

# SEASONAL VARIATIONS IN SALINITY OF KORAPUZHA ESTUARY (CALICUT, KERALA) IN RELATION TO TIDE AND RAINFALL

## ABSTRACT

Hydrographic, tidal and rainfall observations at a selected station situated near the mouth of Korapuzha estuary during the period 1989-1993 revealed that the main causative factor which brings in variations in salinity is rainfall and the associated river runoff rather than the tide eventhough the estuary is connected with the Arabian sea throughout the year permitting a free flow of sea water into the estuary and a counterflow of fresh water in the opposite direction.

THE PRESENT study is based on hydrographic, tidal and rainfall observations at a selected station situated near the mouth of the Korapuzha estuary. The estuary is connected with the Arabian sea throughout the year and hence one can expect a free flow of sea water into the estuary and a counterflow of fresh water in the opposite direction during all the seasons with the intensity varying from time to time (Fig. 1).

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Earlier works in the region by Rao and George (1959) found an inverse relationship between salinity and

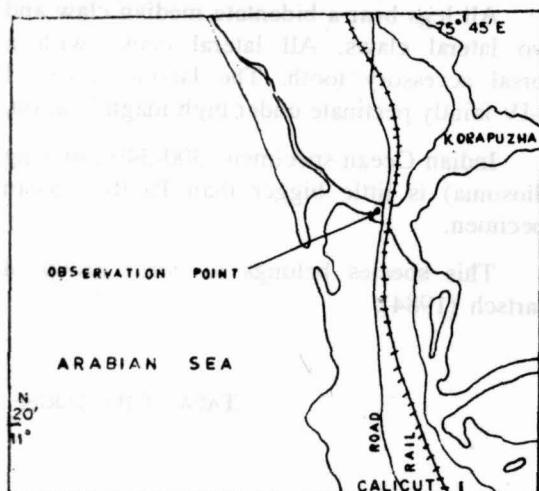


FIG. 1.

rainfall. No other published work is available on the variations noticed in any one of the major hydrographic conditions in the area.

The station where the observations were made in the Korapuzha estuary is located about 10 km north of Calicut city. The estuary is never dry. During the rainy season, the river water from Korapuzha river and land drainage bring in large quantities of fresh water into the estuary. Since the estuary is comparatively shallow with an average depth of less than 5 m, the effect of high saline sea water is very much felt in the lower reaches of the estuary nearer to the barmouth, especially during the high tide. The tide in this region are semi-diurnal characterised by two high waters and

two low waters during a 24 hour period. There is always a difference in the intensity of the first high/low tide with the second high/low tide on the same day.

The area where the observations were made is important in view of a flourishing prawn fishery and also an upcoming edible oyster fishery apart from the regular fishery for the typical estuarine forms. Surendranatha Kurup et al (1991) brought out the importance of Korapuzha estuary which serve as a nursery ground for commercially important prawns.

The aim of the present investigation is to find out a possible explanation for the large scale variations noticed in the salinity of the waters near the mouth of the estuary.

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Salinity data pertaining to the period 1989-1993 both at surface and bottom (5 m) is made use of in the present study. Rain fall data was gathered from the IDWR charts issued by the Indian Meteorology Department. With the aid of tide tables for the respective year the tidal variations for the nearest harbour viz. Beypore (situated about 15 km away from Korapuzha estuary mouth) were noted down. It was possible to divide the observations for any given month into three different categories viz. those falling at the time of low water, those falling at the time of high water and those falling in between during the lull period. The sampling was then classified considering the period in which the observation time fell.

TABLE 1. Total Number of Observations made during rainy/dry seasons (1989-1993)

Period	Total observations	Rainy Season						Dry Season					
		Low Salinity			High Salinity			Low Salinity			High Salinity		
		LW	LULL	HW	LW	LULL	HW	LW	LULL	HW	LW	LULL	HW
1989-1990	32	8	4	NIL	2	1	1	10	3	3	NIL	NIL	NIL
1990-1991	34	6	4	3	NIL	NIL	NIL	11	5	5	NIL	NIL	NIL
1991-1992	31	6	3	NIL	NIL	NIL	NIL	12	NIL	9	NIL	1	NIL
1992-1993	24	7	NIL	1	1	NIL	NIL	8	2	4	1	NIL	NIL

During the period under study, salinity varied between 0.19‰ and 35.08‰. In general, the maximum values were associated with the period of high tide especially during those months when rainfall was very little or nil. Low salinity was associated with rainfall and river run off especially during the period of low tide. There were few cases where high salinity values were observed during rainy season but the tidal cycle indicated a high water or a lull period. There were also one or two cases where low salinity values were observed during the dry weather season but the tidal cycle indicated a low water or lull period.

Out of a total of 121 observations made during the period 1989-1993, 47 were made during the rainy season (38.8%) and the balance 74 during dry season (61.2 %) when the rainfall was negligible or null (Table 1).

Among 47 observation made during rainy season, 30 were made during low water (63.8%), 12 during the lull period (25.5%) and the balance 5 during high water (10.6%). Among 74 observations made during dry season, 42(58%) were made during low water, 11 (13.5%) during lull period and the balance 21 (28.5%) during high water.

Among a total of 73 observations made during low water, 27 observations made during

rainy season (June-September) revealed low salinity values clearly revealing the influence of rainfall and river runoff in bringing down the salinity at the point of observation.

Among a total of 43 observations made during low water, 42 observations made during the dry season (October-May) revealed high salinity values clearly revealing the inverse relationship between rainfall and salinity.

From the above it may be inferred that the main causative factor which brings down the salinity in the area under observation is rainfall and not the phase of the tide. Among 42 observations made during low water referred to above, inspite of low tide conditions high salinity values prevailed in the area. Similarly among a total of 5 observations made during high water in the rainy season, 4 observations indicated low salinity eventhough the high saline sea water was flowing into the estuary at the time of observation clearly revealing the inverse effect of rainfall and associated river runoff on salinity. During the dry season, high salinity values were always observed during high water (21 observations) clearly revealing the effect of high saline sea water in the total absence of rains. During dry season low salinity values were observed only rarely, on 2 occasions one during low tide and another during lull perio.

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