in these zones are derived from various sources. The terrigenous sediments brought in by the Netravathy-Gurpur estuary greatly influence the seasonal pattern of grain size variations as also the higher sorting coefficient values. Thus, the degree of

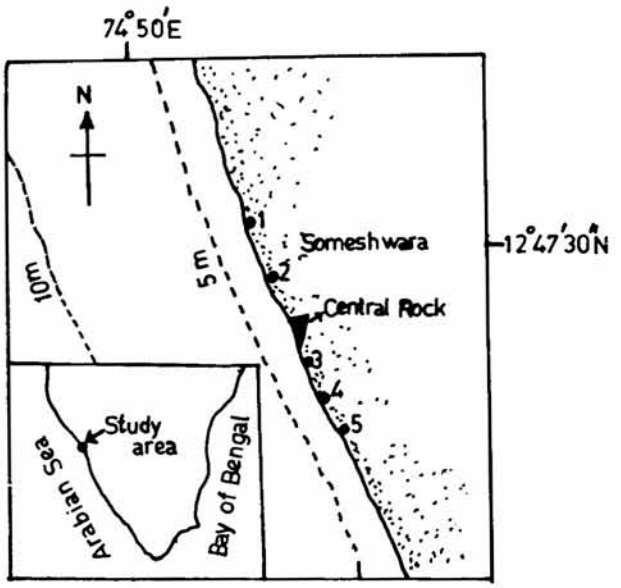

Fig. 1—Station locations

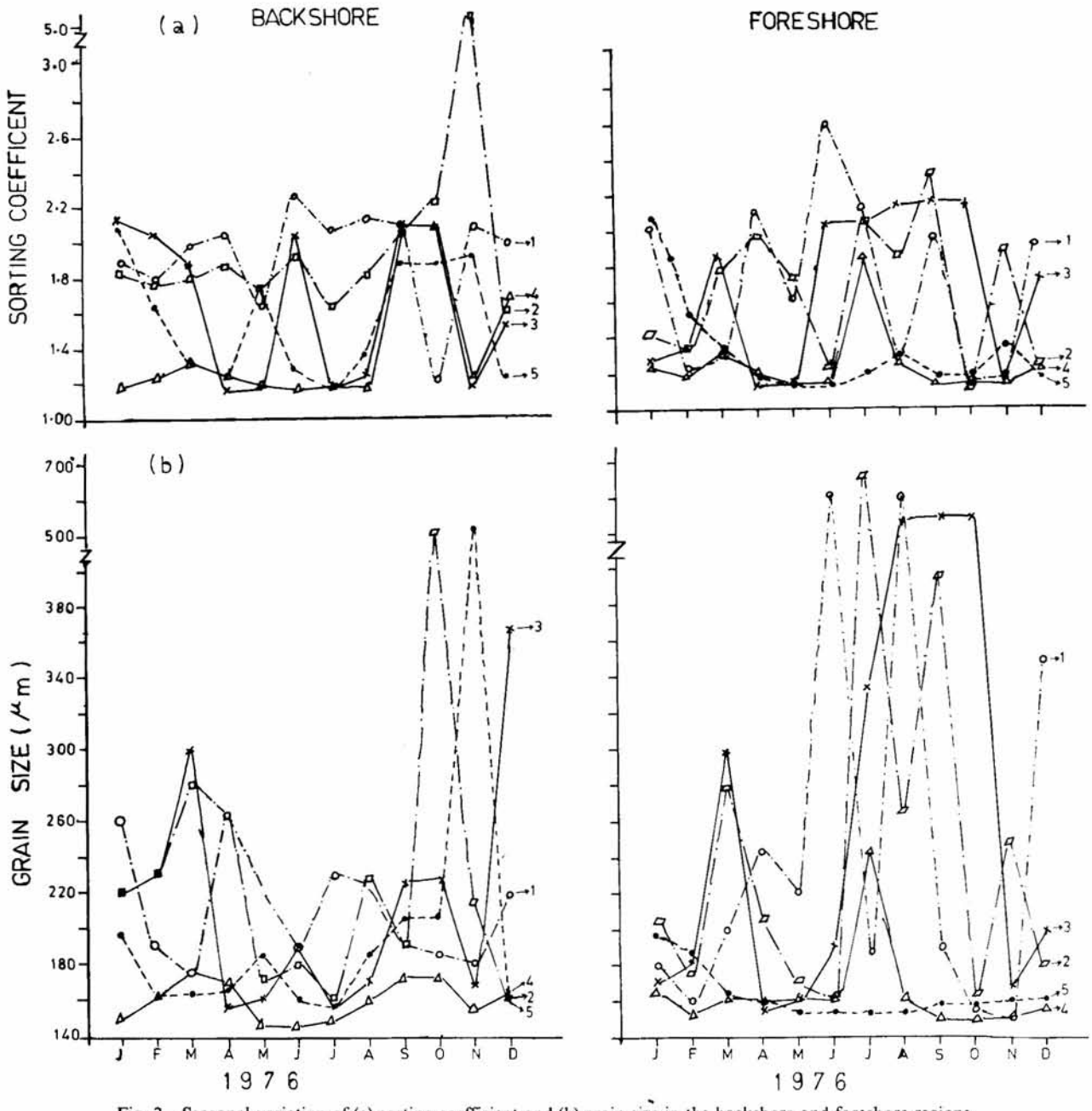

Fig. 2—Seasonal variation of (a) sorting coefficient and (b) grain size in the backshore and foreshore regions

sorting not only depends on the effect of wave energy reaching the coast but also on the source of material[8].

The mean size of the sediments decreases considerably during the fair weather season (Jan.-May and Oct.-Dec.) in comparison to the monsoon season (June-Sept.). Relatively lesser sorting coefficient values during the fair weather season indicate that the sediments are composed dominantly of one size class (well sorted) in fine sands, whereas during the monsoon season poor sorting indicates the prevalence of a mixture of coarse and medium sized sand grains.

Further, the seasonal fluctuation of grain size in foreshore and backshore generally follows each other. There is a wider fluctuation at sts 1 to 3 in contrast to that at sts 4 and 5. This wider fluctuation is due to the proximity of sts 1 and 2 to the central rock as also to the port entrance, where resuspension of sediments takes place due to dredging, both of which can influence the textural characteristics. St 3 which is close to the central rock is highly influenced by it.

Veerayya[8] has reported higher mean grain size and higher sorting coefficient values during southwest monsoon at Calangut beach. In the present study higher mean grain size and the associated higher sorting coefficient values are directly related to the high energy of the steep southwest monsoon waves.

During this season, the lower sized grains are kept in suspension in the surf zone[9]. The north moving littoral drift perhaps brings assorted sized sediments which are blocked by the river outflow. Further, the estuary is found to discharge its sediment load to the south during the southwest monsoon season[10] and so the greater sorting coefficient values observed at sts 1-3 may be partly due to the assorted material brought by the river (Fig. 2).

Comparison of mean size of the foreshore and backshore sediments (Fig. 2) shows that except at st 5, at all other stations, the grain size of the sediments at foreshore exceeds that of the backshore sediments especially during the monsoon season. Although there is a noticeable difference in the average grain size from station to station, the seasonal variations at the backshore region of a particular station appear to be much less in comparison to that at foreshore zone.

The stations in the southern side of the Someshwar central rock (Fig. 1) particularly st 4 are relatively stable throughout the year with lesser average grain size and lesser slope. The stations in the northern side are generally wider, but have greater average grain size, steeper slope and exhibit large variations.

The authors thank Prof. H P C Shetty, Director of Instruction, for his keen interest and encouragement during the work. Thanks are also due to Sri A Praveen for the help rendered. This paper is the outcome of the approved research project No. D.R. 943.

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