(Jour. Geol. Soc. India, 17, 1976, 399-400)

# A note on the study of sediment movement at Karwar, Karnataka

K. V. VENKATESH AND I. RAY
Geological Survey of India, Calcutta

## Introduction

Both fluorescent and radioactive tracers serve as important tools in deciphering the direction of sediment movement in the offshore and foreshore zones. Of late, fluorescent tracers have been increasingly used (Seibold, 1963, Ingle, 1966 and Zenkovich, 1967) in such studies because of its several advantages over the radioactive tracers. Results of such studies are useful to harbour authorities in planning dredging operations and in tackling coastal engineering problems. The Geological Survey of India has drawn up a detailed programme on the study of coastal accretion and erosion, as a part of which, the authors undertook the study of sediment movement at Karwar whose preliminary results are presented below. Karwar (14°48′21″N : 74°07′38″E) is about 81 km south of Marmagoa port and 274 km north of Mangalore. (Fig. 1a)

## Details of study

Systematic sampling in the offshore area by Van Veen type grab sampler (area approximately 200 sq cms) revealed that the proposed harbour area in the Karwar port is carpeted mainly by silty clay and clay which are not amenable to the fluorescent technique and as such study of the beach was undertaken to locate a site suitable for carrying out fluorescent tracer tests on the beach. The beach at Karwar (Fig. 1b) is almost straight in a North-South direction, up to Shitta point where it bends towards the east. Kalinadi from the northeast joins the bay just near the shitta point after traversing nearly 144 km from the source. Mechanical analyses of the beach samples revealed that they were generally composed of medium to fine sand with quartz and felspar. Using indigenous dyes and varnish, about 20 kg of beach sand was made fluorescent, dried and released on 31-1-72 at 2-48 p.m. (Fig. 1) during the slack tidal period at the site (14°48′42″N : 74°07′30″E) from where it was collected. Sufficient time gap after the release of the tracer and before the collection of samples was allowed for the tracer grains to get dispersed. Seven minutes after the tracer release, twenty-five samples in forty-two minutes were collected shoreward in a grid pattern at three meters interval around the site of release. After processing in the laboratory the number of fluorescent grains in each sample was counted under the ultraviolet lamp with the aid of a hand tally counter and recorded.

## Results

Isopleths of tracer concentrations were drawn for the absolute values (Fig. 1c). Corrected values of tracer concentration after a standard elapsed time (25 minutes) was calculated using the standard formula (Ingle 1966, p. 43) and a tracer distribution map was prepared (Fig. 1d). Although the tracer grains have scattered in all directions around the release point, an analysis of the tracer dispersion pattern reveals a higher concentration of tracer sand in the south west quadrant of the release point (Fig. 1c, d). The concentration of the tracer grains to the north and northwest of the release point is much less than towards south and southwest. Due to the general alignment of the beach at Karwar in a north-south direction the wind induced currents from northwest when they strike the beach get refracted towards the offshore in a west

and southwest direction and move the beach sediment in that direction. Thus the depletion of sand on the Karwar beach which is not very prominent is caused mostly by the wind induced currents. The higher concentration of tracer grains nearer to the release point (Fig. 1c, d) speaks of the reduced velocity of the refracted currents after striking the beach. Considering the time lapsed after tracer release and the distance travelled by the fluorescent grains from the release point, grain velocities

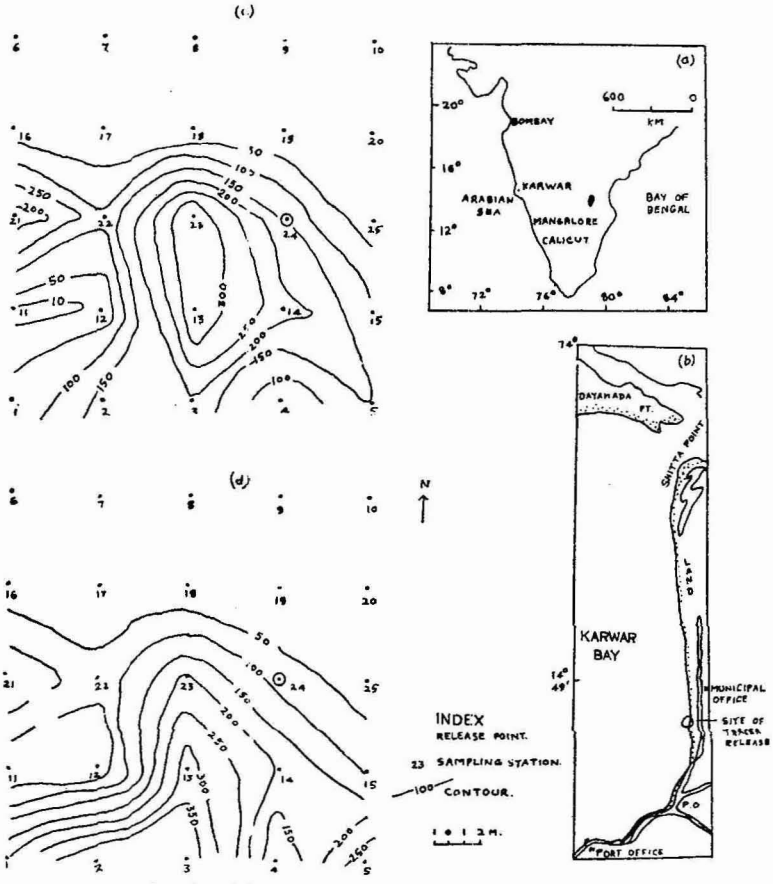


Figure 1. Map showing (a) Location of Karwar (b) site of tracer investigation and tracer concentration of (c) Absolute values (d) Corrected values.

were calculated (Ingle, 1966). They vary from 0.8 to 1.5 m per minute. The low grain velocity reflects the feeble carrying capacity of the refracted currents during the slack tidal period.

Although the present study indicates the movement of sediment towards sw, a generalised picture of the sediment movement will emerge only when such studies are repeated at closer intervals during different seasons.

*Acknowledgement:* The authors are thankful to Shri K. L. Ramaswamy, Port Engineer and to Shri Kumaran, State Port Officer for providing launch facilities.

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