

Archaeological, Literary and Ethnographic Evidence for Traditional Boat-building in Kerala, South India

Veerasamy Selvakumar¹

Abstract

Kerala possesses rich maritime traditions dating back to the Early Historic period. A few types of traditional watercrafts developed indigenously and some are influenced by external contacts. Archaeological excavations revealed a medieval sailboat at Kadakkarappally in 2003 and an Early Historic canoe at Pattanam in 2007. The Early Historic Sangam Tamil texts refer to the watercrafts of Kerala. Traditional boat-building still survives in Kerala. This paper presents the evidence for traditional boats in Kerala, their historical context and the possible external influences, until the 15th century Common Era² (CE).

1. Introduction

Kerala's strategic location connects the eastern and western worlds in the Indian Ocean region. Kerala's internal processes and external influences have caused the development of a vibrant maritime culture, including interesting watercraft types, than any other region in India. This paper presents a survey of traditional boat-building in Kerala, its historical context and the possible external influences, until the 15th century CE.

With the Western Ghats on the east and the Arabian Sea on the west, Kerala (Lat. 8° 15' and 12° 50' E; Long. 74° 50' and 77° 30' N, Figure 1A) is enriched by the monsoons, 44 perennial rivers, 15 backwaters and a 600 km coast. The average temperature is between 20° and 32° C, and the annual rainfall varies from 1800 to 3600 millimeters (mm). Kerala has rich wood sources suitable for boat-building.

Previous Research

Experiments undertaken in methods of navigation to survive in the water-filled landscape led to the development of indigenous watercrafts, some of which still survive. The Classical texts³, medieval travelers⁴ and the European adventurers⁵ and administrators⁶ discuss the traditional watercrafts of Kerala.

Systematic research on the traditional watercrafts was initiated by the Europeans. James Hornell (1920:21-24) offers an account of the traditional watercrafts. A.P. Greeshmalatha and Victor Rajamanickam (1993; Greeshmalatha and Rajamanickam 1995; Rajamanickam 2004) documented the nature, distribution and construction techniques of the watercrafts.

¹ Department of Epigraphy and Archaeology, Tamil University, INDIA, selvakumarodi@gmail.com

² Designation for the Georgian 'Calendar Era'.

³ Specifically the Sangam Tamil (Zevelebil 1974) and Greco-Roman texts, e.g. The *Periplus* (Casson 1989; Schoff 1912).

⁴ For instance, Ibn Batuta (Lee 1829) and Marco Polo (Benedetto 1931; Yule 1993).

⁵ Cabral 1995; Barbosa, Stanley 1866; Varthema 2004.

⁶ For example, Francis Buchanan 1806: 419-420; and William Logan 1884: 39.

Rajamanickam and V.S. Arulraj (1994:9-24) present the watercrafts from Tamil and Malayalam literature. Other important studies include Lucy Blue's Kattamaram Project 2005-2007, Jesse Ransley's *The Backwater Boats of Kerala* (2008, 2010), and Ralph Pedersen's study on the clench-fastened boat (2010).

Archaeological excavations exposed an Early Historic canoe at Pattanam (Cherian, *et al.* 2007a; Cherian, *et al.* 2007b; Cherian, *et al.* 2009) and a medieval sailboat at Thaikkal-Kadakkarappally (Nair, *et al.* 2003; Pedersen 2004; Selvakumar 2006a; Tomalin, *et al.* 2004). An Indo-Arabian type stone anchor has been identified near Kannur (Tripathi, *et al.* 2005).

Several publications exist on Late Medieval boat-building (Appadorai 1936; Arunachalam 2008; Joseph 2003; Malekandathil 2001; Mathew 1997).

Despite these studies further investigations are essential for a holistic understanding of boat-building in Kerala.

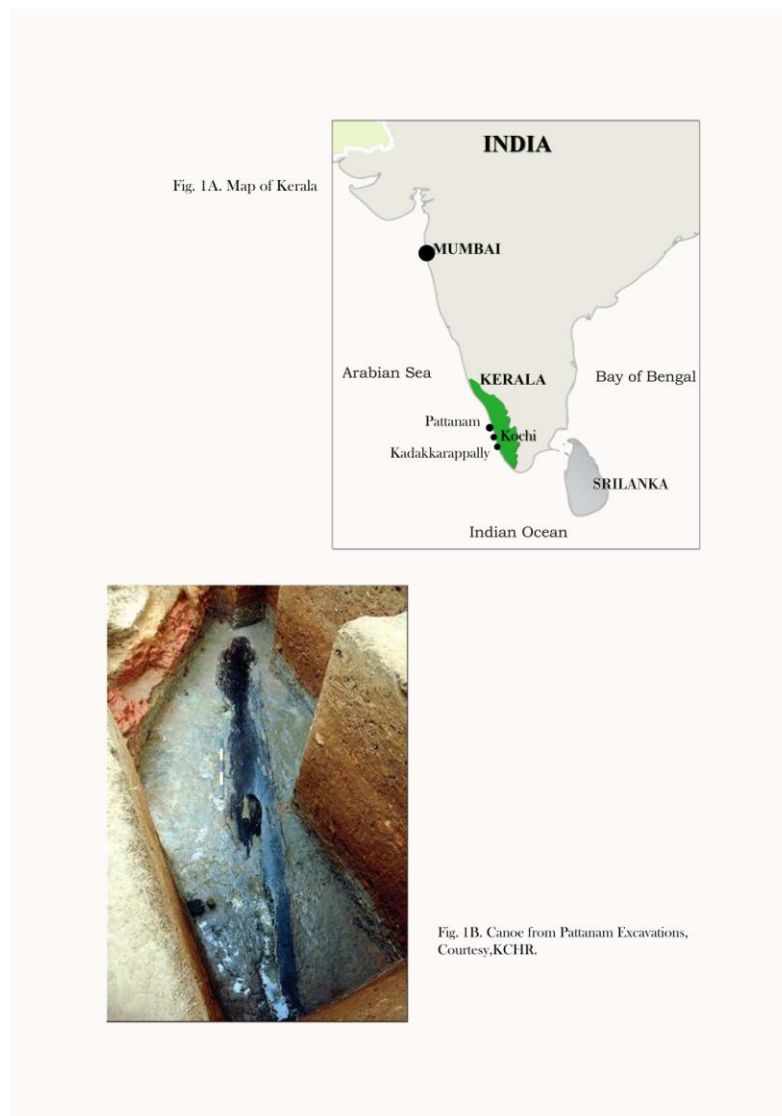


Figure 1. Map of Kerala (Drawing by Tangadurai, 2011) and Canoe from Pattanam (Photo by Mohammed 2007).

II. History of Boat-building

Prehistoric Age

Boat-building in Kerala, perhaps, extends to the prehistoric period. Kerala has evidence for prehistoric cultures; especially traces of the early Holocene microlithic food-gatherers who existed along the littoral of coastal/riverine contexts (Rajendran 1989; Selvakumar 2006b). Kerala was perhaps first occupied by the *Homo sapiens*, who might have migrated along the coast from Africa in the Late Pleistocene (Petraglia, *et al.* 2009). Movement and fishing in riverine/coastal regions were essential for their subsistence, and hence, there is a possibility that rafts like *kattumaram* and *teppam*, which involve securing the logs of wood/bamboo with creepers, emerged as an adaptation to the environment.⁷ It is probable that dugout canoes were crafted using fire and/or lithic tools.

In the later prehistoric context, i.e. post-3000 Before Common Era (BCE)⁸, it is probable that the Harappa civilization (Ratnagar 2006) and its West Asian counterparts interacted/traded with the microlithic communities of Kerala which perhaps brought in new boat-building techniques.

Iron Age

Little research exists on the trade, navigation and boat-building of the Iron Age communities (ca. 1000 to 500 BCE), which built megalithic burials with grave-goods for the dead (Gurukkal and Varier 1999). The iron implements suggest advanced metallurgy, and the carnelian beads and bronze artifacts indicate long-distance trade. The factors such as political conflicts, internal exchange and long-distance trade would have required the plank-built boats, extended dugouts and sails.

External contacts would have influenced the boat-building traditions of Kerala. Colonization of Sri Lanka by Vijaya from North India in 543 BCE, depicted in the Ajanta paintings, means that large vessels were used in India in the Early Historic period (Panikkar 1947:32). In addition, the ships of the Indian Ocean Rim⁹ would have visited the Iron Age Kerala greatly. Teak wood and perfume of Kerala origin are reported to have been used during the time of King Solomon of the Old Testament (Narayanan 2004:41) and the reference to the land of Ophir in the Bible, identified with Kerala, if authentic, point to long-distance trade (Rawlinson 2005:102).

⁷ Such rafts are built by securing banana, bamboo and other light wood with creepers or plant fibres. They are made even today.

⁸ BCE=Before Common Era, a designation indicating years before the beginning of the Georgian Calendar.

⁹By Indian Ocean rim, I mean the countries along the rim of the Indian Ocean from North Africa to Southeast Asia, and also the islands of this Ocean.

Early Historic (300 BCE to 500 CE)

The Early Historic period has comparatively better evidence. Pan-Indian interactions, "rudimentary" urbanization, political conflicts, craft-specialization and the Indian Ocean trade (Champakalakshmi 1996; Gurukkal 2010; Ray 2003; Selvakumar and Darsana 2008) induced by the internal and external factors (e.g. spice trade and Roman Empire) impacted Kerala. The Classical texts and archaeological record attest to the vibrant trade and the multi-functional towns with markets, ports and manufacturing and boat-building centres (e.g. Tondi, Muciri and Nelkynda as discussed in R. Champakalakshmi 1996: 105-141).

Pattanam Canoe

Excavations at the Early Historic site of Pattanam (25 km north of Kochi), proposed to be Muciri, produced the lower portion of a dugout (extended?) canoe (6 m+) (Figure 1B), near a wharf with bollards of teak. Accelerated Mass Spectrometry (AMS) Carbon¹⁴ (C-14) dates place the canoe in first century BCE/CE (Cherian, *et al.* 2009; see Cherian this volume). The canoe, similar to modern *vanji*, is made of *Artocarpus hirsutus* (anjiliy/aini) wood famous for contemporary dugouts. With a carved frame in one end the canoe shows evidence for caulking and repair with a piece of wood. The canoe perhaps was used for the transportation of goods/people along the rivers and backwaters. The Sangam texts refer to *kazhittoni* (canoe of backwater) that brought gold from the Yavanar's *kalam*¹⁰ (*PuranaanooRu*, 343, Selvakumar 2008) to Muciri. Similarly Pliny¹¹ says that the Roman ships could not enter Muciri and, the goods were transported in smaller crafts (Sastri 1939:53). Therefore, the archaeological context perfectly matches with the texts. Was the smaller craft a *kazhittoni* or some other type?

Texts

The Sangam texts mention several watercrafts including *kalam*, *naavaay*, *vankam*, *timil*, *ambi* and *puNai* (Subrahmanian 1966). The description and context help identify their purpose, but not their design and structure. For nautical terms in literature (Rajamanickam and Arulraj 1994; see Athiyaman this volume). The last three crafts meant for coastal-riverine navigation were indigenous; while the first two--sail-driven, sea-going vessels--in some contexts were non-local. *Periplus*¹² mentions about *colandia* and *sangara* (Schoff 1912:46) plying in the Bay of Bengal and Southeast Asia which are considered to be outriggers of Southeast Asian origin (Sakhuja 2009).

¹⁰ The texts often mention about *nankalam*. *Nan* means 'good' in Tamil and *kalam* refers to ships, ornaments, weapons and pottery. Here it refers to ships. Yavanar means people of Greco-Roman and West Asian origin.

¹¹ Pliny the Elder, who lived in the first century CE, was a Roman writer and naval commander. His account gives details on the Indo-Roman trade.

¹² The *Periplus Marei Erithrei* is a Greek navigational guide dateable to the mid first century CE (Casson 1989). The name of the author of this work is not known.

Evidence from South India

Moving east of Kerala, the Early Historic port of Azhakankulam in southern Tamil Nadu, has two graffito motifs of boat on pottery (Sridhar, *et al.* 2005). According to Lionel Casson (1996) one specimen (Figure 2A) is similar to the Roman ships. The sherd is broken and the double ropes of the second mast are very clear and hence it matches with the Ajanta/Satavahana motifs and not with the mosaic of the Ostia specimen (Figure 2C).

The coins of Satavahana (Sharma 1980) ruler Vashistaputra Sri Pulumavi II have a double-ended ship having two masts secured with a single rope on either side; the stern has a rudder (Figure 2B).¹³ The coins of Satavahana Gautamiputra Yajna Sri Satakarni (Bajpai 1981:145; Mookerji 1999:51) have a vessel with twin ropes on the exterior sides of the masts and single rope on the interior, for better compactness to the ship. It appears to have a raised foreside, and both types seem to be sea-going vessels.

In Deccan, the Ajanta paintings have several ship depictions (Figure 2D); one type, carrying pots, has three masts and some carry animals (Mookerji 1999:39; Schlingloff 1976), which prove that large ships were used in India.

Pieces of teak, perhaps used in ships, were recovered at Berenike (Abraham 2007:290), which might have come from Kerala. The volume of ship traffic suggests possible repairing facilities in Kerala. The abundance of corroded copper and a few tin pieces from Pattanam (Cherian, *et al.* 2007a; Cherian, *et al.* 2007b) indicates their probable use in ship building/repair, and it is not clear if Roman ships were built in Kerala.

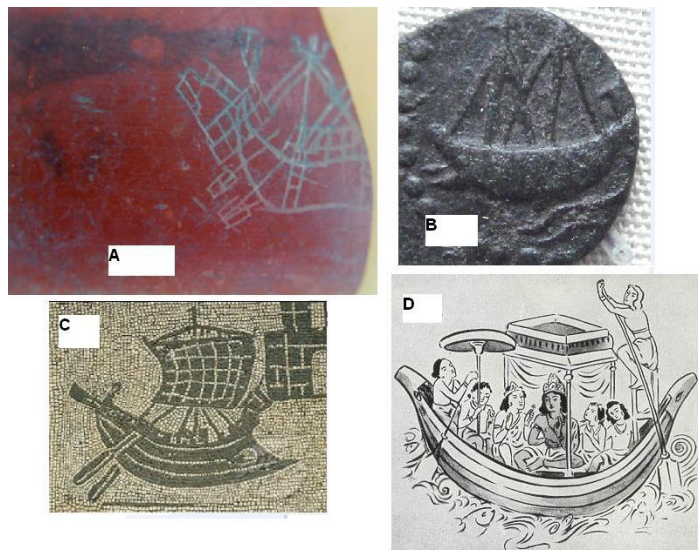


Figure 2. Watercrafts of Early Historic Indian Ocean Region- A Graffito, Azhakankulam; B Motif on Satavahana Coin; C Motif from Ostia; D Pleasure Boat motif, Ajanta

¹³ Wilfred Harvey Schoff (1912: 244) has different versions of the boats on the Satavahana and Pallava coins; their accuracy is uncertain.

Nature of Watercrafts

The evidence suggests four categories of watercrafts:

1. The raft types for fishing on the sea and backwater. While *kattumaram* does not occur in the Tamil texts, *maram* does, and it means ship/boat/raft (Subrahmanian 1966: 645)
2. Dugout canoe for transport of people and goods, and fishing.
3. *Ambi* of the Tamil texts which exchanged fish for paddy (*Puranaanooru* 343) might be a plank-built or an extended plank-built type. It is spoken of as including faces of horse and elephant. Did *ambi* have a keel and the extension of which had animal figureheads?
4. The large sea-going ships, e.g. *vangkam*, *naavaay* and *kalam* with sails and also *colandia* and *sangara* (Schoff 1912: 46). Interestingly, as in English, *kalam* refers to both utensil and ship in Tamil. *Yavanar tanta vinai maaN nankalam* in *Akanaanooru* 149 suggests the Roman origin of certain *kalams*. The poets, not familiar with the specific names of the Roman ships, used the generic label *kalam*. The native crafts are precisely named with their functions; e.g. *kazhitthoni* and *ambi* in *Puranaanooru* 343. *Naavaay* could be a ship of North Indian origin, as its root word *naav* is Indo-European, not Dravidian, and *vangkam*, perhaps belonged to the Bay of Bengal region.

Early Medieval (500 to 1000 CE)

Data on the watercrafts and the navigation of this period is scanty. However, the ship motifs from the Pallava coins (Tripathi and Raut 2006) and Ajanta (Schlingloff 1976) prove the importance of maritime activities. *Vangkam* occurs in the Medieval Tamil texts (*Appar Devaaram* 1.84.7). Obviously state formation and commercial interests in South India boosted navigation and boat-building.

Kerala witnessed the ships of West Asia, Coramandal coast, Southeast Asia and China. Perhaps Islam and Christianity too reached Kerala during this period. Increased evidence for trade occurs from the ninth century. The merchant guilds of *Anjuvannam* and the Christian presence at southern Kollam in 849 CE evidenced by the Terisappalli copper grants are noteworthy (Abraham 1988; Subbarayalu 2001; Varier 2003:160). The Jamat mosque inscription (late tenth century) at Patalayinikollam mentions about the guilds of *Manigramattar* and *Valanjiyar* (Varier 2003:155; SII, 8, 162:69). The maritime empire of the Cholas controlled southern Kerala and northern Sri Lanka, which further proves the importance of boat-building so the empire could be connected. By the end of this period Muslims were very active on the South India coast due to their interest in the Indian Ocean trade.¹⁴ The West Asian navigation technologies might have been introduced to Kerala. Beypore, north of Kozhikode, and other settlements perhaps emerged as major boat-building centres.

¹⁴ Ghosh 1992: 362 suggests that Muslims were pushed out of Mediterranean trade by the Christian states from the 10th century CE.

Late Medieval (1000 CE to 1500 CE)

Evidence for boat-building of this period is available in Arab, Chinese (Karashima 2004a; Sen 2006), European and native (*Payyanur Paattu*, Antony 1994) sources. The polities of Kerala which were in frequent skirmishes needed watercrafts for political and administrative purposes. Reference to the *Kudiraichettis* (horse traders) of Kerala occurs in Tamil inscriptions (Rangacharya 1919:1641). Merchants of Kerala were active on the east coast of India (Karashima 2004b:7), Sri Lanka (Pathamanathan 2004) and Southeast Asia (Selvakumar 2010).

South India witnessed the merchants from the Indian Ocean Rim. Idrisi mentions about Fandarina (Pantalayinikollam) where ships of Sindh anchor (Varier 2003:162). The Genizah letters of Ben Yiju mention about a *nakkudha* named Nambiyar, perhaps a ship captain (Goitein 2001:430). The Cholas dominated the eastern Indian Ocean in the 11th century and they took expeditions to Sri Lanka, and to Southeast Asia to protect their maritime interests (Kulke, *et al.* 2009). The Chola inscription at Krishnapatnam of Andhra (1256 CE) mentions about the vessels named *marakkalam*¹⁵, *thoni*, *vedi*, *padavu*, *kalavam*, *kamarasavalli* and *turi* (Karashima 2004b: 7). Three types of Chinese ships that visited Kerala are mentioned by Ibn Battuta. Pantalayinikollam, north of Kozhikkode, was a wintering port for Chinese ships and Chinese sources mention southern Kollam as a major port (Varier 2003). Clearly West Asian dominance and Chinese interest grew in this phase (Sen 2006).

Kadakkarappally Sailboat

At Kadakkarappally (N Lat. 9° 55.470'; E Long. 76° 18.41' ca. 35 km south of Kochi, Chertala Taluk, Alappuzha dt), a damaged sailboat was excavated in 2002-2003 (Nair, *et al.* 2004; Pedersen 2004; Selvakumar 2006a; Selvakumar 2011; Selvakumar, *et al.* 2004; Tomalin, *et al.* 2004). This is the first significant example of a large boat to be excavated in India (Figure 3).

¹⁵ Marikar, surname of certain South Indian Muslims is considered to have derived from Marakkalarayar which means ship master/captain/owner (cf. Marakkalanaayakan in Barus inscription, Subbarayalu 1994), the Tamil equivalent (?) of nakhuda/naquid (Goiten 2001).



Figure 3. A General view (from south) of the excavated boat at Kadakkarapally (Photo by Ralph Pedersen 2003).

It is a flat-bottomed, nailed and plank-built boat; intact length ca. 18.67 m, width, ca. 4.05 m. The boat had a transom stern, partly disturbed, and a curvilinear-pointed bow, which resembles *kettuvallam*. It had double masts, one in the bow and the other amidships. It is made of Anjily wood (*Artocarpus hirsutus*) and for the bulkhead *Cassia fistula* wood is used. Two C-14 dates of Cal ad¹⁶ 920–1160, average 990±70 years (Birbal Shani Institute of Palaeobotany (BSIP, Lucknow) and Cal ad 1020–1270 (Beta Analytic), place the boat between twelfth and fifteenth centuries CE. The boat displays a mixture of technologies some of which do not survive in contemporary Kerala. The "lashed-lug" technology has interesting parallels to methods used in Southeast Asia and its compartments resemble the Chinese tradition.

¹⁶ 'Cal' refers to calibrated age of the dated sample. It is the calendar age of the sample.

Modern Period (from 1500 CE)

The boat-building scenario changed drastically during this period because of the colonial presence (the Portuguese, Dutch and British)¹⁷ and the emergence of maritime empires (Mathew 1997), and the lack of powerful local polities. A dugout canoe of late historic period (Figure 4) was found at Uzhavur near Koothattukulam in 2006, but many such finds in Kerala either go undocumented or end up as firewood.



Figure 4. A Dugout canoe excavated at Uzhavur-Puthuvely, Kottayam District, and Kerala (V.Selvakumar 2006)

The water-filled southern and central Kerala produce several varieties of watercrafts. From the boat song of *vanjipaattu* to the *Khalasi* workers of Baypore yard the boat-building tradition is very dynamic (Joseph 2003). Malayalam has about 38 names for watercrafts (Rajamanickam 2004). *Vanji* is a canoe for river/backwater transport; *kettuvallam* is a stitched plank-built boat used for large-scale transport, and its modified version functions as houseboats; *changnadam* (*sangara*) is used for ferries and *palliOdam* for ritual purpose; *chundan vaLLam* for the boat race in Alappuzha is an important type. *Iruttukutthi vaLLam* was used for piracy earlier. *Caalattadi* or *kattumaram* is used by the fisher-folk of Kerala. *churulan vaLLam*, *Odi vaLLam*, *veppu vaLLam* and *kochchu vaLLam* are other

¹⁷ Modern and contemporary ship-building are not discussed in this paper.

traditional craft varieties. Craftsmen of Beypore produce large vessels, *uru*¹⁸, which are now manufactured mainly for West Asian customers.

III. Discussion

The internal and external dynamics have conditioned the traditional boat-building in Kerala, especially in Southern and Central Kerala which have numerous rivers and backwaters. The dugouts and rafts, which perhaps developed in prehistoric Kerala as an adaptation to environmental conditions, have been in constant use; however, their specific design has probably changed. Plank-built vessels, extended dugouts and use of masts and sails might have been introduced in the Iron Age when internal social complexities and external interactions intensified.

The find of the Pattanam canoe is no surprise as similar canoes are used even today. *Naavaay* and *vangkam* were large seagoing vessels perhaps manufactured by the major traders in the Early Historic. While the smaller crafts were the products of day-to-day demands, the larger ships were the result of long-distance trade and the capitalist enterprise of major traders and guilds or political enterprise of the states. The chiefs did control the trade and used ships for political and economic benefits.¹⁹ The Indian Ocean trade brought merchants and watercrafts from different parts of the world to Kerala which might have led to hybridization of boat-building technologies. Reference to "the well-crafted vessels given by the Yavanar" in Tamil *Akanaanooru* poem 149 suggests that particular ships were Greco-Roman in origin. The indigenous ships were also used in long-distance trade. The questions of joining planks through stitching and nailing in the Early Historic period and their origin need more research.

Very little is known about the early medieval watercrafts but continuity of early crafts is possible. From the 9th century the Indian Ocean witnessed increased commerce, and West Asian communities dominated the Indian Ocean trade (Arunachalam 2008). These communities with interest in Southeast Asia, traded on a variety of goods, including horses which were in great demand in late Medieval South India. Kerala along with the east coast of India was an ideal ground for these communities due to its location in the sea route connecting West Asia and Southeast Asia and the spice wealth. Therefore, the West Asian boat design dominated in certain contexts. Perhaps the native trading groups faced competition from the West Asian traders and it is probable that some of the traditional Indian designs (e.g. *Vangkam*, *Kalam*) lost their importance. The Beypore *uru* design is considered to be influenced by West Asian traditions (Hornell 1920). According to Hornell (1920: 7), "the Malayali adheres to the indigenous dugout design, the Arab type is largely built at those Mappilla centers

¹⁸ In the Mottupalli (1358 CE, SII XXVI, 635). and Krishnapatnam inscriptions (Karashima 2004b: 7), *uru* is the generic name for ships.

¹⁹ The Chera king Senguttuvan defeated his enemies/pirates on the sea and a Chera king was 'operating gold-yielding *naavaay* and other *kalams* would not pass his way' (*Puranaanooru* 126) in the Early Historic period. *PathiRRuppattu* (II, Canto, 8-10) mentions about a Chera king, who punished the Yavanar and took away their ship (?) with valuables.

where the strain of Arab blood is appreciable, as for example at Calicut, Beypore and Ponnani". However, this categorization cannot be extended to the past. It needs to be researched carefully to understand if the Beypore design is entirely non-local or any of the early Indian elements were incorporated in it. Craftsmen of Beypore perhaps built boats of different types for various markets; and hence they could have copied and experimented with a combination of technologies.

The Kadakkarappally sailboat, with Southeast Asian (cf. Manguin's 1996) and local features, suggests that certain types were abandoned in the past. It also proves that iron nails were used in medieval Indian boat-building, contrary to the widely held notion (Selvakumar, *et al.* 2004: 79). The competition over the Indian Ocean trade increased from the 15th century with the arrival of colonial powers and large watercrafts were built in Kerala to fulfill their ambitions.

Several traditional watercrafts are used in Kerala and some of their names occur in ancient texts. The absence of *kattumaram* in the Sangam texts is puzzling; does *maram* in the texts refer to *kattumaram*? Or did it become popular later? While the contemporary watercrafts can help us to understand ancient navigation they are not static representations of the past navigation system. Modification, abandonment and introduction of boat designs have been a constant process due to social-economic and political demands. For example, traditional watercrafts have disappeared in many traditional river crossings ("Kadavu") due to the new concrete bridges. The *kettuvallams* have been modified into houseboats for promoting backwater tourism (Zacharias, *et al.* 2008).

Kerala has been the meeting ground for boat-building traditions of the eastern and western Indian Ocean regions; so detailed research, documentation and preservation of traditional boat-building methods are required for the growth of nautical archaeology in Kerala and the preservation of traditional nautical knowledge.

Bibliography

Abraham, M., 1988	<i>Two Medieval Merchant Guilds of South India</i> , Manohar, Delhi.
Abraham, S., 2007	"South Asian Perspective", in (eds.) Steven E. and Willeke Wendrich, <i>Berenike 1999/2000: Report on the Excavations at Berenike Including Excavations in Wadi Kalalat and Siket, and the Survey of the Mons Smaragdus Region</i> , Sidebotham, pp.285-294, Institute of Archaeology, Los Angeles.
Antony, P. (ed.), 1994	<i>Payyanur Pattu: Pathavum Padanavum</i> (Malayalam), D. C. Books, Kottayam.
Appadorai, A., 1936	<i>Economic Conditions in Southern India (1000-1500 AD)</i> . Vol. II, University of Madras, Madras.
Arunachalam, B.,	"Technology of Indian Sea Navigation (c. 1200-c.1800)", in

2008	<i>The Medieval History Journal</i> 11, pp. 187-227. DOI: 10.1177/097194580801100202
Bajpai, K.D., 1981	"Source Material for Indian Art history", in <i>Cultural contours of India: Dr. Satya Prakash felicitation volume</i> , Satya Prakash, Vijai Shankar Śrivastava eds., pp. 143-147, Abhinav Publication, Delhi.
Begley, V., and de Puma, R.D. (eds.), 1991	<i>Rome and India: The Ancient Sea Trade</i> , The University of Wisconsin Madison.
Benedetto, L.F., 1931	<i>The Travels of Marco Polo</i> , translated by Aldo Ricci, London, 1994. New Delhi, Reprint.
Buchanan, F., 1806	<i>A Journey from Madras through the Countries of Mysore, Canara, and Malabar</i> , Asian Educational Services, Chennai, 1999, Reprint.
Cabral, P., 1995	<i>Voyage of Pedro Alvares Cabral to Brazil and India</i> , Asian Educational Service, New Delhi.
Casson, L., 1989	<i>The Periplus Maris Erythraei</i> , Princeton University Press, Princeton.
Casson, L., 1996	"On Alagankulam Graffito", in <i>Indian Express</i> . Madras Edition. April, 6.
Champakalakshmi, R., 1996	<i>Trade, Ideology and Urbanization: South India 300 BCE to CE. 1300</i> , Oxford University Press, Delhi.
Cherian, P.J., Selvakumar, V., and Shajan, K.P., 2007a	"The Muziris Heritage Project: Excavations at Pattanam", in <i>Journal of Indian Ocean Archaeology</i> , 4, pp.1-10.
Cherian, P.J., Selvakumar, V., and Shajan, K.P., 2007b	"Evidence for the Ancient Port of Muciri", in <i>Chemmozhi</i> , 2.1, pp. 26-27.
Cherian, P.J., Ravi Prasad, G.V., Dutta, K., Ray, D. Kr., Selvakumar, V. and Shajan, K.P., 2009	"Chronology of Pattanam: An Early Historic Indo-Roman-West Asian Port Site on The Malabar Coast", in <i>Current Science</i> , 97, 2, pp. 236-240.
Ghosh, A.,	<i>In an Antique Land</i> , Ravi Dayal, Delhi.

1992	
Goitein, S.D., 2001	"From Aden to India", in (ed.) Ranbir Chakravarty, <i>Trade in Early India</i> , pp. 416-434, Oxford University Press, New Delhi.
Gurukkal,R., 2010	<i>Social Formations in Early South India</i> , Oxford University press, Oxford.
Greeshmalatha, A.P. and Rajamanickam, G. V., 1993	"An Analysis of Different types of Traditional Coastal Vessels along the Kerala Coast", in <i>Marine Archaeology</i> , 4, pp, 36-50.
Greeshmalatha, A.P. and Rajamanickam, G. V., 1995	"Kattamaram in South Kerala: A study of Constructional Techniques", in <i>Indian Journal of History of Science</i> , 30, 2-4, pp.87-102.
Gurukkal, R and Raghava Varier M.R., (eds.), 1999	<i>Cultural History of Kerala Vol-1</i> , Department of Cultural Publications, Thiruvananthapuram.
Hornell, J., 1920	<i>The Origins and Ethnological Significance Of Indian Boat Designs</i> , Memoirs of the Asiatic Society of Bengal, Calcutta 1920, Re-issued by South Indian Federation of Fishermen Societies, Trivandrum.
Joseph, C.C., 2003	<i>The shipbuilding and navigation in India and the Portuguese during the sixteenth and seventeenth centuries</i> . Ph.D. Dissertation, Pondicherry University, Pondicherry. http://hdl.handle.net/10603/838 ,
Karashima, N., (eds.) 2004a	<i>In Search of Ceramic-Sherds in South India and Sri Lanka</i> , Taisho University Press, Tokyo.
Karashima, N., 2004b	Machilipatnam/Mottupalli/Krishnapatnam/Kottapatnam/Pulicat, <i>In Search of Ceramic-Sherds in South India and Sri Lanka</i> , Karashima ed. pp.1-10, Taisho University Press, Tokyo.
Kulke, H. Kesavapany and Sakhuja, V. (eds.) 2009	<i>Nagapattinam To Suvarnadwipa: Reflections on the Chola Naval Expeditions to Southeast Asia</i> , Institute of Southeast Asian Studies, Singapore.
Lee, R. S., 1829	<i>The Travels of Ibn Batuta 1325-1354</i> , Translated to English.

Logan, W., 1884	<i>The Malabar Manual</i> , Kerala Gazetteers Department, Thiruvananthapuram, New Edition, 2000.
Malekandathil, P., 2001	<i>Portuguese Cochin and the Maritime Trade of India</i> , Manohar Publishers and Distributors, Delhi.
Manguin, P.Y., 1996	"Southeast Asian Shipping in the Indian Ocean During the First Millennium A.D.", in (eds.) Himanshu Prabha Ray and Jean-François. Salles, <i>Tradition and Archaeology: Early Maritime contacts in the Indian Ocean</i> : proceedings of the International Seminar Techno-Archaeological Perspectives of Seafaring in the Indian Ocean. pp. 181-197, Manohar, New Delhi.
Mathew, K.S., 1997	<i>Ship-building and navigation in the Indian Ocean Region, AD 1400-1800</i> , Delhi, Munshiram Manoharlal Publishers.
Mookerjee, R.K., 1999	<i>Indian Shipping: A History of the Sea Borne Trade of the Indians from the Earliest Times</i> , Munishiram Manoharlal, New Delhi.
Nair, M.V., Selvakumar, V., and Gopi, P.K., 2004	"Excavation of a Unique Sailboat at Kadakkarappally", in <i>Current Science</i> , 86, 5, pp.709-712.
Narayanan, M.G.S., 2004	"Maritime History of Kerala: Notes for a Master Plan", in <i>The Journal of Centre for Heritage Studies</i> , 1, pp.39-50.
Panikkar, K.N., 1947	<i>A Survey of Indian History</i> , The National Information and Publication Ltd., Bombay.
Pathmanathan,S., 2002	"The Nanadesis in Anuradhrapura: A Unique Bronze Image of Virabhadra", in (ed.) Noboru Karashima, <i>Ancient and Medieval activities in the Indian Ocean: Testimony of Inscriptions and Ceramic-Sherds</i> , pp. 48-56, Taisho University, Tokyo.
Pedersen, R., 2004	"Shipwreck in the Coconut Grove: The Kadakkarappally Boat", in <i>Institute of Nautical Archaeology Quarterly</i> , 31,2, pp.3-9.
Pedersen, R. 2010	"A Clench-Fastened Boat in Kerala, India", in <i>International Journal of Nautical Archaeology</i> 39.1. pp.110-115.
Petraglia, M.D., Clarkson, C., Boivin, N., Haslam, M., Korisettar, R.,	"Population Increase and Environmental Deterioration Correspond with Microlithic Innovations in South Asia ca. 35,000 years ago", in <i>Proceedings of the National Academy of Sciences</i> , 106, pp. 12261-12266.

Chaubey, G., Ditchfield, P., Fuller, D., James, H., Jones, S., Kivisild, T., Koshy, J., Lahr, M.M., Metspalu, M., Roberts, R., Arnold, L., 2009	
Rajamanickam, V. G., 2004	<i>Traditional Indian Shipbuilding: Memories, History, Technology</i> , New Academic Publishers, New Delhi.
Rajamanickam, V. G., and Arulraj, V.S., 1994	<i>Maritime History of South India</i> , Tamil University, Thanjavur.
Rajendran, P., 1989	<i>Prehistoric Cultures and Environment</i> , Classical Publishing Company, New Delhi.
Rangacharya, A., 1919	<i>A Topographical list of Inscriptions of the Madras Presidency: with Notes and References. Vol.3, Government Press, Madras.</i>
Ransley, J., 2008	"The Boats of Munrothuruthu: Identity, Landscape and Producing the Social World", paper presented at the Third International Congress on Underwater Archaeology, UCL, London.
Ransley, J., 2010	"In response to Pedersen's 'A Clench-Fastened Boat in Kerala': a Revealing Boat Narrative not a 'new' type of boat", in <i>International Journal of Nautical Archaeology</i> , 39, 2, pp. 423-431. (doi:10.1111/j.1095-9270.2010.00282.x)
Ratnagar, S., 2006	<i>Understanding Harappa: Civilization in the Greater Indus Valley</i> , Tulika Books, New Delhi.
Ray, H.P., 2003	<i>The archaeology of seafaring in ancient South Asia</i> , Cambridge University Press, Cambridge.
Rawlinson, G., 2005	<i>Phoenicia in History of Civilization</i> , Tauris, London.
Sakhuja, V. and Sakhuja, S., 2009	"Rajendra Chola I's Naval Expedition to Southeast Asia: A Nautical Perspective", in (eds.) Hermann Kulke, Kesavapany and Vijay Sakhuja, <i>Nagapattinam To Suvarnadwipa: Reflections on the Chola Naval Expeditions to Southeast</i>

	Asia, pp. 76-90, Institute of Southeast Asian Studies, Singapore
Sarma, I. K., 1980	<i>Coinage of the Satavahana Empire</i> , Agam Kala Prakashan, New Delhi.
Sastri, K.A.N., 1939	<i>Foreign Notices of South India: From Megasthenes to Mahuan</i> , Madras, University of Madras.
Schlingloff, D., 1976	"Kalyanakarin's Adventures: The Identification of an Ajanta Painting", in <i>Artibus Asiae</i> , 38,1, pp. 5-28. http://www.jstor.org/stable/3250094 .
Schoff, W.H., 1912	<i>The Periplus of the Erythraean Sea: Travel and Trade in the Indian Ocean by a Merchant of the First Century</i> , Munshiram Manohar Lal, Third edition, 1995.
Selvakumar, V., 2006a	"Nature And Characteristics Of the Sailboat Excavated at Taikkal-Kadakkarappally, Alappuzha District, Kerala", in (eds.) A.S. Gaur and K.H. Vora, <i>Glimpses of Marine Archaeology in India</i> , pp.4-14, Society for Marine Archaeology, Goa,
Selvakumar, V., 2006b	"Recent Archaeological Findings in the Angamaly-Kalady Area, Periyar Basin", in (ed.) Charles Dias, <i>Kerala Spectrum: Aspects of Cultural Inheritance Dr. K.J. John Felicitation Volume</i> , pp.81-89, The Indo-Portuguese Cultural Institute, Cochin.
Selvakumar, V., 2008	"The Living Dead and Lost Knowledge: Indo-Roman Trade and Internal Exchange Systems of Ancient Tamil Country", <i>Papers of the International Seminar on Muziris Heritage Project: Archaeological Research</i> , pp. 21-28, Trivandrum, Government of Kerala.
Selvakumar, V., 2010	<i>Tamil Cultural Connections across the World (up to 1600 CE)</i> , Tamil University, Thanjavur.
Selvakumar, V., 2011	"Contacts between India and Southeast Asia in Ceramic and Boat Building Traditions", in (eds.) Pierre-Yves Manguin, A. Mani and Geoff Wade, <i>Early Interactions between South and Southeast Asia: Reflections Cross-cultural Exchange</i> , pp.197-220, Institute of Southeast Asian Studies, Singapore.
Selvakumar, V. and Darsana, S. 2008	"Genesis and Development of Urban Processes in the Ancient/Early Historic Tamil Country", in (eds.) Gautam Sengupta and Sharmi Chakrabarty, <i>Early Historic Archaeology of South Asia</i> , pp. 337-374, CASTEI, Kolkata.
Selvakumar, V., Nair, M.V., Gopi, P.K., and	Spatio-Temporal Contexts of the Sailboat Excavated at "Kadakkarappally", in <i>The Journal of the Centre for Heritage Studies</i> , 1, pp.75-82.

Sreedharan, P. 2004	
Sen, T., 2006	"The Formation of Chinese Maritime Networks To Southern Asia, 1200-1450", in <i>Journal of the Economic and Social History of the Orient</i> 49, 4, pp.421-453.
SII	<i>South Indian Inscriptions</i> , Archaeological Survey of India, New Dlehi.
Sridhar, T.S., Thulasiraman, D., Selvaraj, S., and Vasanthi, S., 2005	<i>Alagankulam: An Ancient Roman Port City of Tamil Nadu</i> , Tamil Nadu Department of Archaeology, Chennai
Stanley, H. E.J., 1866	<i>A Description of the Coasts of East Africa and Malabar in the Beginning of the Sixteenth century</i> , by Duarte Barbosa, A Portuguese Translation from an early Spanish Manuscript in the Barcelona library.
Subbarayalu, Y., 1994	"Sumatravil Tamil Kavettukal", in <i>Avanam</i> , 4, pp.114-124, Tamil.
Subbarayalu, Y., 2001	"Anjuvannam: A Maritime Trade Guild of Medieval Times", in <i>Studies in Cola History</i> , pp.144-152, Surabhi Pathippakam, Madras.
Subrahmanian, N., 1966	<i>Pre-Pallavan Tamil Index</i> , University of Madras, Madras.
Tomalin, V., Selvakumar, V. Nair, M.V. and Gopi, P.K., 2004	"The Thaikkal-Kadakkarapally Boat: An Archaeological Example of Medieval Shipbuilding in the Western Indian Ocean", in <i>International Journal of Nautical Archaeology</i> , 33, 2, pp.253-263.
Tripathi, S., and Raut L. N., 2006	"Monsoon Wind and Maritime Trade: a Case Study of Historical Evidence from Orissa, India", in <i>Current Science</i> , 90, 6, pp. 864-871.
Tripathi, S. A, Manikfan and Mohamed, M., 2005	"An Indo-Arabian Type of Stone Anchor from Kannur, Kerala, West Coast of India", in <i>International Journal of Nautical Archaeology</i> , 34, 1, pp.131-137.
Varier, M.D.R., 2003	"Pantalayinikollam", in (eds.) Kesavan Veluthat and P.P. Sudhakaran, <i>Advances in History Essays in Memory of M.P. Sridharan</i> , pp. 154-179, Professor M.P. Sridharan Memorial Trust, Calicut.

Varthema, L. D., 2004	"The Itinerary Of Ludovico Di Varthema Of Bologna From 1502 to 1508", in <i>School Oriental Asian Studies Bulletin of Burma Research</i> , 2, 2, pp.119-129.
Yule, H., 1993	<i>The Travels of Marco Polo</i> , Dover Publications Inc., New York.
Zacharias, S., Manalel, J., Jose, M.C., and Salam, A., 2008	"Back Water Tourism in Kerala: Challenges and Opportunities", paper presented in conference on <i>Tourism in India-Challenges</i> , Indian Institute of Management, Kozhikode. http://hdl.handle.net/2259/597 .
Zevelebil, K., 1974	<i>Tamil Literature</i> , Harrassowitz, Weisbaden.