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SILTING AND ANCIENT SEA-PORTS OF THE TAMIL COUNTRY

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The progressive and irreversible process of sedimentation on the Tamil coast has brought about the decline of the ancient sea ports which could not escape ruin when lagoons and river mouths were filled up. Conditions were much favourable for earlier navigation, since lagoons and deltaic tributaries were better suited for maritime settlements, with sufficient water depth and safe shelter. Owing to the sand bars thrown by the action of the waves across their openings into the Bay of Bengal, their access, as found in ancient documents, must have always been difficult, but the coastal sailing vessels could put up with it. Their history can be reconstructed by geologists who study fossil pollen grains preserved in sediments in the coastal area. The result of these investigations can thus be used by historians to know, with a relative precision, the water depth of a lagoon at a given period and thus trace the stages of maritime activities in the settlements situated at their outlets.

Key words: Coastal barrier, Geomorphological, Navigation, Neolithic, Palynology, Sedimentation

INTRODUCTION

In a research article (Deloche 1983, pp. 439-448), it had been shown that it is very difficult to provide a complete account of the ancient sea-ports of India. The factors responsible for the evolution of the littoral forms, or the varied causes explaining the shifting of the shores, the encroaching of the sea on land, or its receding are but little known. Thus, we lack knowledge regarding a significant portion of history of the coast as pertains to the transport and accumulation of sediments, to the threat of mud deposits in the estuaries, or as regard the development of a delta or costal sand spit in the bays. How many ports have thus

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been cut off from access to the sea or abandoned? To locate them or identify their remains which are probably fossilized under several metres of alluviums or submerged, more extensive and comprehensive researches are needed. We will here consider the investigations which have been made on the silting of the ancient maritime settlements of the Tamil Country.[1]

Sandy coastal barriers between the Krishna river and Cape Comorin

Access to the eastern littoral, particularly to the coast of the Tamil Country (Fig. 1) has always been difficult because of the succession of smoothly curved

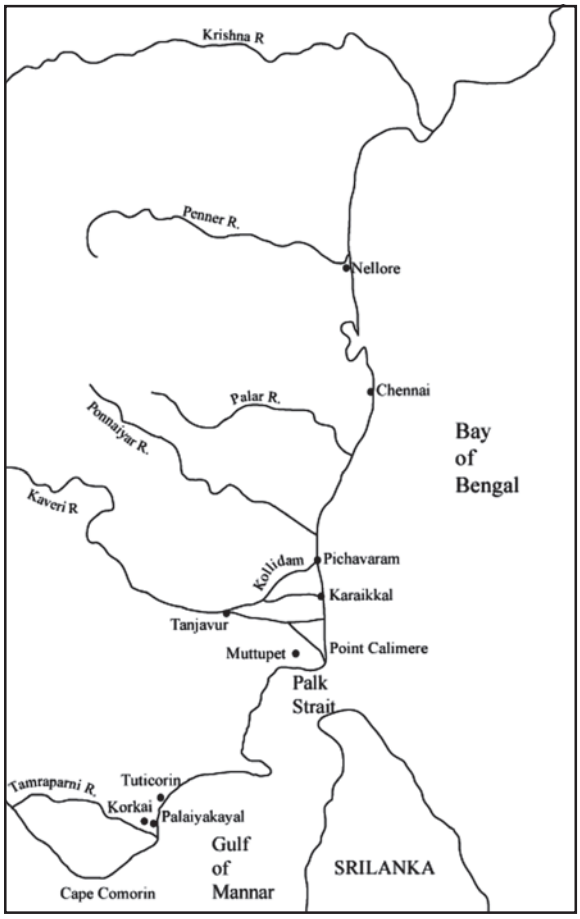

Fig. 1. Map of the East Coast between the Krishna River and Cape Comorin.

or straight stretches which form the entire coast line, offering no natural protection against the sea.

From the Krishna delta to Point Calimere a long sandy barrier occurs, backed by a more or less continuous line of tidal lagoons or creeks surrounded by marshy tracts or mangrove swamps. Such a feature, found even against the mouth of the main rivers, results from absolute dominance of marine erosion. Generally this barrier ranges from 3 to 7 km.

In Nellore district there is a succession of water bodies and associated swamps, alternating with continuously cultivated upland. Pulicat Lake (55 km long and 5 to 16 km wide), is the largest of all on the coast. It is being filled up in its northern half by sediments delivered mostly from land by streams. Further south, we find a belt of the same sheets of water whose width ranges from about ¾ of a km to about 2 km. This continuity of the bars, due to the long-continued action of waves and currents, has thwarted deltaic protuberances at the mouth of such rivers as the Penner, Palar, Ponnaiyar and even the Kaveri.

In the Tanjavur delta there are long sandy barriers ranging in width from 100 to 1000 m, extending across the mouths of the different distributaries of the large river, which are the sediments of the offshore shelf excavated and piled up into bars and beach ridges. Along with them are lagoons parallel to the delta shore. Near Point Calimere we find a wide belt of swamps and creeks separated from the sea by a barrier about 25 km long, marked by muddy mangrove and salt swamps.

South of the Kaveri, because of the relatively protected water of the Palk Strait and Gulf of Manar, the lagoon is relatively absent and the coast is marked by a belt of grassy and swamy lowlands, except south of Tuticorin, where off the mouth of the Tamraparni, the formation of an offshore bar has created a local lagoon.[2]

Thus, on this straight coast, as there is no natural haven, the only sites suited for maritime settlements were the shelters offered by lagoons and river estuaries. There only, the elementary organs of a maritime settlement, providing protection from winds, waves and currents could be found. But, as shown by geographers, since the neolithic emergence or uplift, there is an irreversible process of sedimentation resulting in the continuous filling up of the lagoons and, because of the shrinking size and the periodic blocking of the narrow outlets in the littoral sand bar, the sediments remain trapped inside.

This means that, in the past, their access have been much easier with a sufficient water depth for sailing vessels of low capacity. It would, thus, be very instructive to know the pace of the filling up of these sheets of water.

Bishop Caldwell's Excavations

The first scientific investigations were carried out by Bishop Caldwell (1877,pp 284-286) on the Tamraparni delta in 1877. He identified Korkai, the ancient sea-port of the Pandyan Kingdom, with Kolkhoi of Ptolemy who lived about 180 AD. He also identified Palayakayal or Old Kayal with "Cael" of Marco Polo who visited South India in 1292. Today, the first locality is situated about 8 km inland, the second, 4 km from the sea. This means that the land has gained on the sea by the same distances.

At Korkai, stratigraphically, he found first a layer of the estuarine alluvium of about 6 feet of stiff clay with estuarine fossils, then, below, a gritty sand-stone of about a foot in thickness with comminuted sea-shells; finally still lower down a fine grained white marine sand with plenty of sea-shells as chanks, etc. The thickness of the sand and what was underneath it cannot be found out on account of the abundant springs of water. The old human settlement was situated about 8 feet (2.5 m) below the 1877 level, where pieces of pottery and other evidences of human habitations were found(Caldwell, 1877, pp. 284-285).

At Palaiyakkayal, he found the old chunammed floor of the ancient city at a depth of 2 or 3 feet consisting of alluvial soil with plenty of pieces of Chinese porcelain and Arabian pottery (Caldwell, 1877, pp. 285-286).

This shows that at Korkai, since the beginning of the Christian era, about 2.5 metres of sediments accumulated and, at Palaiyakkayal, 1 metre only since the 13th century.

Palynology technique

Since then no excavation has been carried out and we are not aware of recent stratigraphical and geomorphological studies showing the historical evolution of the landscapes and harbours of the Tamil Country, except the works done by the scientists of the Palynology Department at the *French Institute of Pondicherry* on the silting of lagoons and mangroves of the east coast, which give us accurate data for reconstructing their past. C. Caratini[3] studied the lagoon of Pulicat and

C. Tissot (1979), the mangroves of Muttupet and Pichavaram, on both sides of the Kaveri delta.

Their technique of investigation consists in studying fossil pollen grains preserved in sediments. As the quantitites of sediments supplied by the rivers which flow into the lagoons form the alluvium now deposited at their bottom, the age of the deposit increases with depth. Therefore by studying the pollen content of each successive sediment layer and comparing the nature of the successive pollen assemblages, the evolution of the vegetation over a period of time can be described. To know the period when the layer was deposited, a technique of radio-carbon dating based on the analysis of a natural isotope of organic carbon can be applied.

The result of this investigation can thus be used by historians to know, with a relative precision, the water depth of the lagoon at a given period and thus trace the stages of maritime activities in the settlements situated at their outlets.

RATE OF SEDIMENTATION

The study of pollen assemblages in the Pulicat lake by C. Caratini (1994) shows that the rate of of deposition of sediments in the lagoon is quite fast, about 4 metres in 4 centuries (Fig. 2). The author thinks that silting is probably even

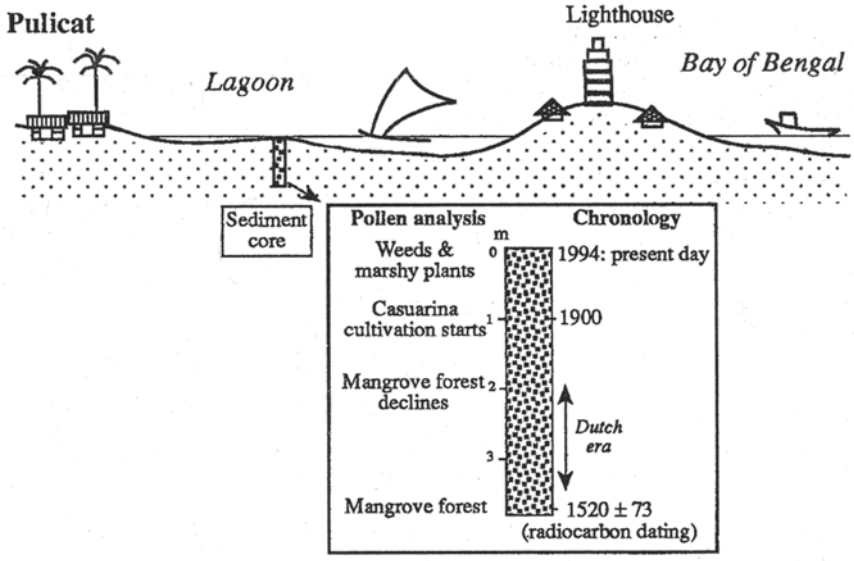

Fig. 2. Pulicat lake: pollen analysis (drawing by C. Caratini)

faster today because of deforestation leading to increased soil erosion and a higher supply of alluviums by the rivers.

C. Tissot[3], in her study of the mangroves of Muttupet (to the south of the Kaveri delta) and of Pichavaram (to the north, near the Kollidam), considering the pollens of *casuarina* introduced in India 200 years ago, evaluates the pace of filling at about 1 metre in two centuries only. Though it is half the rate of sedimentation given by Caratini for Pulicat lake, it is still a very rapid pace.

These figures are of a great significance for the the historian of maritime settlements, because they give us an idea of what could have been, in a recent past, the water depth of these bodies of water, sheltered from the sea and accessible to sailing vessels.

We do not have any historical information about Muthupet and Pichavaram but documents are available for Pulicat Lake.

PULICAT

Pulicat was a very prosperous centre during the period of the European companies, teeming with activity as early as the 16th century (Deloche, 1994, pp. 101-102). At that time, the depth of the lagoon was over 3 metres, enough to allow the place to be used by trading vessels. In 1505, Varthema[4] speaks of its "immense traffic" and Barbosa[5], in 1517, mentions the numerous Moor boats which frequented its port. It became a Dutch stronghold in 1609 and an English trading post in 1621 (they did not found Madras until 1639). In 1672, according to Bowrey (1905, pp. 51-53), it was "a more safe and commodious place for ladeinge and dischargeinge goods, haveinge a very good river that cometh close to the town side, but the barre is not very good, nor better than for boats of 20, 30 or 40 tuns, all this coast indeed wantinge nothinge but some good harbours for shippinge". S. Master[6] noted in 1679, "a great lake of salt water, which communicates with the sea, by which a great deale of wood is carryed in Boates from Chyarcoat (Sriharikota) to Madrass and other parts on the coast." François Martin (1931-34, pp. 231-232) saw there in June 1681 "large boats, even a ketch flying the Dutch flag", but he also remarked that a submerged sand bar had already formed at its northern outlet : "there is a fine river at Armogon; one assured me that large vessels had formerly entered it and that conditions at its mouth began to worsen since then because of the sand transported by the sea; there had been no more than 6 or 7 feet of water on the bar since that time.".

At the end of the 18th century, the trading activity of the port decreased significantly since the depth of the lagoon was reduced to 2 metres, according to Caratini. The traffic abated when the Buckingham canal was completed. Around 1900, the depth in this zone was about one metre, which was utterly insufficient for sailing vessels. Today, the lake is still used by fishing craft, inspite of the shallowness of the water.

This site favoured with good conditions respective of former navigation is not mentioned in Tamil annals or in classical accounts, but, very likely, it was used by sailing vessels, all the more so since, at the beginning of the Christian era, the lagoon was very deep.

Coastal navigation at the end of the 18th century: Karaikkal example

Regarding the Kaveri delta, we have at our disposal the observations made on the silting of the Karaikkal river (Arasilaiyar) in the second half of the 18th century and at the beginning of the 19th century collected by the French administrator Cordier (1971, pp. 24, 30, 32-3, 44, 80, 107, 177). They show that periodic attempts were made to improve the river by constructing permanent structures to narrow the channel in such a way that the strength of the current was inhibited, resulting in a greater depth to the water on the bar.

From 1755 to 1760, the Karaikkal river could accommodate vessels of 200 to 300 tuns. But, in 1760, the channel was so large that it was no more navigable, even for *chelingues* (stitched masula boats), from April to July, except at high tide. Works were started to build an embankment on both sides of the river, so that all Indian vessels could find there a safe shelter. In 1765, the river could only accommodate vessels of 100 tuns. In 1766, because of the shifting sand banks which obstructed the channel, the mouth of the river was diverted towards south. The embankment made in 1774 was eroded in December by the current and was in danger of falling down, but the government refused to repair it in 1777. In February 1792, an engineer was sent from Pondicherry to prepare an estimate for the works to be done, unfortunately, it was not carried out. Finally, in 1824, it was decided to remove the sand which obstructed the mouth of the river and separated the outlet from the sea.

Nevertheless, there were monsoons during which there had been more than 100 *tonis* of different sizes on the river. This means that at the mouth of the

Karaikkal river boats could be hauled over the sandbar, and could find water spaces that were closed off from the strong swell and surf and, thus, there was no need of an artificial port for the coastal sailing vessels, since elementary harbour installations were sufficient.

From these observations we can infer that, if at the beginning of the Christian era, the main tributary of the Kaveri had, at its mouth, a depth equal to that of the Karaikkal river at the end of the 18th century, Kaverippumpattinam, the Chola port, celebrated in Tamil annals and known to the Greeks and Romans, was accessible to seafaring vessels.

Conclusion

This summary analysis shows that the progressive and irreversible process of sedimentation on the Tamil coast has brought about the decline of the ancient sea ports which could not escape ruin when lagoons and river mouths were filled up. This is what happened for Korkai and Kayal, as shown by Caldwell, and very likely for Kaverippumpattinam.

It also proves, as demonstrated by Caratini and Tissot, that conditions were much favourable for earlier navigation, since lagoons and deltaic tributaries were better suited for maritime settlements, with sufficient water depth and safe shelter. Owing to the sand bars thrown by the action of the waves across their openings into the Bay of Bengal, their access, as found in ancient documents, must have always been difficult, but the coastal sailing vessels could put up with it.

Finally, it emphasizes the need for more researches on the landscapes around the ancient sea ports, because their history can be reconstructed by geologists. It would be very interesting now, in order to supplement the investigations made by Caldwell, to study the fossil pollen grains preserved in sediments in the Tamparani delta.

Notes & References

1. Detail accounts of the ancient sea-ports of the Tamil Country (Poduke or Puducheri, Mamallapuram, Korkai, Kayal, Turicorin and Kaverippumpattinam, have been published in my article, J. Deloche (1985, pp.141-166, 10 maps).

2. This summary description is based on E. Ahmad (pp. 75-77, 85-91, 102-109), B.W. Sparks (1911, pp. 246-247, 275-27), and personal observations.

3. Tissot, 1979, p.110

4. Varthema, 1928, p. 74

5. Barbosa, 1918-21, p. 130

6. Master, 1911, p. 131

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