

Deposition of Tar-like Residues on the Beaches of Kerala

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Received 19 February 1981; revised received 2 May 1981

In majority of the beaches the deposition of tar-like residues was low as compared to other parts of the west coast of India during 1977 to 1980. Recorded only in monsoon periods the deposit was dominant in open sea beaches and infrequent in HT level than in MT and LT levels. In few beaches the deposition was seen 15 cm below the surface at HT levels. The shape of the deposits varied from small pellets to large lumps or flat melting tar pieces. Extraneous matter like polychaete tubes, debris, charcoal pieces, seeds, exposed shells was also associated with the deposits. Maximum deposition was noticed in 1978-79 and the magnitude of tar deposition was higher towards north zone of Kerala, which may be due to wave action or current patterns of the inshore waters.

Oil spills in the sea ultimately result in the deposition on the beaches in the form of pellets or balls. This was first recorded¹ in India from Vagator beach at Goa (west coast of India) and subsequently from a number of beaches along the east and west coasts of India^{2, 3}. Studies on the chemical nature of the oil spills⁴ and their environmental impact⁵ were made. Qasim⁷ reviewed the oil pollution of the sea around India. Present study on oil pollution of Kerala coast was undertaken as part of the pollution monitoring programme along the Indian coasts.

Occurrence of tar deposits was recorded along 14 beaches of Kerala, viz. Vizhinjam, Kovalam, Sankumugham, Quilon, Neendakara, Alleppey, Fort Cochin, Cherai, West Hill, Calicut, Kappad, Mopla Bay, Payyambalam and Ezhumala. Monthly observations were made at High Tide (HT), Mid Tide (MT) and Low Tide (LT) levels from 3 transects, 75 m distant from each other. At each tidal level an area of 1 m² was marked and deposits were collected. Extraneous matter adhering to the surface of deposits was recorded and removed carefully prior to weighing. The values reported are averages of 3 transects for the respective tidal levels and are expressed in g/m². Physical parameters like wave height, wave frequency and

beach gradient were recorded in the field. Data on Kerala coast presented in this paper are for 3 successive years (1977-80) covering premonsoon, monsoon and postmonsoon seasons.

Percentage occurrence of tar deposits in different beaches is given in Table 1. During the study period tar deposition was mainly recorded during monsoon months (June and July) while scanty deposits were observed during other months such as October and December to February. In open sea beaches like Kappad, Calicut, West Hill, Ezhumala, Alleppey, Neendakara and Sankumugham, the tar deposits were predominant while in Kovalam, Vizhinjam and Mopla Bay which are the protected beaches, the occurrence was insignificant. Similar trends were reported earlier^{2, 3}. In beaches like Kappad and Sankumugham the wave periodicity was 4-5/min and the average height during monsoon was 2 m. Beaches having steep gradient like Kappad, Ezhumala, Sankumugham and Calicut, the deposition was well-marked. Other environmental parameters such as dissolved oxygen, temperature, etc. do not seem to have any direct effect on the deposition of tar.

Plastic beads, seeds, twig, wooden pieces and polychaete tubes were the common extraneous

Table 1 - Percentage Occurrence of Tar Deposits*

Vizhinjam	Shangumukham	Quilon	Neendakara	Alleppey	Calicut	West Hill	Kappad	Payyambalam	Ezhumala
1977-78									
Nil	16.6	25	Nil	8.3	Nil	33.3	Nil	Nil	—
1978-79									
8.3	16.6	25	8.3	25.0	8.3	41.7	41.7	Nil	100†
1979-80									
—	—	—	—	—	8.3	50.0	41.7	16.6	50

* No tar-like deposits were observed at Fort Cochin, Cherai, Kovalam and Mopla Bay.

† May be due to the oil spillage from the agrounded Panama ship *Good Fortune*.

material found in association with tar deposits. Ciliates and a few talistidae were also found. Microbial components were mainly *Pseudomonas* sp. and *Achromobaeter* sp.

Of the total coastal environment (590 km) of Kerala, about 75% is contributed by the sandy areas. Occurrence and formation of tar balls along 25 beaches in the east and 60 beaches in the west coasts of India were reported by Dwivedi and Parulekar². However, for Kerala their study was based on a single collection. The present study based on monthly observations for 3 yr is more comprehensive for this coast.

Extraneous matter associated with tar balls gives some indication of their origin. Based on the data collected during the 3 yr, it is inferred that in majority of the beaches the magnitude of deposition was low compared to other parts of the west coast. Also deposition was more frequent in HT level than in MT and LT levels. Moreover, in a few beaches like Sankumugham, West Hill and Kappad at HT levels about 15 cm below the surface sand also tar deposition was seen. In many of the beaches a tendency to develop grey or black layers of sand close to the surface was noticed and this normally should not have happened but for pollution. However, the colour was not intense as reported⁵. The shape of the deposits varied from small pellets to large lumps or flat melting tar pieces and the range was 47.5 to 557.5 g/m². Seasonal rather than yearly variations were more prominent throughout the period of observation. However, at Ezhumala comparatively high deposition of tar was noticed during 1978-79 (114 to 515 g/m²). This may be due to sudden spillage of oil in the inshore waters of Ezhumala where the Panama ship *Good Fortune* ran aground on 6 August 1978. However, general penetration and contamination of beach substrata by film of sheen oil was not a problem on this beach.

Similarly burial of discrete layers of mousse was also not a hurdle on Ezhumala beach. Moreover, considerable amount of stranded oil immediately did not cause any local serious problem as noticed for *Amoco Cadiz*⁶. An indepth study of the benthic structure⁸ of Ezhumala inshore waters should highlight the harmful effects of pollution if any due to *God Fortune* incident. Spilled oil gets into the form of small or big pellets by the action of sea water and other physical parameters resulting in the deposition on the beach. Cochin harbour, one of the biggest ports in India handles oil tankers and other ships considerably. In addition there are many minor ports especially fishing harbours all along the Kerala coast which also may contribute to oil spillage. However, the present observation does not seem to indicate serious tar deposits on Kerala beaches. The present data suggest that the magnitude of tar deposition was higher in the northern than southern beaches. This may be due to the inshore current pattern and wave action.

The authors are thankful to Dr S Z Qasim, Director for encouragement. One of the authors (KNR) is grateful to CSIR New Delhi for the award of a post-doctoral fellowship.

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