

# Underwater Exploration off Poompuhar and possible causes of its Submergence

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## Introduction

Poompuhar also known as Kaverippattinam, one of the most notable ancient Chola ports played a vital role in the maritime history of Tamil Nadu, especially during the Sangam period. It is located at the confluence of river Kaveri with the Bay of Bengal. Sangam period texts such as *Pattinappalai*, *Ahananaru* and the two epics *Silappaikaram* and *Manimekhalai* vividly describe Poompuhar as the capital port-city of the early Cholas.

*Manimekhalai* mentions that the Chola king had lost his son and in his great grief he forgot to celebrate the annual Indra festival. This enraged the goddess Manimekhalai who caused the city to be swallowed up by the sea. Though the reference is only to a supernatural incident, it may be taken as an echo of some actual sea erosion of high tidal wave that lashed out on the city.

## Previous work

Surface exploration at Kilaiyur, a part of Kaverippattinam, in the years prior to 1963 had yielded square copper coins with tiger emblem which was the royal crest of the early Cholas. Other finds include beads of semi-precious stones and amphora pieces. The most significant discovery was an T-shaped brick structure, exposed in the ancient channel of Kaveri at Kilaiyur which is now completely silted. This brick structure with

a drain for the flow of water and platform and wooden posts for handling cargo, served as wharf<sup>1</sup>. The joint off-shore exploration in 1981 by the Department of Archaeology, Tamil Nadu and National Institute of Oceanography, Goa revealed some conspicuous features<sup>2</sup> off Poompuhar. They could not be identified as no underwater exploration followed immediately.

Since 1989 underwater explorations have been carried out in Tranquebar-Poompuhar waters<sup>3</sup>. The successive investigations in the inter-tidal zone as well as off-shore region in 5 to 8 m water depth revealed a number of ring-wells and brick structures in the inter-tidal zone and submerged stone structures along with early historical pottery in shallow waters and two other objects in deeper waters<sup>4</sup>. One of them was identified as a shipwreck which was carrying lead ingots dated AD 1791-92<sup>5</sup>.

## Description of the area of Survey

Poompuhar in Nagai district of Tamil Nadu state (11° 08' 33" N and 79° 51' 31" E.) is situated on the east coast of India (Fig. 1). The onshore and offshore exploration area extended from Vanagiri to Nayakkankuppam, about 7 km along the coast and about 5 km in the sea. Two rivers, namely Kaveri, south of Poompuhar and Palayar, north of Poompuhar join the sea here. Apart from these rivers a few nullahs join the sea on the north of Poompuhar.

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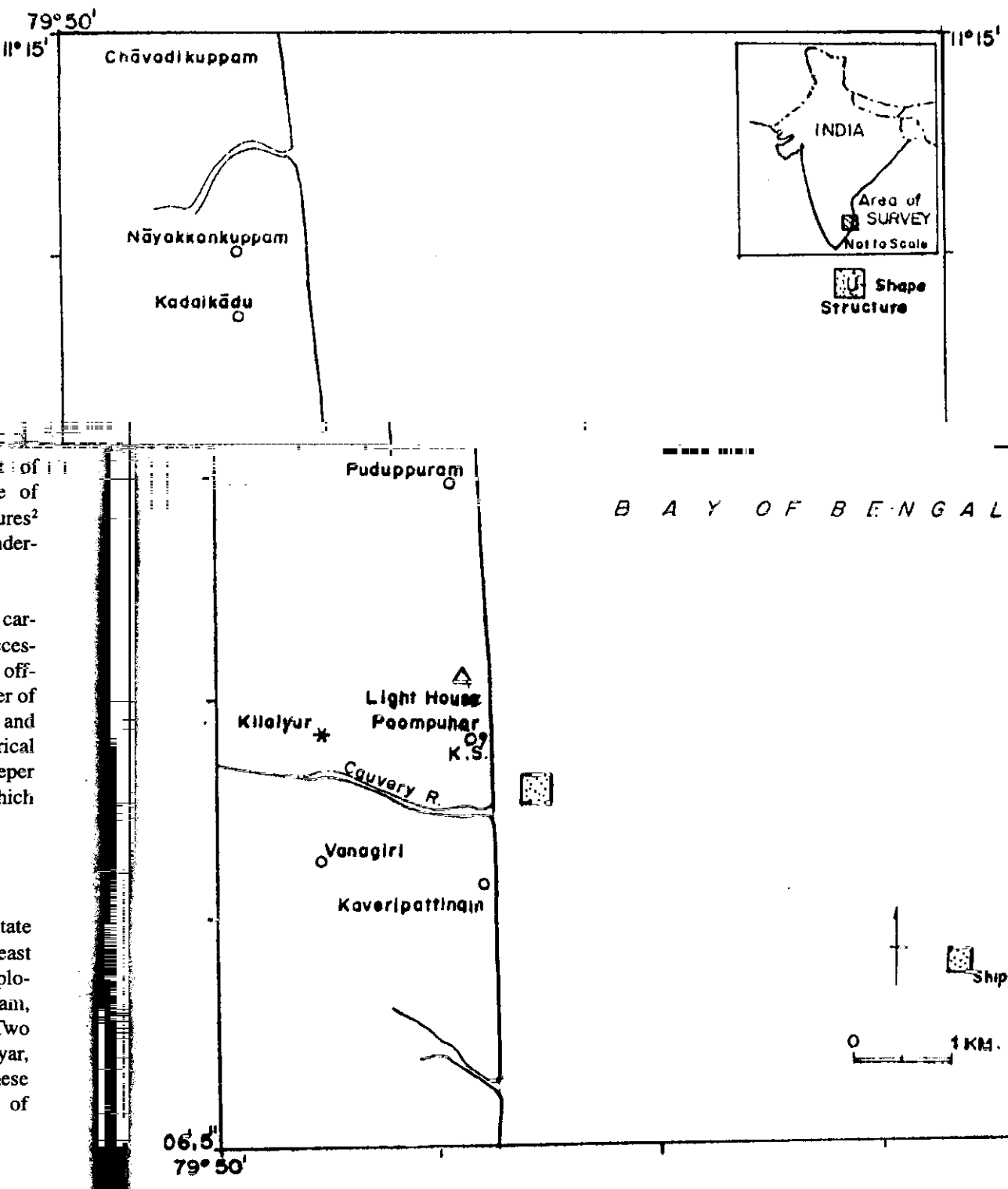


Fig.1. Location Map showing the Survey Area.

## Methodology

Four places were identified for geophysical survey as also for diving. These are : 1. Shallow region between 6 to 10 m water depth; 2. Water depth between 11 to 15 m; 3. The area of U-shaped structure; and 4. Shipwreck site.

The diving operations initiated at the located site was gradually extended to the adjoining areas. Each diving team roughly covered an area of about 50 m radius in a circular search pattern. Two places were selected for diving in shallow water where depth varied from 5 to 8 m. Subsequently airlifting work was also undertaken to expose objects buried in sediments. In deeper waters three places, namely a shipwreck, horse-shoe shaped structure and two small structures in 19 m and 23 m water depth respectively were selected for diving.

## Results and Discussions

Underwater explorations were carried at 3 different places (fig. 1). These are divided on the basis of depth.

### *Near the shore area- Water depth- 6 to 10 m*

Explorations were undertaken opposite the Kaveri mouth about 600 m offshore. A few dressed-stone blocks were located. One of them measured 90 x 40 x 15 cm. This is semi-circular in shape with a L-shape cut on it's surface. Apart from this there are lots of irregular blocks. All these are sandstone. The area is covered with fine black sand. Airlift operations in this area resulted the following stratigraphy :

- Layer (1) is about 10-20 cm in thickness with fine black sand. A few marine organism are seen.
- Layer (2) consists of sticky black clay which is about 20-30 cm in thickness.
- Layer (3) a very compact yellow clay appears in this layer with a few potsherds. The thickness of this layer is 15-20 cm. A few patches of this types clay also appear of in intertidal zone of Poompuhar and in the neighbouring areas.
- Layer (4) White coarse sand with stone-blocks a few potsherds appear in this layer.

This suggests that stone was also used for construction but whether it was used for habitational or other kind of building is still not confirmed. Sangam literature mentions that buildings were constructed of bricks. Airlift operation suggests that habitational site was buried at least 1 m under sediment. Explorations in shallow water also suggest that habitation extended towards the north of present Kaveri river. The ceramic evidences suggest that the habitation belonged to early Christian era.<sup>6</sup>

Up to a depth of 8-9 m the area is much more disturbed by high waves, currents and tides. It is very difficult to presume that some structures particularly of bricks that were mostly used in Sangam period would have survived in tact in the high energy zone. It is only the stone structures which are likely to give a clue to understand the shape of structure.

### Explorations at 'U'-Shaped Structure

The earlier explorations carried out in deeper waters revealed the presence of 'U'-shaped stone structure, located at about 5 km seaward off Kadaikkadu. The structure lies in north-south direction. On the northern side of the object an opening was noticed.

### *Diving operations*

An extensive exploration and documentation was carried out at this place. In previous exploration three stone strutures were located. The structures lying in north-south directions are described below :

### Bigger Structure

It was located at a water depth of 23 m. Side Scan Sonar records suggest an oval shape for this structure<sup>7</sup>. The maximum length of this object is about 40 m and width about 20 m. The centre of the structure, which is about 1 m deep, is covered with a thin layer of sand below which hard rock was noticed. The height of object on the outer edge is 3 m. The height of eastern arm is greater than that of the western arm. The width of arm varies from 3 to 6 m. On the northern side of the object an open space was noticed, where some rubble was found. A section of the structure was exposed by chiselling and hammering which suggest that a heavy growth of barnacles above the structure. The section is highly porous. At a

few places two/three courses were noticed. Airlifting near this structure suggest a huge coarse sand deposition at least up to 2 m.

Smaller structures :

These are lying about 40 m north of bigger structure. These two objects are lying in east-west direction. These structures are heavily disturbed and broken in several pieces. The distance between two objects is 10-12 m. They are covered with the fishing nets. Presently, extensive fishing is taking place here. A few blocks are approximately 2 m in length 1.5 m in breadth and 1 m in height.

### Shipwreck—Water depth—, 19 m

Shipwreck was relocated and an extensive airlifting and diving was carried out at this place. A cannon measuring 2.1 m in length was noticed. Five gun-powder boxes were also found. A 5 cm thick barnacles growth was noticed on these objects. Cannon seems to be of iron and is fixed on an iron platform which makes difficult to lift. A large area of surface of wreck was exposed by airlifting near the cannon area. Wooden planks with copper nails were noticed. Airlifting up to a depth of 1 m suggests that ship was mainly made of wood. Surface wooden planks were affected by wood borer while lower planks were in tact. While airlifting three square holes were also noticed. eight lead ingots were retrieved. A new type of ingot was noticed. Now a total five varieties of ingots have been recognised.

- (1) Long oval boat-shaped with inscription 'W : BLACKETT' and bearing date 1792 on reverse and symbol of VOC;
- (2) Oval-shaped but flat with the same inscription as above;
- (3) Long oval-shaped with a crown symbol and below that the alphabet 'D' and the same symbol in smaller size in the reverse side;
- (4) Rectangular in shape, without inscription or symbol in obverse while in reverse VOC symbol is seen; and
- (5) Long oval boat-shaped without any inscription

or symbol on obverse. One of the ingots of this type has a heart symbol on reverse.

### Coastal Erosion

The explorations at Poompuhar and Tranquebar clearly demonstrate that sea has gradually encroached the land to a greater extent since the last 2000 years.

It is worth mentioning here that in 1973 the Kannagi statue was installed on the shore of Poompuhar about 200 m away from the high water line, and in 1994 it was shifted about 150 m inward because the structure was destroyed by the sea. Similarly, other monuments at Poompuhar were also destroyed by the sea.

A mid-17th century map of Tranquebar has been displayed in the Dansborg Museum at Tranquebar. It shows a complete plan of the town along with the then shoreline (Fig. 2). A careful study of the map suggests: i. that Tranquebar town was well protected by a seaward fort wall, and ii. the Siva temple was sufficiently landward within the fort wall. It is estimated that during the 17th century AD shoreline was at least 50 m away from the fort wall and temple located around 250-300 m from the shoreline. This observation unequivocally suggests that the shoreline has transgressed about 300 m in the last 300 years infringing at an average rate of one metre per year.

Another example of coastal erosion may be mentioned here at North sea, where a 12th century city called Dunwick<sup>8</sup> got submerged in the sea and the deepest point of finding is 16 m about 1.5 km from the shore. Study of map revealed that between 1702 to 1754 about 160 m shoreline had advanced while between 1754 to 1973 it was about 120 m. So there was no constant rate of erosion.

Factors responsible for the land erosion may include the construction of several dams along the course of river Kaveri since AD 1900 for irrigation and hydroelectric power generation. The rivers discharge significant amount of land-derived detritus to the sea thus maintaining a dynamic balance between the coast line and sea. The influx of sediment to the sea by Kaveri has been reduced to negligible amount due to the construction of several dams resulting in a disturbed natural balance. This human induced disturbance appears to have withdrawn the natur-

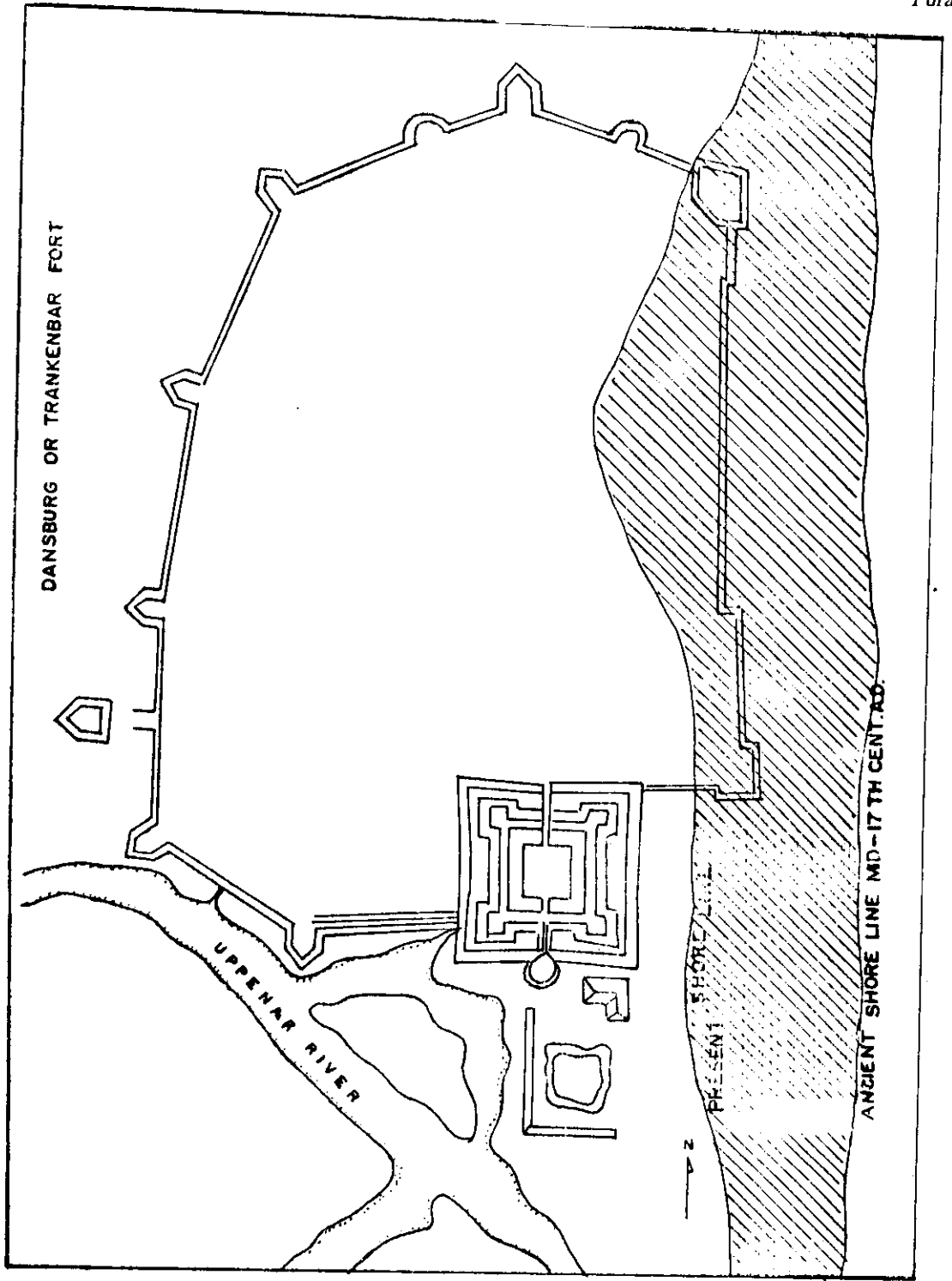


Fig.2. Map of Tranquebar Fort of Mid 17 TH Cent A.D. (copied from Densborg Museum Tranquebar Tamilnadu).

al resistance to the waves. Subsequently, the sea began to erode the coastline leading to the submergence of several ancient coastal structures of Poempuhar.

While the immediate cause of coastal erosion is the removal of sand from the beaches that results in destabilization and destruction of coastal structures, the ultimate causes need to be addressed.

The Bay of Bengal, whose western boundary is formed by the east coast of India, is a rather unusual sea. The Bay of Bengal is subjected to a large number of high intensity cyclones as compared to the Arabian sea.

Cyclones are short lived phenomena capable of causing immense destruction when they cross the sea and hit the coastline. The destruction power of cyclones at present and in the past along the coast of Madras, Andhra, Orissa

sion shifts land ward (submergence), and during a fall in sea level, the zone of erosion shifts sea ward, resulting in seaward progradation of land. An example of this is the location of ancient ports at Korkai and Algankulam on south Tamil Nadu coast far inland but which were patently designed and located to be on the shoreline.

### Conclusions

Ceramic evidences along with these structure suggest that they belong to the Sangam period. Explorations also confirm that habitation extended further north of river Kaveri. There is a serious problem of coastal erosion at least between the river Kaveri on the north and the south. This is confirmed by the presence of structures, ring-wells of historical period zone and 10th-11th century stone and

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