# Exploring The Effects Of Sea-Level Change On An Ancient Port City Through Archaeological Discoveries-Poompuhar

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**Abstract:**
India with its 5000 years history of maritime activity and 6000 km coast has played a major role in commerce and cultural interaction between the East and West. During historical period India had trade and cultural contacts with Egypt, Rome, Greeks, Arabs, China and all most all Southeast Asian countries. The same maritime traditions continued even during the Buddha, the Mauryas, and the Gupta and in later periods. Human settlement depends on the stability of the coast city. The coastline is one of the reason for the development of human civilization. Through this coastline the civilization is transferred from one place to another. There are many indirect references which suggest that the shifting of shoreline was one of the major threats to habitation. Reference in the Literature like Mahabharata and Manimegalai clearly mentioned the migration of shoreline and associated effects, which has an impact on the human settlement.This paper deals with the archaeological evidences of shoreline shift on east coast of India by collecting the underwater data and to find out the submerged extension of the ancient town of kaveripoompattinam and how much it was swallowed by the sea. Onshore exploration in poompuhar and surrounding sites, particularly in vanagiri were conducted as an evidence many archaeological remains exist all along its coast. Offshore exploration is also conducted and the old coastline is found which indicates clearly the shoreline shift.

**Keywords**: offshore, onshore, exploration, shoreline shift.

## 1. Introduction

Poompuhar was also an important centre of art and culture during the sangam period. Many famous Tamil literary works such as Silappathikaram and manimegalai were composed here. The city was known for its vibrant cultural scene, with numerous festivals and cultural events being held throughout the year.

Sangam Literature like chilapathikaram, manimegalai, pattinapalai, purananuru serves as the source material for ancient port city Poompuhar. Particularly in Pattinapalai, it describes the plan of town, regions and the

streets allotted for various activities, the port, the merchandise, the people etc. and it gives wholesome account of kaveripoompatinam.

In Epic Tamil Poems like Silapathikaram and manimegalai, it describes Poompuhar as a city of great wealth and cultural diversity, where people all over the world gathered to trade and exchange ideas.it also describes that poompuhar is covered with area of 4 Kavatham approximating 30 sq.miles, and its boundaries extends from kadarakondan in the west, thirukadaiyur in the south, kalikamur in the north and the sea in the east.it encompasses of 30 villages. In pattinapalai, the poem describes the city Poompuhar vibrant cultural scene with its numerous festivals and cultural events. The literary description offers insights of Poompuhar rich history and culture (sundaresh et al 2014).

The history of Chola race can be traced in Thiruvalangadu copper plate which Mentions about the Justice rendered by the king to the Cow. The Bharhut inscriptions is of greater importance as it traces the history of early Indian Buddhism and its art. The Maurya king Ashoka is believed to have built the Bharhut stupa in 3rd century. Here to they have recorded about kaveripoompatinam in prakrit inscription.The gift of a slab by the Buddhist nun Soma of Kakandi in the 2nd century BC demonstrates that Kaveripattinam was a wealthy town that operated as an important Buddhist centre until at least the 8th century AD. Tsunamis, sea incursions, erosion, and floods are all mentioned in literary works and archaeological evidence in Kaveripattinam (Vora et al 2006). The original city was submerged by the sea, and only a little town remains.

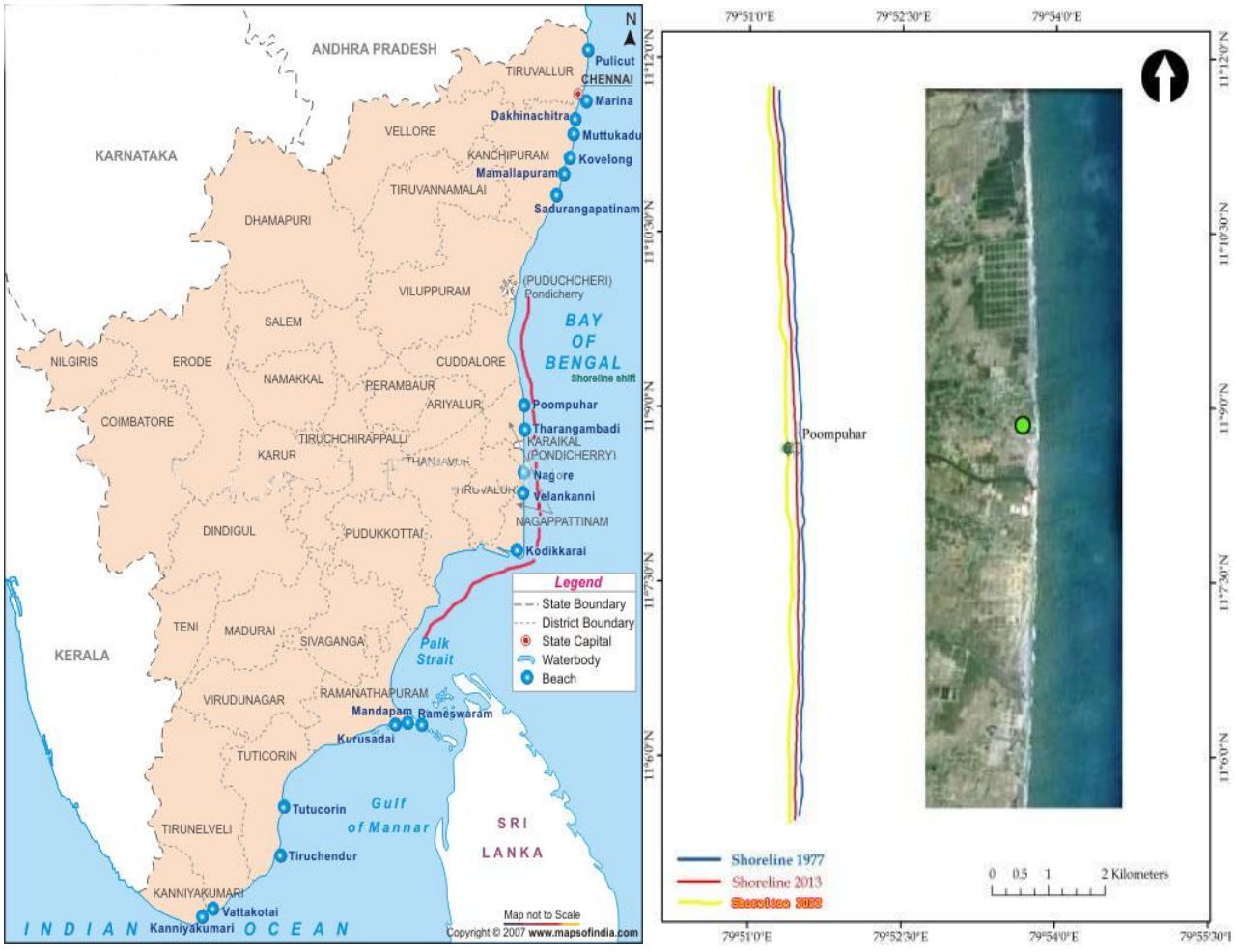


**Fig 1:** Shoreline changes of poompuhar coast

## 2. Underwater excavation in Poompuhar

From the sangam Literature, the archaeologist draws the interest and started to explore inshore and off shore of Poompuhar and found various artefacts that is placed in the Poompuhar Museum. Many artefacts and idols belong to 8$^{th}$ century was found which clearly shows that our ancient people are very well versed in their civilisations and also it is clear that they lived a happy rich life. Previous archaeological excavations done by Mr. Gaur national institute of Ocean Technology, Goa, in 1992 used the technology called single beam echo sounder system, through which they found the sediments and produced the anomaly result like the u shaped structure, ring wells etc[1]. Few idols were found near the seashore are collected and through carbon 14 technology found that these belongs to the 6-8$^{th}$ century (Gaur et al 1999). Through the data from Literature and also the data he got he clearly states that the ancient port was submerged under the water.

The preliminary survey on the sea off the shore of Kaveripoompattinam began in the year 2019. This exploration was carried out by the joint efforts of National Institute of Oceanography, Chennai. The exploration was made by deploying Multibeam Echo scan sonar, Sub bottom profiler (Ramasamy et al 2020). These sophisticated equipment's showed some tangible results on the graphs.

## 3. Discussion

The on shore exploration was carried out surroundings the Poompuhar sites particular in Tranquebar, Vanagiri, chinnavanagiri and nayakankuppam. The number of archaeological remains exists all along the coast between nayakankuppam to tranquebar. The remains include terracotta ring wells, pottery, and brick structures etc. A brick structure of 1.2m height,1.2m width and 4 m length exposed in intertidal zone of poomphar shown in fig2(sundaresh et al 2014).,were recorded. The ring wells at poompuhar and at vanagiri were noticed during low tide shown in figure 3.

**Fig 2:** Brick structures eroded at poompuhar coast

**Fig 3:** Ring wells found at poompuhar coast

The destruction of masalamani temple at vanagiri dated approximately at 11 centuary is presently under threat Fig 4.About 50 percent of the structure has already been destroyed and submerged under the sea.This is clear evidence to show the advance of the shore line in the last 100 years.


**Fig 4:** Destruction and submergences of Masalamani temple at Poompuhar coast
a) 1991 b) 1996 c) 2005 d) 2010

In 1973 Fig 5.the kannagi statue was installed at the shore of Poompuhar about 200m away from the high waterline and 1994 it was shifted about 150m landward because the structure was destroyed by the sea (Dr.R.Poonkuntranar et al 2011). Similarly other monuments is also destroyed by the sea.

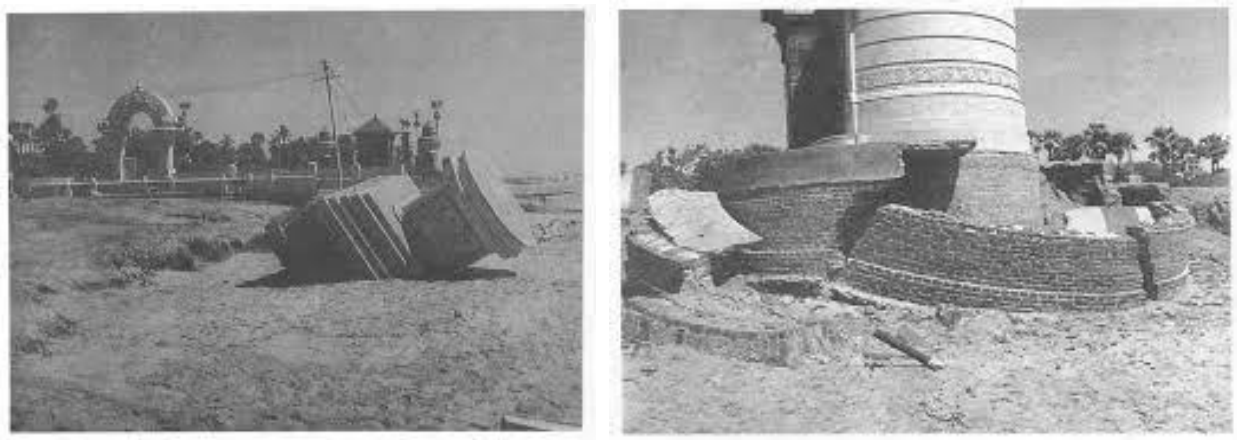

**Fig 5 :** Kannagi temple and monuments destroyed at poompuhar by sea

**4. Underwater excavation Around Poompuhar**

When interpreting the data that was received from NIOT, Chennai, in a particular block ie, in Block E through ArcGIS and seismic software a significant output was found. The Raw Data received from NIOT is converted into SGEY Format which is accessible by ARCGIS Software, it is then run into the software with the Mapping

of the Coordinates that shows the clear view of geological location of the data that is taken by NIOT. Each received sound waves is defined by a triplet (x, y, z), where x and y represent the geographical or projected coordinates on the horizontal plane, and z is the measured depth, respectively as shown in Table 1.The x, y, and z Data are converted into CSV format which can be plotted in ArcGIS. In mapping the lost/submerged port cities, these submarine geological/geomorphological features are to be mapped. By analysing the contour patterns shaded relief images, and the color-coded DEM, the data detected from the MBES- DEM data/contours and the digitally processed outputs shown in figure 6, were further interpreted in detail.

| x | y | z |
|---|---|---|
| 387855 | 1224975 | 31.19 |
| 387885 | 1224975 | 31.26 |
| 387915 | 1224975 | 31.3 |
| 387945 | 1224975 | 31.38 |
| 387975 | 1224975 | 31.46 |
| 388005 | 1224975 | 31.54 |
| 388035 | 1224975 | 31.57 |
| 388065 | 1224975 | 31.62 |

**Table 1:** Sample data received in XYZ triplet form where x denotes latitude Y for longitude and z is for depth

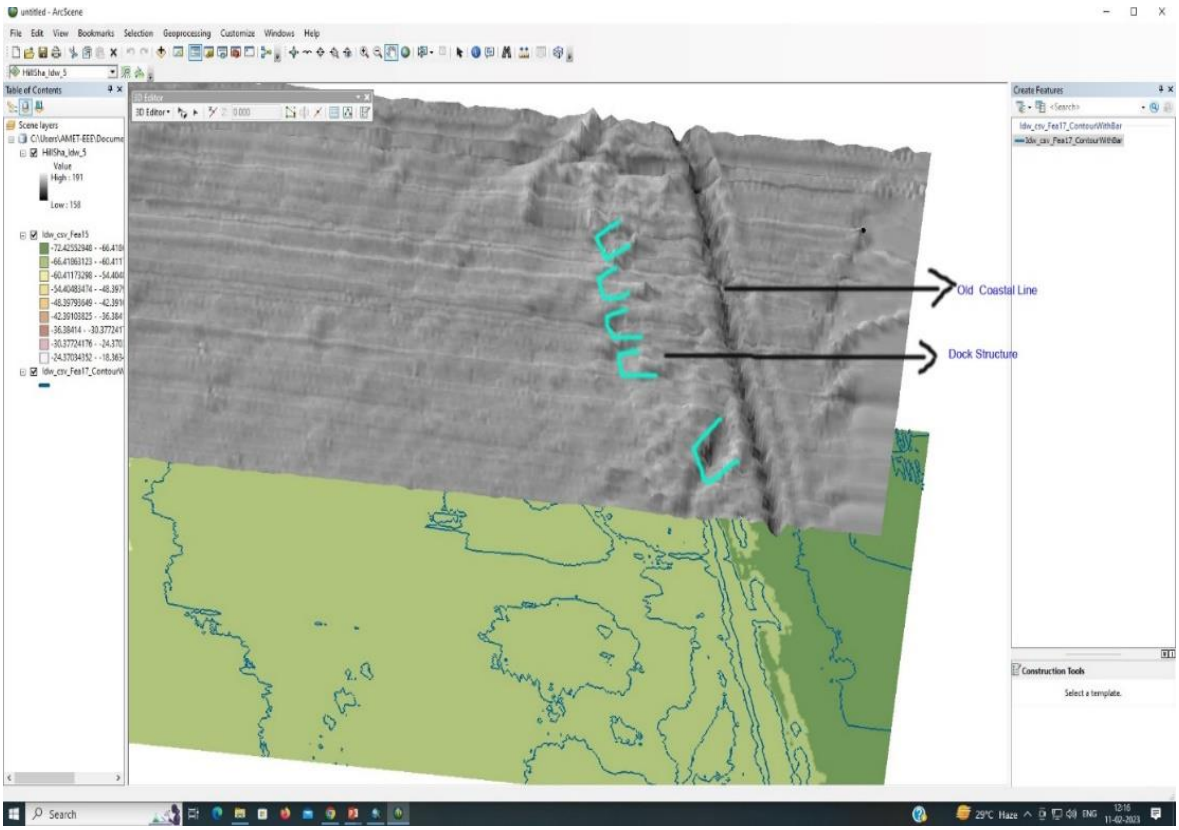


**Fig 6:** Dem Model displaying the dock structure and old coastal line

Through which it can be conclude that the sea has eradicated many places of Old Poompuhar and it had shifted to new region. The coastal erosion in Poompuhar region has been occurring for 2000 years. Because of the net rise in global seal level rise the erosion has become more vigorous and many parts has been destroyed.

## 5. Conclusion

The primary goal of this survey was to determine the extent of the old town of Kaveripumpattinam's underwater extension and how much of it was destroyed by the sea. The Coastal erosion in Poompuhar region has been

occurring for 2000 years, and the erosion has become more vigorous in the last 100 years. With the observation made, we conclude that the major Poompuhar city existed inside the Bay of Bengal at 30-40 kms from the present coast**.**Due to some natural disasters and sea level rise shifted in six stages from 15,000 to 2500 years and finally resettled in kaveripoompattinam. If this rate continues then in next 30 years the temple in vanagiri will be submerged.so a new strategies has to be taken to save this archaeological site.

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