COASTAL EROSION AT BENGRE, A FISHING VILLAGE NEAR MANGALORE
—A PRELIMINARY STUDY

M. P. M. REDDY, V. HARIHARAN and N. P. KURIAN
College of Fisheries, University of Agricultural Sciences, Mangalure.

ABSTRACT

In view of the reported large scale erosion near Bengre fishing village, a preliminary study on the coastal erosion has been undertaken by taking beach profile measurements at three selected stations near Bengre from October 1975 to October 1976. The study reveals considerable erosion on the northern side of the beach and to a certain extent in the middle portion of the beach. However, no marked variation in the beach topography on the southern side near the estuarine mouth has been observed during the one year period. The annual net erosion of beach on the northern side was found to be 120 m³ and in the middle portion of the beach it was found to be 33.3 m³.

INTRODUCTION

The problem of coastal erosion assumes great importance along the large coastline of India with numerous villages and towns located right on the coastline. Especially, it is a problem of great magnitude on the Kerala-Karnataka shore, along the west coast. The relatively mellow land of this coast is under constant attack by the fury of waves generated by the south-west monsoon (Enayat, Ahmad, 1972). Along this coast numerous fishing villages and other settlements and also coastal highways are under constant danger of being eroded by sea. The natural causes for coastal erosion are waves, littoral currents, storms, tides, sea-level changes and off-shore relief (King, 1961). In addition to these, manmade installations such as construction of harbours, blocking of rivers discharging into the sea and natural disturbances such as silting of inlets, river mouths, etc., can upset the material-energy balance resulting in a large scale localised erosion along a coastline. In order to control coastal erosion and study shore protection methods, it is necessary to investigate the past history of the area from all available records and study the present conditions in detail by means of beach profiles and other environmental observations.

PRESENT STUDY

The coastal erosion near Bengre, an important fishing village with a population of about 5,000 near Mangalore took a new trend during August, 1975. There was considerable erosion at the mouth of the Netravathy-Gurpur estuary near Bengre and also along the seaward side of the fishing village. According to the local people, ever since this erosion started ten years ago, about 1 km of the coastline on the north side of Bengre has been eroded. So far properties worth about Rs. 3 lakhs have been lost. The Government fish curing yards and some other buildings have become part of the sea. If the erosion continues at this rate for some more
years, there may be a danger to the entire Bengre village and also to the old Mangalore harbour.

In order to save this fishing village, the Government is considering to construct a protective wall near Bengre. Hence a detailed and continuing study on the movement of sediments of the beaches (Bengre, Ullal and Someshwar) and nearshore regions along the coastline near Mangalore is being carried out in order to understand the coastline changes in this region. The present paper deals with the monthly, seasonal, annual and spatial variations of the coastline near Bengre.

DESCRIPTION OF THE AREA

Physiography

At Mangalore, Gurpur river runs in a southerly direction, parallel to the coast and joins the Netravathy river at its mouth (Fig. 1). Gurupur river is separated from the Arabian Sea by narrow sandspit which is several miles long (West Coast Major Port Development Committee’s Report, 1950). Bengre village is situated on this sandspit just on the northern side of the Netravathy–Gurpur estuarine mouth. The maximum observed discharge of the Netravathy and Gurpur rivers are 7100 cum/sec and 1700 cum/sec respectively (C. W. P. R. S. Specific Note No. 1184, 1971). The flow in these rivers is maximum during the months of May to September, and minimum during January to April.

Winds

Wind observations recorded at the time of beach profile measurements show that winds with high velocities of about 45–50 km/hr, blow from WSW and west during the south–west monsoon season. During the remaining period of the year, winds approach in general from directions varying between NNW and NE with maximum velocities ranging between 25–30 km/hr.

Waves

From the visual observations made on waves in the area under study, it was revealed that waves approach this area from WNW and NW, during the period November to April with maximum wave heights of 2 to 2.5 m. During the period May to October, the waves approach from SW, WSW and west with maximum wave heights over 4 m. The period of the waves throughout the year was mostly between 5 and 14 sec.

Littoral currents

From the wave refraction studies, the littoral currents were found to be directed towards south during the period November to April, when waves approach this area from WNW and NW (Reddy, Hariharan and Kurian, 1976).
The littoral currents were found to be directed towards north during the period May to October, when waves approach from SW, WSW and west.

EQUIPMENT AND METHODS

The area under investigation is shown in Fig. 1. Three reference pillars were fixed along the beach on the estuarine mouth side and on the sea side of Bengre village for observations. Station BS is situated near the estuarine mouth on the southern side of Bengre, station BM is in the middle and station BN is on the northern side of Bengre beach. Beach profiles were measured using graduated pole and measuring tape. Information on winds, waves and other related parameters was also recorded. The profiles were measured at monthly intervals from October 1975 to October 1976.

RESULTS

Figs. 2, 3 and 4 show the topographic changes at stations BS, BM and BN, which have occurred from October, 1975 to October 1976. At station BS (Fig. 2), the beach profiles do not indicate any marked change during the entire year. During 1975 monsoon season, due to large river discharge through the estuarine mouth, there was considerable erosion on the Bengre side of the estuarine mouth. But during 1976 monsoon season due to the failure of monsoon rains, the river discharge was not large and hence

Fig. 2: Beach profiles for Station Bengre-South.

Fig. 3: Beach profiles for Station Bengre-Middle.
gradual erosion from October 1975 onwards till October 1976. Even the building up of the beach during winter and pre-monsoon seasons was not remarkable.

**DISCUSSION**

In general, erosion on the northern side of Bengre beach (Station BN) is due to high and steep waves affecting the coast during the south-west monsoon season and also early post-monsoon season. Waves of height about 4 metres and of period 8 seconds occurring at this time seem to be responsible for the large scale erosion at this station. The effect of river discharge may not be significant at this station since it is located away from the estuarine mouth. There is a net erosion of 120 m$^3$ per metre length of beach from October 1975 to October 1976 at this station (Fig. 5). To calculate the net erosion of beach material, the profile of October 1975 and the profile of October 1976 were drawn for station BN and station BM (Fig. 5). An assumption has been made here by extending the two profiles to meet so that the volume of material eroded can be found out from the enclosed area. The assumption has been made such that the area enclosed is only the minimum possible. Near the middle portion of the beach (station BM), erosion during SW monsoon and early post-monsoon seasons is due to the high and steep waves occurring during this period: whereas accretion of the beach is due to long period, low swell waves prevailing at the time of winter and pre-monsoon seasons. Even at this station there is a net erosion of beach material of 33.3 m$^3$ per metre length of beach during the period between October 1975 and October 1976 (Fig. 5).

This erosion effect could be clearly seen.
Fig. 5. Net annual erosion at Station Bengre-North and Bengre-Middle.

from the fact that a road laid in the beach by the Public Works Department three months ago is presently in a precarious condition with part of the road already eroded (Fig. 6). At the southern station near the estuarine mouth (station BS), erosion can occur mainly due to the flooding of the Netravathy–Gurpur rivers. As the river discharge during the monsoon season of 1976 was not high, there is no marked variation in the beach profiles at this station. There is neither net erosion nor net accretion except for the difference in the profiles from backshore to foreshore regions of the beach from October 1975 to October 1976. The onshore–offshore movement of beach material at this station is due to variations in wave conditions during different seasons.

CONCLUSION

The preliminary study on coastal erosion at Bengre village revealed considerable erosion during the one year period from October 1975 to October 1976 in the north and middle portions of the beach which can occur mainly due to waves and littoral currents. Erosion on the southern side seems to occur mainly due to river flow. However, it is premature to pinpoint any single factor responsible for this erosion, before a thorough investigation is being made for some more period on the beach characteristics, waves, littoral currents and other related phenomena. Hence, a detailed study on all these aspects is in progress in order to find out the causative factors respon-
Fig. 6. Erosion of the road near Bongre. The arrow in 'A' indicates the position of the scale in 'B'.

...sible for this erosion and to make suggestions for arresting this erosion.

ACKNOWLEDGEMENT

The authors wish to acknowledge their grateful thanks to Shri H. P. C. Shetty, Director of Instruction (Fisheries) for his encouragement and to Dr. P. S. B. R. James, Professor of Fishery Biology, College of Fisheries, Mangalore for his valuable suggestions.

REFERENCES


Central Water and Power Research Station, Specific Note No. 1184 (Private communication).

