

Author version: Saundaryashri: Studies of Indian history, archaeology, literature & philosophy (Festschrift to Professor A. Sundara). ed. by: Reddy, P.C.Sharada Publishing House; New Delhi; India; 2009; 695-703.

Coastal Structural Remains on the East coast of India: Evidence of Maritime Activities and their Significances

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Abstract

Archaeological evidence and literary sources mention that India had several ports and trade centres dating back to the Harappan period onwards. Archaeological explorations and excavations have brought to light a number of coastal structures such as dockyards, jetties, lighthouses, wharves and warehouses related to maritime activities of India. Lighthouses, warehouses and wharves have been located at Poompohar, Arikamedu, Dharanikota, Chilika and Mahabalipuram on the east coast of India. Similarly, the recent maritime archaeological explorations have brought to light the remains of brick structures at Poompohar and jetties at Dwarka and Aramda. The structures found on the east coast of India are datable from the early historical period to the historical period. The study of the remains of maritime structures provides the duration of their use, abandonment and causes of decline of port site. This paper details the coastal structures of the east coast of India and tentative dates are ascribed in relation to the maritime history of the east coast of India.

Keywords: Coastal structures, Ancient ports, Maritime activities, Structural remains, East coast of India.

Introduction

The Indian Peninsula has noticed a chain of development of seaports all along the coastline from the very early times. The people of India have been using the sea since the Neolithic, Chalcolithic and Megalithic periods and even before. However, the evidence for overseas trade and commerce and establishment of ports came to limelight only from 3rd millennium BC onwards. Archaeological explorations and excavations carried out in the last century yielded a number of coastal structures such as dockyards, jetties, landing platforms, lighthouses warehouse and wharves closely related to the maritime activities of India. These remains are the best evidence to trace the exact location of ports and trade centres. Anchors, timbers of vessels, remains of cargo, foreign origin pottery, coins, beads, amulets, seals and sealings are the other finds of this activity. All these findings are evident of the past trade and commerce, cultural and social relations of India with other overseas countries. These structural remains are the key to indicate the period in which the site was flourishing and when abandoned approximately.

Archaeological explorations and excavations on the east and west of India have brought to light docks, wharves, jetties, warehouse and lighthouses along with anchors, timbers, remains of cargo, coins, beads, amulets, seals, sealings datable from the Harappan period to the 17th century AD. People constructed these structures on their requirement and depending upon the environment of the site.

The geomorphological features of different regions of India and their connection with hinterlands favoured the maritime trade. For example on the east coast, the Gangetic delta with its fluvial network has opened many outlets into the sea. The large and fertile plain of Orissa has arches towards the Bay of Bengal; similarly, the flourishing deltas of Andhra coast have natural outlets, valleys of the rivers Krishna and Godavari. The plain Coromandel Coast of Tamil Nadu provided unique facilities for the development ports. The geomorphological features of the west coast of India are different from that of east coast (Ahmad 1972).

The ports of India can be divided into various groups on the basis of varied geographical features of the coastline such as littoral port, estuary ports and tidal ports. A maximum number of ancient ports of India were located at the mouth of rivers and in case of lagoons at the outlets to the sea, where cargo can be handled easily and vessels can be anchored properly. Further, to corroborate the fact, the ancient Indian text the *Silpasastra* mentions two types of seaports namely *Pattana* and *Dronimukha*. *Pattana* were situated on the seacoast where cargo was loaded and unloaded. Even today the place names ending with *Pattana* indicate a port name e.g. Manikapatna, Visakhapatnam, Masulipatnam and Nagapattanam. On the other

hand, *Dronimukha* refers to a port situated near the confluence of the river and the sea. *Dronimukha* was also a market place. Interestingly, the ports such as Dwarka, Tondi and Puhar also had the same meaning and these port towns had well-established markets and hinterland connections (Roy 1994).

Besides the geographical considerations in the location of ports, the maritime structures such as boatbuilding yards, landing places, boat shelters, causeways, wharves, jetties, breakwaters and moorings on the sea front also played a vital role in the maritime activities of the country (McGrail 1983). The explorations and excavations have brought to light the existence of docks at Lothal, Gujarat (Rao 1973), Vijaydurg, Maharashtra (Sila Tripathi *et al* 1998), Akhnur near Jammu, Jammu and Kashmir (Chowdhary 1994); wharves and warehouses at Lothal (Rao 1973), Prabhasa, Gujarat (Dhavalikar 1977-78), Kaveripattinam, Tamil Nadu (Soundar Rajan 1994), Dharanikota, Andhra Pradesh (Raghavachary 1972-73), Arikamedu, Tamil Nadu (Wheeler *et al* 1946) and Rajbandar, Maharashtra (Rao 1987); jetties at Kuntasi, Gujarat (Dhavalikar *et al* 1996), Inamgaon, Maharashtra (Dhavalikar *et al* 1988) and Ganjam and lighthouses at Chilika, Orissa, Mahabalipuram, Tamil Nadu and Kanheri, Maharashtra (Fig. 1). It seems that almost all the seaports of India had some kind of a dockyard or wharf for anchoring ships and hauling the cargo and merchandise.

In this paper an attempt has been made high light the evidence of ancient maritime structures from archaeological context ranging from the 3rd century BC to the medieval period of the Indian history with special emphasis on wharves, landing places, lighthouses on the east coast of India which are directly related to the maritime activity of India. Attempts have also been made (Gaur *et al*; 2004) to compile the available data and information on the maritime structures of the west coast of India. Both the papers have been prepared from archaeological context to provide comprehensive information on the ancient maritime structures of India.

Ancient Indian landing places

In addition to the maritime structures information is also available on the ancient landing places of India both on the seacoast and riverbanks. The Periplus (1st century BC/AD) mentions that there were thirteen landing places along the coast of India, which were related to maritime activities of India (Schoff 1974). Out of them the important ones were on the east coast of India the places were *Komar* (Cape Comorin), *Kolkhai* (Korkai on the river Tambraparni in Tirunelveli), *Kamara* (probably Puhar or Poompuhar), *Poduke* (probably Arikamedu near Pondicherry), *Sopatma* (near Chennai) and *Masalia* (Masulipatnam) in Andhra Pradesh and on the west coast on the south of the Gulf of Cambay, *Kalliena* (Kalyana, near Mumbai), *Limurike* (Travancore coast), *Naoura* (Cannonore), *Tundis* (Tanor), *Muziris* (Cranganore) and *Nelkinda*

(Kottayam) in Kerala on the west coast of India (McGrail 2001) (Fig. 2). Though there were many numbers of other landing places in India, it is not known why Periplus did not refer to them.

Maritime structures on the east coast of India

Wharf of Poompuhar

Poompuhar variously known as Puhar, Kaveripattinam or Kaveripumpattinam (city at the mouth of the Kaveri), was an important port situated at the confluence of the River Kaveri and the Bay of Bengal on the east coast of India. Poompuhar continued as a port town under the early Cholas (3rd century BC to 3rd century AD), Pandyas, Cheras, even during the Imperial Cholas. Several Sangam period and post Sangam period texts elaborate on the city, trade and commerce, foreign settlement and busy harbour. The excavations carried out by the Archaeological Survey of India (1963-73) at Poompuhar have yielded remains of a brick wharf, Buddhist Vihara complex, reservoir, Urn burials, ring wells, Chola coins and Megalithic pottery. The wharf of Poompuhar is located in Kilayur village about 2 km away from the shore on the north side of the Kaveri stream. The excavated wharf platform measures (18.28 x 7.62 m) and runs north-east-south-west direction (Fig. 3). The location of the wharf indicates that it was close to the high tide water line and berthing of boats were taking place during the high tide. There was a channel intended to cut the impact of the breakers by allowing water to flow through the channel gap. At least two stages of erection of the wharf arrangement had been noticed during the excavation. The first stage was organised by a rows of four strong and tall poles in each line having 15 cm diameter were driven firmly inside the river bed at least a few metres and also provided additional poles for cross planking above the high water line which was suitable for loading and unloading of merchandise. The bricks were laid in lime and sand mortar and those have worn out due to water action. The size of the bricks used in the wharf measured 61 x 40.5 x 7.7 cm. The other findings from the nearby area of the wharf is Black and red ware and Rouletted ware. The radiocarbon date of the wooden poles yielded dates 2200 ± 100 and 2265 ± 100 , thus the absolute dates falls between 300-200 BC an average of 250 BC. It appears that the wharf was in use in the 2nd century AD (Rao 1987; Soundar Rajan, 1994).

The Marine Archaeology Centre of the National Institute of Oceanography has also carried out underwater explorations in Poompuhar waters from 1989 to 1997 to locate remains of port installations. The successive investigations (Vora, 1987; Rao, 1991; Rao *et al.*, 1997; Sila Tripathi *et al.*, 1996) in different seasons in the intertidal zone as well as offshore in 5 to 8 m water depth revealed a number of ring wells, early historical pottery and brick structures, which

were the remains of the port of Poempuhar. Due to seasonal variation sometimes these remains buried in the sediment and those cannot be seen on the intertidal zone.

Wharf of Dharanikota

Dharanikota is situated on the right bank of the river Krishna close to Amaravati, the famous Buddhist Stupa site of the 2nd century BC in Guntur of Andhra Pradesh. Among the Indo-Roman trading centre on the east coast of India Dharanikota stands next to Arikamedu. The excavation findings of Dharanikota include imported glassware, glass earrings, glass bangles, glass objects of various colours and millifiori, Rouletted ware, copper and lead coins, black and red ware, NBP ware and sherds with Brahmi inscriptions and amphora of the Mediterranean countries. Further, the excavations also brought to limelight a rock-cut navigation channel of 15 feet depth at mid centre and the width at top is 85 feet and 70 feet width at bottom, connected with the river Krishna for loading and unloading of cargo. During the high tide ships were berthed at the wharf alongside the embankment (Raghavachary 1972-73).

In phase II (200 BC) a huge wharf was raised upon wooden posts to the height of 3.36 m, which is clearly indicated by the row of post-holes. The wharf appears to have been built of wooden planks and cross beams resting on huge posts. Remains of stone or brick are not traceable in this phase. The huge wooden wharf was constructed at right angles to the navigation channel at a length of 40 feet from the edge of the cutout channel. The excavations also revealed only one row of post-holes. In phase III a brick structure was constructed close to the wooden wharf all along the channel on its inner side and an earthen embankment was raised at the back (Ghosh 1989).

Warehouse of Arikamedu

Arikamedu now is a small village near Pondicherry situated on the riverbank of Ariyankuppam in Tamil Nadu. The excavations yielded Roman amphorae, Rouletted ware, Arretine ware, which were imported from the Mediterranean countries, datable to the 1st century AD, including a warehouse and the dyeing rooms. The warehouse is 135 x 8 m in dimension and laid bare in the northern sector of the port. It is oblong in plan and opens into the river (Fig. 4). From the excavation it is clear that the warehouse was constructed on the foreshore of the estuary and nearer to the water level. The floor of the warehouse was at higher level, which facilitated draining out the normal floodwater and the walls were reinforced to keep water out. It is interesting to note that the main walls of the warehouse were built on rough foundations of bricks sunk on rubble soling. The side chamber appears to be a later addition and the finding of a number of bricks partly covered with concrete suggested that was a staircase or a ramp.

It appears that the warehouse was not used for long duration and subsequently destroyed by brick robbers and river flooding (Wheeler *et al.*, 1946).

Wharf at Ganjam

Ganjam port (close to Chilika Lake) was situated on the mouth of the river Rushikulya in Orissa. The river was deep and navigable for country boats for some distance inland. The British attempted to set up a factory at Ganjam at the end of the 17th century AD. The port was famous for the export of rice, beeswax, iron, cloth, forest products like stick lac and timber to Madras and other regions of the Coromandel Coast. But the port was known for its export of cloth and rice. The famous cloths were the Salampore and long cloth of coarser variety, which the Dutch called Guinea or Negro cloth were exported from Ganjam port. These cloths were also exported to West Africa (Sila Tripathi 1997).

The explorations at Potagarh close to Ganjam has brought to light a brick jelly and laterite kankar soil mixed with floor embedded at a depth of one metre on the left bank of the river Rushikulya. The exposed extent of the floor measures 30 m and its thickness varied from 10 to 15 cm. The existence of the extensive floor possibly served as a platform for loading and offloading the cargo to be carried by ships. Besides, the loading platform a few blue and white Chinese porcelain shreds of bowls and dishes and shreds of bowls, dishes and vases of red ware were also noticed near and in the adjoining area of the platform. On comparative grounds these sherds may be dated between 12th-14th centuries AD (Indian Archaeology 1984-85).

Lighthouses at Chilika Lake

Chilika is the largest brackish lake in India. Excavations in and around the Chilika Lake, brought to light habitational remain of the Neolithic-Chalcolithic period onwards, datable to the 3rd millennium BC. The ports along the Chilika coast were Manikapatna, Palur and Che-li-ta-lo had close contacts with Africa, Ceylon, China and Southeast Asian countries. Further, a text of 10th century AD mentions about the maritime activities of the lake and ships used to ply to Southeast Asian countries from Chilika (Sila Tripathi 2000).

In order to understand the importance of maritime activities of Chilika Lake in recent past archaeological explorations were carried out at Podaghar, Raghunathpur, Jhatipadara, Gourangapatana, Arunapur, Manikapatna and Palur. In course of exploration remains of a 2 m high monolithic stone pillar noticed on a 70 m height hilltop near Raghunathpur and Podaghar. There is a hollow rectangular depression on the top portion of the monolithic pillar, which was probably meant for keeping fire. It appears that the stone pillar might have served as a lighthouse for seafarers during the historical period onwards (Fig. 5). The Bay of Bengal can be seen from the southern side of the stone pillar. The hillock on the shore of Chilika referred

to as *Deepa-Adia Pahad* (Hill of Light), had a stone pillar lighthouse to guide the mariners during the night navigation.

Similarly, Gourangapatana, another site on the bank of Chilika has yielded the evidence for the Mediterranean-Persian Gulf contacts. Our recent exploration brought to light red slipped ware, coarse black and red ware, dull red ware and a few Chinese ceramics. The people of Gourangapatana suggested that there was a dockyard on the eastern side of the village and the hill *Deepa Dandi* (Light pillar) on the southern side of Gourangapatana served as a lighthouse. Even today the local sailors of Chilika use these landmarks for their navigation.

Lighthouse of Mahabalipuram

Mahabalipuram in Tamil Nadu is other wise known as Mamallapuram. It is well known for its rock-cut monuments of the Pallava period. During the rule of King Narasimha Varma I (AD 630-668) of the Pallava dynasty, Mahabalipuram was an important port and an entrepot for the Indian and foreign traders especially from China and Southeast Asian countries (Narasimhan 1995). Ptolemy (2nd century AD) has referred to Mamallapuram as 'Malange' (McCrinkle 1985). The Tamil work *Periya Thirumozhi* of 8th century AD of Thirumangai Alwar mentions that Mahabalipuram was a flourishing seaport under the Pallavas of Kanchipuram. Further, the same Tamil work also refers to the port city of 'Kadamallai' with ships loaded with elephants and heaps of gems (Ramaswami 1980). In the subsequent period, the port city also became a centre for Art and Architecture under the Pallavas. After the construction of cave and monolithic temples, the Pallavas had introduced the last and the best variety of temples category involving the masonry architecture known as structural temple based on the *Manasara*. The shore temple and Olakkaneswar temple near the modern lighthouse of Mahabalipuram are the earliest representation of structural temples of the region.

The Olakkaneswar or Olakkanath (means 'flame eye') temple is situated on a hilltop in Mahabalipuram. On the roof of the temple there is a shallow depression where a pot of 1.5 feet height was kept with oil. Everyday evening the oil was set on fire, the light of the fire used to guide the mariners during night navigation. This system was prevailing till the construction of lighthouses on the same roof of the temple (Fig. 6).

Discussion and Conclusion

Several maritime structures have been noticed along the coast of India. However, on the basis of archaeological dating the excavated maritime structures on west coast of India are much older than that of the east coast of India. Dockyards have been noticed at Lothal in Gujarat and Vijaydurg in Maharashtra on the west coast, however, no such findings have been reported along the east coast and the reasons are yet to be known. These coastal structures had been

constructed in relation to the geomorphology of the region, but if there are any differences in technique of construction the structures of the east and west coast of India are yet to be ascertained. These maritime structures suggest how long a port or a trade centre was in use and when it was abandoned. Sometimes scientific studies indicate the causes of abandonment of the sites and structures. Further, it is also noticed that once a port declined due to some reasons, another port comes to lime light in the nearby region and this phenomena is noticed on both the coasts of India. In consideration with the maritime history of India, not many coastal structures have been located on the both coasts nor from all port sites of India, in view of this further coastal explorations are essential. The Romans, Arabs, Chinese and Europeans have influenced the maritime activities and ports on both the coasts of India. Conversely influence of India is also noticed on the other part of the world.

Similarly, along the rivers of India, several *ghats*, loading platforms and trade centres existed which had trade contacts with the ports. In India so far only one riverine dockyard has been reported in Akhnur fort, Jammu located on the riverbank of Chenab. Attempts have not been made to study the structural construction of ghats and other details, which needs to be undertaken. The study of these ancient structures from marine engineering point of view would help in understanding the skill and techniques of the past. The revival of ports at the confluences and the use of riverine routes would provide easy transportation and better communication facilities with hinterlands of India as it was in earlier days. Both manmade and natural factors are responsible for declining of the ports and the subsequent abandoning of these structures. All the maritime structural findings are indicative of progressive and well-developed coastal engineering techniques of ancient India.

The number of new ports has come up either in the ancient port sites or in adjoining area. It would be right ways if the new ports adopt the ancient sites for posterity. Any kind of surveys conducted either in the coastal or offshore region the findings and anomalies should be reported to the concerned authority for its in depth study and preservation. Maritime structures and archaeological sites along the coast are our cultural heritage. The rampage industrialisation activity along the coastal region may destroy the evidence of bygone civilisation forever. Once the evidence is lost it can never be recovered. In view of this, it is imperative to undertake extensive coastal survey to locate and study the remains and those should be protected for coming generations.

Acknowledgements

The author expresses his deep sense of gratitude to Dr Satish Shetye, Director of the National Institute of Oceanography and Shri K.H. Vora, Scientist-in-Charge, Marine Archaeology Centre for their encouragement in this field. Author also acknowledges the help of Shri S. N. Bhandodker in photography, Ravindra Uchil and S. B. Chitari for computer tracing and preparing of figures.

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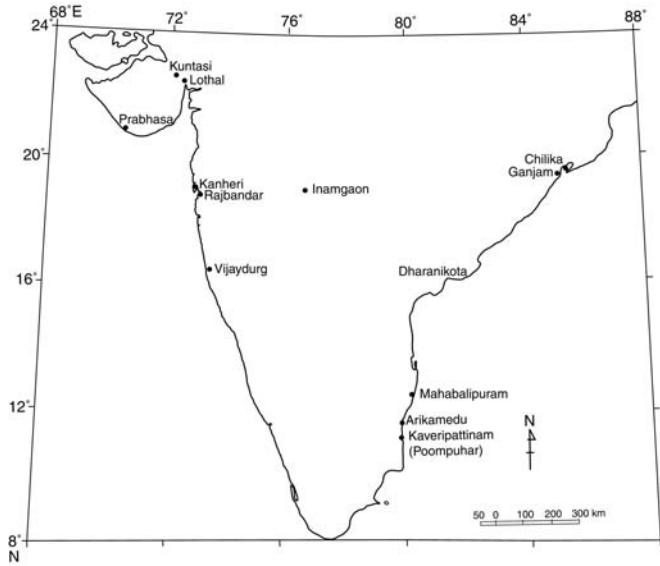


Fig.1. Figure showing the sites mentioned in the text.

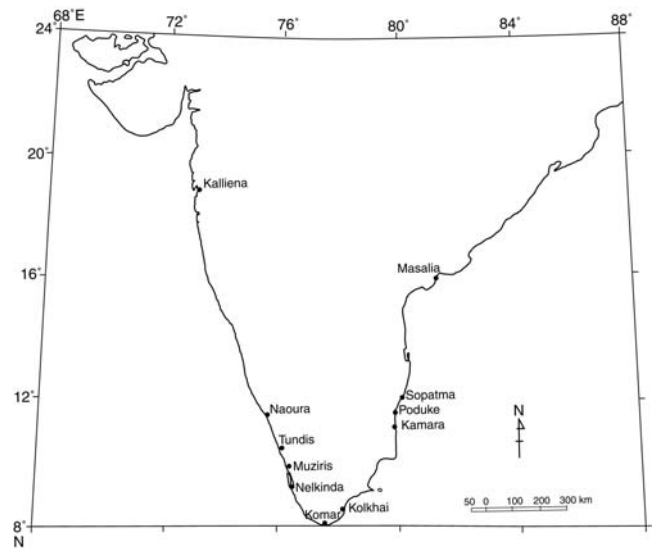


Fig. 2. Ancient landing places of India as mentioned by Ptolemy



Fig.3. Wharf of Poempuhar, Tamil Nadu (after: Rao 1987).

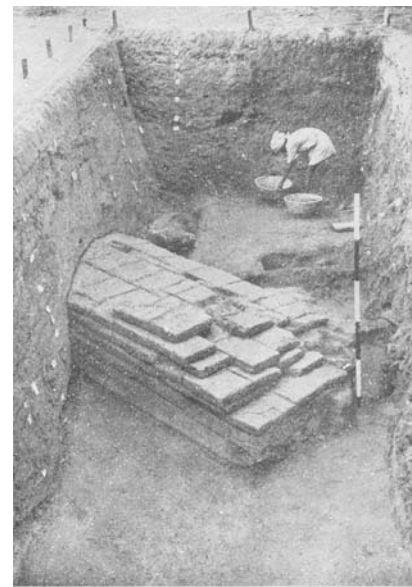


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Fig.5. Monolithic stone pillar lighthouse on the hilltop of Chilika, Orissa. Photo: Sila Tripathi



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