

TOPOGRAPHICAL VARIATIONS ALONG THE TELLICHERRY BEACH DURING THE SOUTHWEST MONSOON SEASON

K. PREMCHAND & C.M. HARISH

Centre for Earth Science Studies, Regional Centre, Cochin-18.

ABSTRACT

The short term changes in the topographical variations of the Tellicherry beach along five profiles (twice a week) was worked out at closed space interval of around 200 m. The maximum loss of material was observed along the southern sections. The predominant wave approach was southwest which resulted in a northerly littoral drift with varying speeds during the southwest monsoon season. The wave heights generally did not exceed 1.5 m except on few days when it exceeded 2 m which resulted in the erosion of the foreshore beach material. A tumbola formation was noticed on the northern side of the study area.

Key-words: Waves, tumbola, erosion, Tellicherry beach.

INTRODUCTION

Kerala is bestowed with a long coastline and it experiences intense erosion during the southwest monsoon. Of the 560 km of the coastline, 260 km is subjected to severe erosion necessitating the construction of protective structures in the form of groins and sea walls along the coast at selected places. The problem of coastal erosion along the west coast of India was dealt by Das, Hariharan and Varadachari (1966), Varadachari (1972), Murty and Varadachari (1980), Varma (1971), Varadachari and Murty (1966), Reddy and Varadachari (1972), Murty, Sastry and Varadachari (1980), Gouveia, Joseph and Kurup (1976), Antony (1976), Shenoy and Prasannakumar (1982), Prasannakumar, Shenoy and Kurup (1983) and Prasannakumar, Kurian and Baba (1984).

All the above studies are aimed at understanding the various processes responsible for the changes in the shoreline. The effect of seawalls constructed along the Kerala coast on the changes in the beach topography were presented by Murty, Sastry and Varadachari (1980). Most of the above reports on the topographical variations are based on collection of data at long intervals which masks the short period variations. The beach morphological changes over microtime scales along the coasts of Goa were studied by Murty, Veerayya, Sastry and Varadachari (1980). Parts of the coastline north of Tellicherry and Cannanore experience severe erosion during the southwest monsoon. In particular, the beach topography, experiences erosion during monsoon necessitating the construction of sea walls and groins. To understand the variations of the beach topography, observations at short period intervals (twice a week) and at closed sections (200 m apart) were made during the southwest

monsoon. The present study deals with the data obtained from May 15 to August 25, 1980 along the Tellicherry coast.

DATA AND ANALYSIS

Beach profiles were obtained along five stations separated by 200 m along Tellicherry coast. Fig. 1 shows the location. The pier of about 175 m long was made use of for obtaining the profile at station 3. The variations in the beach topography for the other sections was obtained using the dumpy level and graduated staff at 5 m intervals from the reference point. Littoral

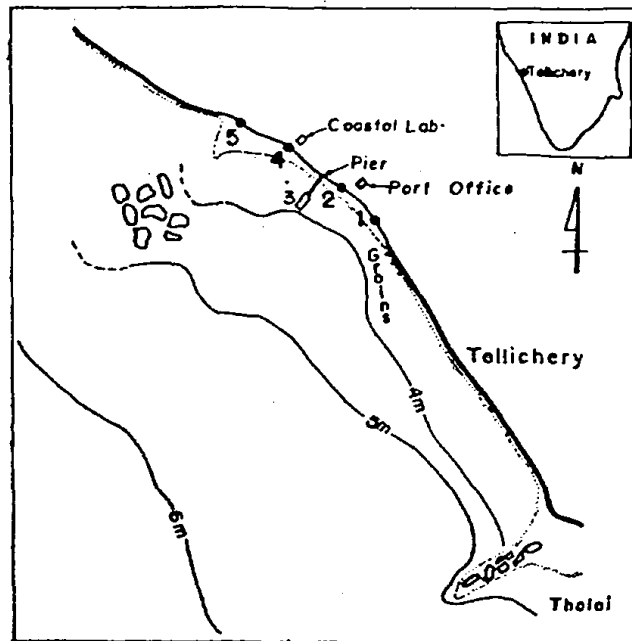


Fig. 1. Location map.

currents were measured using small plastic bottles of the appropriate buoyancy in the surf zone. Wave height, period and direction were obtained from the end of the pier and the type of breakers were noted. A pressure type wave recorder was installed during July 1980 and was in operation for obtaining the wave records. The beach topographical variations were measured twice a week during low tide along the five sections.

RESULTS AND DISCUSSION

Figs. 2 to 6 shows the variations in the elevation contour at different points along the five sections. Along the southern section the beach experiences loss of material from the end of May and continued upto June 10th. From then the beach regains its original position except on July 24th when loss of material from foreshore was noticed. Again on 17th July the accretion was

noticed (Fig. 2). The beach experienced maximum change between May 25 and June 10 along section 2 (Fig. 3). Material was removed during this period and after June 10 the change was rather gradual. The beach was more or less stable except on July 24th when severe erosion took place. After July 30th the beach remained more or less stable with a slight deposition in the middle of August. The profile taken along the pier indicated no significant change in the foreshore upto 20 m from the reference point. Between 30 and 90 m the change in the topography was noticed and beyond that the profile was more or less unaltered (Fig. 4). North of the pier (Fig. 5) the beach was built upto 31st of May. Afterwards the beach experienced erosion and by the middle of June the material was brought back and remained more or less stable. Fig. (6) shows the variations along the northern most section. The beach experienced gradual build up from May 25th and was maximum by 7th of July. On July 2nd severe erosion was observed. Afterwards the beach experienced loss of material with a slight deposition during the end of July. Again accretion took place till the end of the period of observation.

Apart from the waves, tides, bottom topography and prevailing currents, the occurrence of mudbanks along this coast influences the depositional

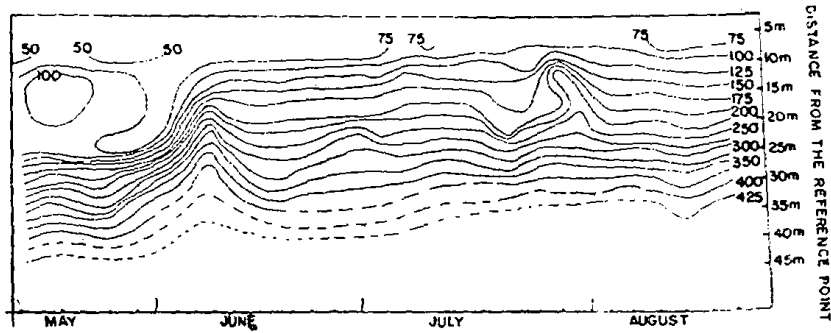


Fig. 2. Beach elevation contour (cm) along section 1.

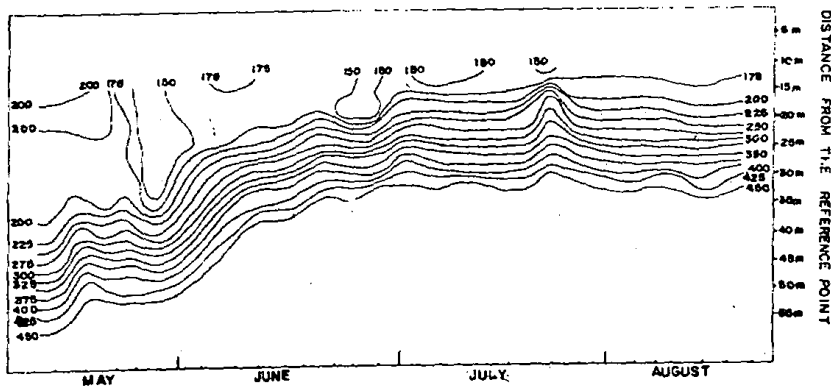


Fig. 3. Beach elevation contour (cm) along section 2.

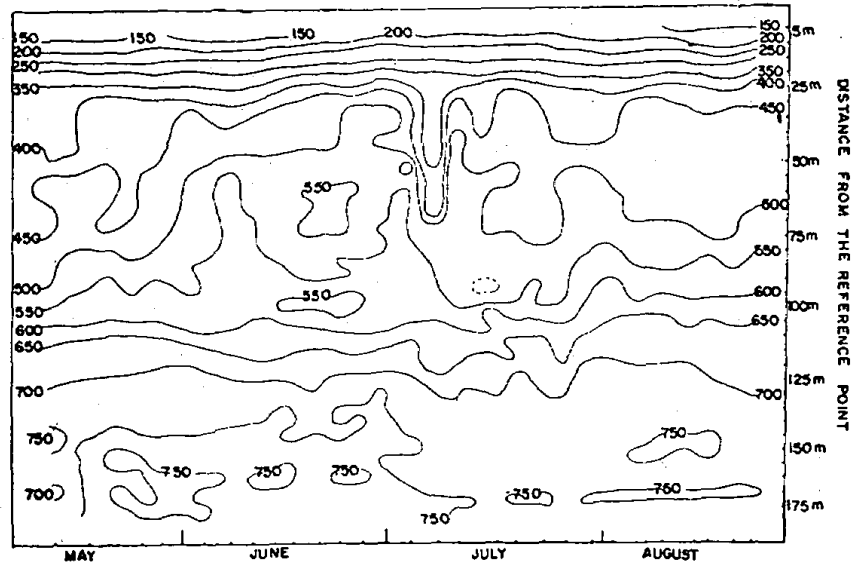


Fig. 4. Beach elevation contour (cm) along the pier.

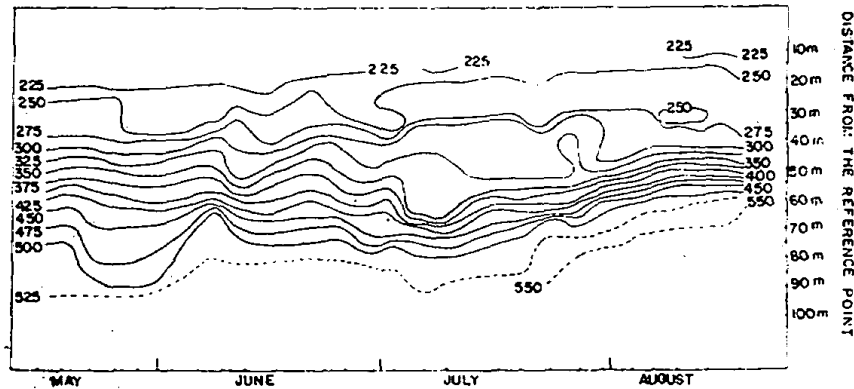


Fig. 5. Beach elevation contour (cm) along section 4.

and erosional tendencies of the beach. No occurrence of mudbank was reported along this part of the coastline during the period of observation. The wave climatology along the Kerala coast (Baba, — personal communication) showed that during the southwest monsoon the intensity of the waves decrease from south to north and was minimum along the Tellicherry coast. The waves observed visually and the recordings made using the wave recorder during this period showed that they generally do not exceed 1.5 m. The waves generally approach this part from $210-235^{\circ}$ (Table I) and resulted in a northward littoral drift. Along the pier offshore onshore flow was noticed on some days. The loss of material along section 1 during first week of June coincided with the onset of the monsoon conditions over this region. Associated with the onset of the southwest monsoon the intensity of the waves increases resulting

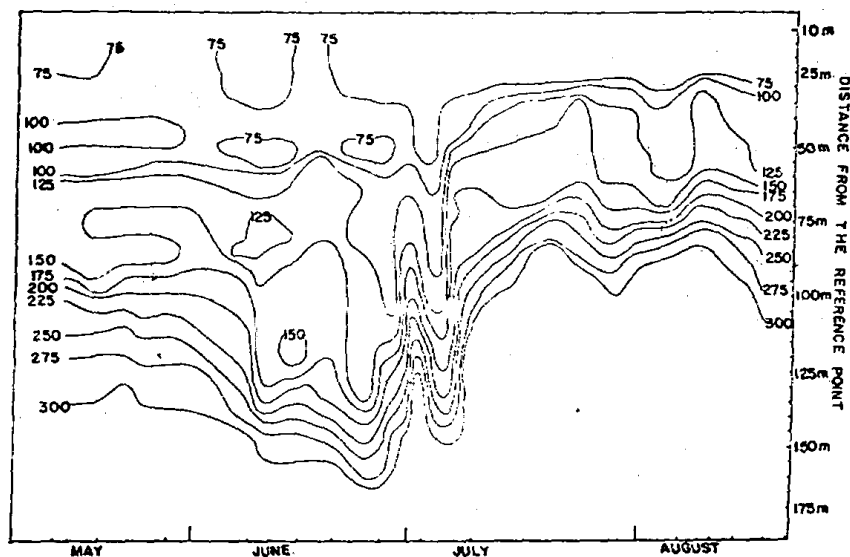


Fig. 6. Beach elevation contour (cm) along section 5.

in the erosion of the beach. Similarly on 24th July the waves exceeding 2.1 m height were noticed. With the increased run up foreshore beach material was lost. The elevation contours of the beach along the five sections shows that the material lost from Section 2 from May 15 to June 10 is deposited along the northern most section (Fig. 6). The littoral currents also indicated a predominantly northerly flow with varying speeds during the period of observation. While the section taken perpendicular to Section 5 shows that the beach material removed from July 10th to August 7th was deposited on the northern side which is bordered by rocky cliff. The subsequent studies during 1981, 1982 and 1983 by Harish, Premchand and Baba, (unpublished) have shown that the beach along the southern most sections never regained its original position even after three years while the beach developed on the northern side more or less remained stable. Compared to the Section 2 the erosion of beach along Section 1 was less due to the presence of the series of groins constructed on the southern side. The beach slope was maximum along the southern section and the part of the beach north of the pier was very flat.

The presence of the rock out crop around 200 m offshore acts as a barrier for the incoming waves. The waves are defracted and creates a shadow zone resulting in the formation of a tumbola. As seen from Fig. (6) the tumbola formation extends to around 170 m from the reference point. The beach material lost during July 3rd was transported northward and was deposited on the northern side perpendicular to the profile. The presence of the pier also did not seem to effect the transport of sediment from the southern section to the north as there was no significant deposition of material on either side of the pier. In addition to the waves and the resulting littoral

Table I. Wave parameters observed along Tellicherry coast.

Date	Wave period (sec.)	Wave direction degrees	Wave height (m)
15-05-80	11.8	210	0.6
19-05-80	11.4	210	0.6
23-05-80	14.5	210	0.7
26-05-80	11.4	210	1.3
29-05-80	11.0	210	1.1
09-06-80	11.9	230	1.2
12-06-80	12.5	220	0.95
16-06-80	8.0	215	1.2
19-06-80	8.0	225	1.25
23-06-80	13.6	220	2.10
26-06-80	9.5	220	1.20
30-06-80	9.6	225	1.80
03-07-80	10.5	220	1.74
07-07-80	10.5	—	1.4
10-07-80	10.5	—	1.45
17-07-80	15.8	220	1.15
21-07-80	16.9	216	0.86
24-07-80	11.9	213	2.1
28-07-80	14.1	—	1.57
31-07-80	13.9	213	1.19
04-08-80	17.9	215	0.95
07-08-80	13.0	—	0.87
10-08-80	—	—	1.8
11-08-80	13.5	225	1.37
14-08-80	11.3	225	0.55
18-08-80	13.6	—	0.50
21-08-80	12.1	225	1.00

drift the indiscriminate removal of sand from the small stretch of beach affects the dynamical equilibrium of the beach along Tellicherry.

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