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AN INSTANCE OF TOTAL DRYING UP OF PILLAIMADAM LAGOON DURING 1986-'87 IN SOUTH-EAST COAST OF INDIA*

Pillaimadam Lagoon is located in Ramanathapuram District, adjoining the Palk Bay (Long. 79° 6'E and Lat. 9°17'N). The Central Marine Fisheries Research Institute has converted about 3 ha in the easternmost extremity of the lagoon into fish culture ponds. Also, net pen enclosures were put up in the lagoon for experimenting fish culture. Since the lagoon has been playing a role in the economy of the fishermen living in its neighbourhood, any marked change in its ecology and fisheries is bound to influence the fishermen there, in one way or the other. In view of this, an instance of total drying up of the lagoon observed during 1987 is documented in the present note.

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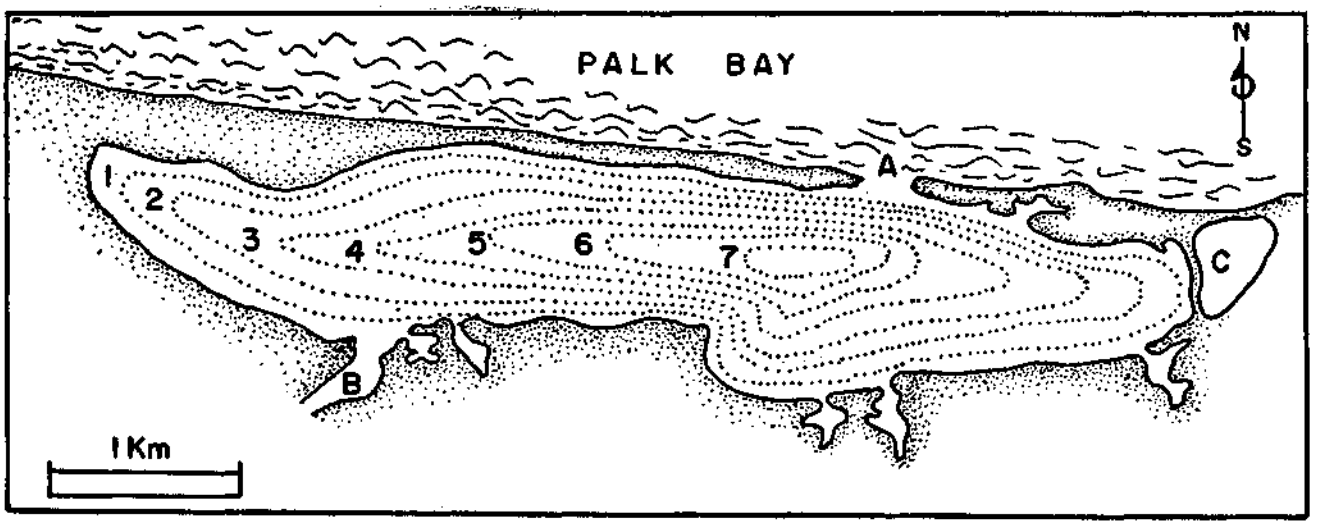

Fig. 1. Pillaimadam lagoon showing the successive drying up process. Numerals 1 to 7 indicate the receding water levels from December, 1986 to June, 1987 and the total drying up during July, 1987. A. Bar mouth from the sea; B. Freshwater inlet from land; C. Fish farm constructed by CMFRI.

The lagoon is situated at an altitude of about 2.5 m above mean sea level. The east-west length is about 6.5 km and north-south width varies from about 0.5 to 1.0 km (Fig. 1), when filled with water, encompassing a water area of about 360 ha. The sand bar between the lagoon and Palk Bay is usually about 70 to 180 m in width. When full, the depth varies from 0.4 to 1.2 m. Before 1964, the lagoon is reported to have had two natural barmouths, 2 km from the eastern and western limits and at a distance of about 2.5 km from one another. The western mouth got closed during the cyclone of 1984. Thereafter, only the eastern mouth has been the source of seawater supply to the lagoon, apart from some amount of seawater overflowing the bar at other sites also. The eastern mouth generally opens from October, due to erosion of sand caused by strong winds and waves during the north-east monsoon period. The mouth closes sometime during February-March, coinciding with weakening of waves and change in the direction of wind for the southwest monsoon period. The freshwater supply to the lagoon is from the rains in the area, especially during the northeast monsoon from about September to December including the run off water from the land on the south, east and west.

The ecology of the lagoon is influenced by two principal climatic conditions prevailing in the locality. The longer season is the dry one, from about February/March until August/September, when the rains cease, summer prevails and the barmouth closes, thus cutting off freshwater and seawater supply to the lagoon. During this period the water level goes down, salinity reaches as high as 73 to 93‰ or even more during July–September and excepting the middle region of about 5 to 10 ha, the other parts of the lagoon get dried up. This is followed by the shorter season, from September to February, when rain water and run off water from the land accumulates in the lagoon, the bar gets opened, the lagoon water becomes brackish and salinity values became low (25–33‰).

Table 1. *Monthly values of rainfall at Mandapam, mean depth of water in Pillaimadam lagoon and salinity of the water in the lagoon during two years of observation,* 1985–'86 *and* 1986–'87

Month	Rainfall (mm)		Mean water depth (mm)		Salinity (‰)	
	1985–'86	1986–'87	1985–'86	1986–'87	1985–'86	1986–'87
September	29.6	38.5	47.0	19.7	40.0	73.5
October	202.9	179.2	69.0	25.6	35.7	33.5
November	302.9	182.9	83.8	52.1	29.7	32.5
December	110.9	279.3	72.6	76.7	28.0	30.4
January	28.6	33.2	67.5	64.3	25.3	32.0
February	32.6	—	50.2	52.0	29.2	47.0
March	15.7	1.0	46.7	35.4	39.0	83.0
April	12.2	10.0	41.0	20.0	47.0	174.6
May	1.8	195.6	27.7	10.0	56.0	293.0
June	—	—	28.5	5.0	68.8	350.0
July	15.2	—	17.4	dried	93.0	Salt formed
August	1.2	—	21.5	dried	73.0	Salt formed

In marked contrast to such a normal pattern, an unusual drying up of the entire lagoon was observed in 1987. This was the result of the closure of the bar mouth and lack of freshwater supply from the land. A comparison of the rainfall data at Mandapam, mean depth of water in the lagoon and salinity of the water there for the two years 1985–'86 and 1986–'87 is given in Table 1. During 1985–'86, the total annual rainfall was only 753.6 mm, but during 1986–'87 it was 916.7 mm, which was 163.1 mm more than the former year. Inspite of this fact, the water depth in the lagoon went down rapidly from 53 cm in February, 1987 to a meagre of only 5 cm in June, 1987 and a totally dried up condition has prevailed in the following two months. But during 1985–'86, the water depth was 50.2 cm in February, 28.5 cm in June and 17.4 and 21.5 cm in the next two months. The presence of water in the lagoon throughout 1985–'86 was not due to rains, but only due to tidal waves bringing in seawater by overflowing the narrow sand bar at locations of low altitudes. Due to paucity of freshwater supply, the salinity values have risen to as high as 93‰ during July, 1986. On the otherhand, during 1986–'87, although the rainfall during February–August, 1987 was more than 2.5 times of the same during the corresponding period of 1986, there has been a rapid decrease in water depth until June, followed by a total dried up condition in the following months. This was due to the lack of tidal seawater entering into the lagoon by overflowing the sand bar, apart from the closure of the bar mouth.

Enquiries have revealed that prior to the present total dried up condition, a part drying up of the lagoon was observed during 1978–'79, when about 70 tonnes of common salt was gathered; and earlier during 1962–'63, the local fishermen, in order to gather salt, have closed the two bar mouths. Also, during the thirties and early forties, some salt pans are reported to have been functioning in the western part of the lagoon; and salt produced from there was even exported to Sri Lanka. These pans are reported to have been destroyed in a cyclone sometime during the forties and hence had to be abandoned thereafter.

The studies by CMFRI have indicated that with the existing single bar mouth and under the climatic conditions prevailing, capture fisheries as well as culture projects can be undertaken in the lagoon only from about October till the following March. Hence, for extending the duration of capture and culture fisheries in the lagoon, a continued flow of seawater has to be maintained. Some amount of coastal engineering is essential in this regard.