Description of the study area
2.0. DESCRIPTION OF THE STUDY AREA

Cape Comorin coast having a stretch of about 67.69 km is situated on the southern extremity of the Indian Peninsula (Lat. 08° 04' and 08° 21' N; Long. 77° 26' and 77° 30' E) (Fig. 1). The coast receives both the southwest monsoon from June to September and northeast monsoon from October to December. Considering the geomorphological, anthropogenic and ecological factors, 5 different coastal sampling stations viz. Rajakkamangalam, Kovalam, Manakudy, Colachel and Chinnamuttom and 3 different saltpan stations viz. Kovalam, Puthalam and Thamaraikutlam were selected for the present study. The sampling stations have an average distance of 10 km, along the Cape Comorin coast, which is the trijunction of Arabian sea, Bay of Bengal and Indian Ocean.

2.1. Description about beach stations

a. Rajakkamangalam

This site is situated at the southwest coast of Cape Comorin (Lat. 08° 07' 27"N; Long. 77° 23' 28"E). This is a bar-built estuary, opened when the water inflow is more during monsoon seasons. This is a sandy shore with immediate depth. The coastal stretch of Rajakkamangalam is marked by raised sand dunes (10 – 25 m height). Here, dunes of complex nature show a limited distribution. In dunes, medium coarse grains represent the texture of the sediments (Shanmugaraja, 2004).
FIG. 1. LOCATION MAP OF THE STUDY AREA
b. Kovalam

This beach is situated southwest to Cape Comorin at a distance of 2 km (Lat. $08^\circ 05' 11''$N; Long. $77^\circ 32' 42''$E). This is a rocky shore made of coral blocks of ancient age. The sand dunes are complex and grains are coarse. This station showed rich seaweed diversity (Eg. *Ulva lactuca*). The Kovalam saltworks is situated near to this beach. Here brine effluents are discharged into the sea.

c. Manakudy

This is situated about 8 km northwest of Cape Comorin (Lat. $08^\circ 05' 18''$N; Long. $77^\circ 29' 0.02''$E). It is the place where river Pazhayar connected to the sea during rainy season and remains landlocked for the rest of the year by a sand bar. Manakuduy is a major fish-landing centre of Kanyakumari district (Succelan, 1975; Lazarus and Joel, 1979). Other important small-scale industries like saltworks, coconut husk retting, shell dredging etc., are also associated with this station. Dominant vegetation includes mangrove plants and ferns are distributed in this site.

d. Colachel

This beach is almost flat and it is one of the major fish-landing centres situated at the southwest coast of Cape Comorin (Lat. $08^\circ 10' 20.4$ N; Long. $77^\circ 14' 54''$E). The shore is situated near to Indian Rare Earths (IRE), a mineral mining public industry of Government of India. This area is free from saltworks. The coastal communities practice sun
Picture showing the sampling sites of Cape Comorin coast

Rajakkamangalam (SI)  
Kovalam (SII)  
Manakudy (SIII)  
Colachel (SIV)  
Chinnamuttom (SV)
dry fish processing. The entire coastal area is made up of beach rocks of marine calcareous sand stone and it is deep flesh colour. Some seaweed of chlorophyceae members are found in this region. Coastal placer mineral deposits of both ancient and modern age are located here.

e. Chinnamuttom

This beach is situated about 3 km north east of Cape Comorin (Lat. 08° 05' 48" N; Long. 77° 31' 31" E). The seashore area is having fine sands of complex mineral deposits. Some seaweeds are occasionally found on the shore rocks. This is the largest fish-landing centre in Cape Comorin. Many numbers of mechanized and non-mechanized boats are engaged in fishing activities. Large scale mechanized fishing activities, result in oil spillage, a very common occurrence in this area.

2.2. Description about saltpan stations

a. Kovalam saltworks

Kovalam saltpan is situated about 3 km away from Cape Comorin towards southwest direction with the area of 27.38 ha (Lat. 08° 04’ 25” N; Long. 77° 31’ 25” E). Water from the Arabian sea has been trapped in the trenches and further pumped into the canal, which runs underground and the other end of the canal was connected with reservoir. The reservoir pond has a total area of 2 ha with 2 m depth and having a salinity of 35 ppt, on the first day and then it rose to
Picture showing the Kovalam saltworks (SVI)

Lay-out of Kovalam saltworks
about 55 ppt and allowed to pass into the condenser pond of 40m² area. Water is retained in the first condenser for 2 days and when the salinity is raised 100 ppt, it is passed to the condenser II for 3 days; followed by condenser III and retained for 7 days. Further, water is passed to the crystallizer pond of area 5.261 ha and water is retained for a period of 6 days, attaining a salinity of 280 ppt and the salt is crystallized.

b. Puthalam saltworks

This site is situated south to Puthalam village, which is 3.5 km away from Manakudy beach and adjoining Manakudy estuary (Lat. 08° 04’ 36” N; Long. 77° 28’ 36”E). The total area of the saltwork is 8.09 ha. The saltwork receives saline bore water (20 – 25 g.l⁻¹) and stored in reservoir ponds of 2 ha. When the salinity reaches 30 g.l⁻¹ within 2 – 3 days, the water is allowed to pass into the condenser pond I having an area of 280 m² with 15 cm height. The water is retained for 9 days. The initial height of the water is 10 cm and on the final day, the height of the water is reduced to 5.6 cm and the salinity is raised to 100 g.l⁻¹. The crystallizer pond is also having the same size as condenser pond (280 m²). There are 72 condenser and 72 crystallizer ponds with varying size with the height of 12 cm. The water retained on crystallizer ponds for 9 days at a level of 8 cm. On the ninth day, the salinity of the water is raised to 250 g.l⁻¹ and the height of the water is reduced to 2.5 cm, which is suitable for the formation of raw table salt.
Picture showing the Puthalam saltworks (SVII)

Lay-out of Puthalam saltworks
c. Thamaraikulam saltworks

Thamaraikulam saltworks (category I), situated at 13 km southeast coast of Nagercoil and 5 km north to Kanyakumari (Lat. 08° 06' 48"N; Long. 77° 28' 02"E). This is the largest salt producing saltworks in Kanyakumari district during summer. Seawater supplemented with ground water has been used for salt extraction. The total area of the saltpan is 15.21 ha. The saltpan is situated very close to the Manakudy estuarine water. Here, the sub-soil water is pumped into the condenser I pond (male pond) directly, has the total area of 6.475 ha.

Each pond has an area of 200 m² with 20 cm height and a salinity of 30 ppt. On the 7th day, the height of water is reduced to 8.2 cm and the salinity was increased to 135 ppt. Then the water was passed into the condenser II called 'Attupathi'. The area of the condenser is 202 m² and a height of 18 cm. The water is kept for 7 days, allowing the salinity to rise to 185 ppt. The saline water from the condenser II pond was passed to the crystallizer pond for 7 days having the same area with 15 cm height. On the 7th day, the height of the water was reduced to 2.5 cm and the salinity was raised to 275 ppt and then salts will be formed. High calcium content in this saltpan resulted in the production of salt related products like CaCl₂ and CaSO₄ (gypsum). These saltpan ponds are reported to have much plankton diversity (Reginald, 2003).
Picture showing the Thamaraikulam saltworks (SVIII)

Lay-out of Thamaraikulam saltworks