

Stone anchors from Mombasa, Kenya: Evidence of maritime contacts with Indian Ocean countries

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Abstract

For 2000 years or more, the East African Coast has had contacts with other parts of the world and that was possible because an understanding of the monsoon winds and current patterns of the region encouraged the interchange of knowledge, transfer of technology and barter of products. This facilitated sailing over long distances, crossing the Red sea, the Persian Gulf and the Indian Ocean. Among other ancient coastal cities on the East African Coast, Mombasa has played a significant role in the transoceanic trade. Earlier, trade and cultural contacts with other countries was delineated on the basis of land and inshore exploration and excavation finds. Now, it is possible to understand the aspects of maritime trade contacts because of availability of new tools and technologies to decipher the unknown past from underwater finds. With the initiation of maritime archaeological investigations new evidences come to light indicating trade and cultural contacts through pottery, amphorae, stone anchors, cargo, ingots, ship remains, etc. With the number of underwater findings increasing, the curiosity to know more about them also rises. During underwater explorations stone anchors have also been recovered from many sites across the world and in recent past from Mombasa, Kenya coast. This paper describes stone anchors discovered during underwater explorations off Mombasa and explores ancient trade contacts of Mombasa with other countries through the anchors and other findings.

Keywords: Stone anchor, Indo-Arab trade, Indian Ocean, Mombasa, Underwater exploration

Introduction

From prehistoric times, people have used some kind of watercraft to cross the rivers, seas and oceans, reaching far-off places. They most likely used stones as anchors. After several centuries, the watercraft changed dramatically, i.e., construction changed from log to plank, plank to hull and from wood to steel; rowing and sailing were replaced by mechanical power; and carrying capacity increased. Similarly, anchors changed from stone to wood, from lead to iron and iron to steel. These aspects have been confirmed by evidence from various maritime archaeological investigations and shipwreck findings throughout the globe (Pulak 2005: 43; Tripathi *et al.* 2014: 115–143; Curry 1999: 17–23; Wachsmann 1998: 255–293; Upham 1983: 3–25).

In many parts of the world, maritime archaeologists have recorded a variety of stone anchors mostly from sheltered bays, ports, harbours, trade routes and shipwreck sites but occasionally from other places such as reefs and shoals. These stone anchors have been dated on the basis of associated findings either using relative or absolute methods, or using comparable findings from elsewhere. Stone anchors have been dated from prehistoric times to the Bronze Age and beyond, up to the 20th century. Likewise, while undertaking a surveillance search off the Mombasa coast, three stone anchors came to light in 15 to 20 m of water. Of these, one is an Indo-Arabian type while the other two are composite types. This report presents a description of the stone anchors off Mombasa and their probable dates based on comparisons with similar types of stone anchors reported from sites in other Indian Ocean countries.

Indo-Arabian stone anchors have been variously termed 'Arabo-Indian' (Souter 1998: 331-342), 'Arabic or Protograpnel' (Frost 1985: 352-369), 'Arabo-Indian grapnel' (Raban 2000: 260-272). Now, these anchors are known as 'Indo-Arabian' type stone anchors. Stone anchors have been named both by shape and region. Moreover, these anchors have been named so because these have been found only in the Indo-Arabian region.

Generally composite anchors have two round or square or rectangular holes at the lower side meant for wooden flukes and a circular rope-hole on the upper side. These anchors are made of flat slabs. The shape of the composite anchors are triangular (slightly rounded) in shape; all the sides are parallel or gently converge toward the top; the upper portion is

rounded. Generally, the thickness of these stone anchors is nearly the same from base to top. Occasionally, some of the composite anchors used to have two or four holes but in most of the composite stone anchors three holes are noticed. Slightly curved wooden flukes were provided in lower holes which protrude on both sides of the anchor so that whichever manner the anchor falls on the seabed the flukes will hold the seabed firmly. Additional wooden fluke is also provided in the fourth hole to get extra grip (Frost 1991: 355-410; Toth 2002: 85-118; Tripathi 2014: 973-86).

Frost (1991) indicates that a composite stone anchor used to have more than one hole. Wooden flukes were provided in the additional holes which protrude on both sides of the anchor so that whichever manner the anchor falls on the seabed the flukes will hold the seabed firmly. Triangular anchors are known as composite anchors, these are often made of a flat thin stone block, giving them a triangular shape with a circular upper hole at the apex and two holes at the lower side. These lower holes may be either rectangular or square. Occasionally, some of the composite anchors used to have one, two and four holes. These anchors have two round tooth-holes and a larger, circular rope-hole. The base of the slab is flat or slightly rounded; the sides are parallel or gently converge toward the top; the upper part is rounded. The thickness of the stone is nearly the same at the base and at the top. Composite stone anchors are stone slabs with two or more holes drilled into them. One of these functions as a rope hole through which the anchor cable is fixed. The other hole or holes are the tooth holes in which a wooden bar is fixed to help in fastening the anchor. Composite anchors, in which the stone provided the weight to take the anchor to the seabed, whilst the holding power was provided by means of separate arms, usually made of wood. Should any trace of the arms survive this too needs to be recorded.

Mombasa's maritime trade contacts with Arabian and Indian Ocean countries

Mombasa is a small coralline island located in the central part of the Swahili coast (4°4' S and 39°43' E) and Mombasa town is situated on the southeast end of Mombasa Island. Fort Jesus was built in 1591 AD on the southern end of the island (Fig. 1). Being located close to India and Arab countries, seafarers of Arabia, India, China, Persia and Greece visited Mombasa and more evidence of maritime contacts comes from inshore and underwater excavations (Biti 2015: 485–510). Mombasa's coast has the trade advantages of the

monsoon winds and currents, which are relied on for seasonal navigation along the coast of eastern Africa and the Indian Ocean to western and southern Asia. The *Periplus of the Erythraean Sea* (40–70 AD) and Ptolemy's *Geography* (140 AD) mention trade routes, ports and cargo of the East African coast and involvement in trade with the Red Sea, Mediterranean Sea and the rest of the Indian Ocean region (Casson 1989: 6–31; Freeman-Grenville 1975: 1-303; Chami 1994: 7-104). The items of Mombasa such as ivory, rhinoceros horns and high quality tortoise shells were exchanged for lances, hatches, daggers, awls and glass. Ptolemy noted that this trade was growing rapidly in the early centuries of the Christian era (Mathew 1963: 94–128; Sheriff 2002: 116–150) and the inhabitants of the Swahili coast traded with ivory and tortoise shell in exchange for metal objects.

The earliest evidence of the Arab contact with Mombasa comes from archaeological excavations (Sassoon 1980: 1–42; 1982: 79–97) at Tuaca and Mbaraki, which recovered Sassanian Islamic pottery. Further, Al-Idrisi (1099–1165 AD), the Arab Geographer, mentioned that Mombasa was a prosperous trading town (Freeman-Grenville 1975: 1–303) with a harbour that was well protected from winds. Mombasa had trade relations with Sofala, Zanzibar as well as the Far and Middle Eastern countries (Fig. 2). Archaeological excavations in Mombasa have unearthed Islamic pottery (12th–15th centuries) including blue and green glazed wares of the Arabian Peninsula (Sassoon 1980: 1–42; 1982: 79–97). The later excavations (Rory *et al.* 2007: 1449–1460; McConkey & McErlean 2007: 99–121) have yielded similar type of Islamic pottery dated to the 13th century, suggesting trade contacts with the Arabian countries. Archaeological studies at Kilepwe near Malindi town have also yielded Islamic green glazed pottery of the 13th century (Kirkman 1952: 168–184; Wilson 1982: 201–219). Islamic yellow-on-black imported pottery dating to the 12th–15th century AD has been recorded in Mambrui north of Malindi (Bita 2015: 485–510 and Abungu 1994: 11–41). Further, underwater archaeological studies along the Kenyan coast and shipwreck explorations in Ngomeni, Lamu and Mombasa have unearthed huge quantities of Islamic ceramics including yellow and green monochromes (Piercy 1977: 331–347; 1978: 301–319). The Moroccan traveller, Ibn Battuta (1304–1377 AD), who visited Mombasa in 1331, mentioned the people of Mombasa. Duarte Barbosa, a Portuguese voyager of the 15th century, claimed that 'Mombasa is a place of great traffic and a good harbour where small crafts and great ships were moored, bound to Sofala, Cambay, Malindi and other ports'.

During the pre-modern period, Mombasa was an important trading centre for spices, gold, ivory, millet, sesamum and coconuts (Boxer & Azevedo 1960: 1593–1729) and Portuguese occupied Mombasa in 1698.

The underwater survey

Several underwater archaeological surveys have been conducted off Mombasa Island (Breen & Lane 2003: 469–489; Patience 2006: 10–132; Rory *et al.* 2007: 1449–1460; Bitá & Wanyama 2011: 9–43; Bitá 2015: 485–510) over the last few decades. Among these, the important discovery is the *Santa Antonio De Tanna* (1680–1697) shipwreck where finds include Chinese porcelain, Indian wares, Martaban and Portuguese jars, canons, mortar shells and bronze artefacts (Blot 2015: 83–87; Piercy 1978: 301–319; Sassoon 1980: 1–42). Most of the shipwreck's remains are still *in situ*, and recovered artefacts are exhibited at the Fort Jesus Museum, Mombasa. Shipwrecks have also been explored off Ngomeni and Lamu, north of Mombasa (Bitá & Wanyama 2007: 2–17; Bitá 2014: 2–11). In 2008, the National Museums of Kenya conducted intertidal, geophysical surveys and diving between the Tudor Channel on the eastern side of Mombasa Island as well as at the entrance to the old port of Mombasa channel with the objective of determining the nature of the seabed for laying fibre optic cable from Mombasa Club to 20 m water depth. While diving 100 m away from the survey area, the team found two composite stone anchors and subsequent survey yielded one Indo-Arabian type of stone anchor in the nearby area (Fig. 3).

Description of anchors

Three stone anchors were found at different locations some distance away from the survey area. As no other finds were recorded along with these stone anchors, excavations were undertaken in the vicinity. All of these stone anchors are made of locally available shelly limestone, which are found around Mombasa. None of the anchors showed any marks including no chisel mark on their surfaces but, the surfaces have undergone substantial weathering following exposure to the marine environment and currents.

As the anchors showed signs of being worn out, this indicates that they were used extensively noting also that their surface is porous because of the nature of raw material (Fig. 4). Originally, the shape and size of composite anchors with three holes and the Indo-Arabian

anchor were much larger than the present size. Measurements of all three anchors are presented in Table 1.

Among the composite anchors, anchor No. 1 (Fig. 5a) is made of shelly limestone. Its surface is smooth, and shells, bivalves and worm tubes are visible near its exterior surface. The anchor has two circular holes but these are not in line. The upper hole is smaller than the lower hole. However, one side of the upper hole is weathered. The edge of the anchor has been chopped off at many places. While being transported, the anchor broke into pieces. It was subsequently repaired and mending marks are still visible in the form of white lines.

Anchor No. 2 (Fig. 5b) is also made of shelly limestone; its surface is uneven and shells, bivalves and worm tubes are embedded within it. The anchor has three holes. Of the three holes, the upper circular hole and one lower square hole are intact whereas the other lower square hole is partly damaged. The edge of the anchor is not sharp nor the outer line uniform.

The Indo-Arabian anchor, anchor No. 3, (Fig. 5c) is made of shelly limestone, its surface is rough and bivalves, worm tubes and shells are embedded in it. Its upper circular hole is present but the lower portion, along with holes, is missing.

Probable date of the anchors

It is difficult to ascertain the precise date of the anchors from Mombasa because no associated materials have been recovered along with the anchors from the site and these anchors were chance finds. Ceramics, which have been recovered from excavations of nearby sites namely Kiberamni, Northwest of the island (Sassoon 1982: 79–97) and Tuaca (Sassoon 1980: 1–42; McConkey & McErlean 2007: 99–121), suggest that these anchors could be dated between 11th and 16th centuries AD. On account of development and typology of anchors, anchor 1 appears to be older than the composite and Indo-Arabian anchors. Chittick (1980: 73–76) suggested that similar kinds of anchors were used on the coast off Horn of Africa in the 1980s. However, a very limited number of ovoid-shaped anchors have been reported from all over the world in comparison with composite and Indo-Arabian anchors. In the Mediterranean region composite anchors have been dated to later than the 15th century BC (Wachsmann 1998), whereas along the west coast of India,

composite anchors were used until the middle of the 20th century. Similarly, Indo-Arabian anchors were also used in Indian waters for a long time (Tripathi 2014: 973–986).

Such Indo-Arabian anchors have been discovered in the Arabian Gulf, Indian Ocean and Red Sea, but from datable contexts only a very limited number have been recorded so far. In the absence of evidence, majority of the anchors cannot be dated with confidence. If stone anchors are found either with a shipwreck or stratified land excavations it would be easier to date them precisely. Along the African Coast, Indo-Arabian stone anchors have been reported from Kilwa Kisiwani, on the East African coast, Slave Island of Aden and Mogadishu and all these are documented from land sites. However, along the Kenya coast, stone anchors have been recovered for the first time from Mombasa's waters. Until now, no report is available on composite type of stone anchors from the African coast; probably the composite stone anchor off Mombasa is the first of its kind. Taking into account the work of Chittick (1980: 73–76), Vosmer (1999: 248–263) and the date of the stone anchors of the Indian coast which continued in use up until the middle of the 20th century, it could be proposed that the stone anchors of Mombasa could be approximately dated between the medieval period and the 20th century and maybe to a slightly later period. Very few stone anchors have been recovered from the African coast and even less from underwater therefore the anchors have been placed in a broad period.

Discussion and conclusions

Until now, the earliest dates for primitive stone anchors have not been ascertained. Anchors provide crucial evidence on the maritime activities of a region and their study is significant because information obtained cannot often be obtained from other sources. It has been observed that anchors were mostly recovered along ancient trade routes, particularly in sheltered bays, ports and harbours as well as shipwreck sites. In the case of Mombasa, stone anchors were found at the entry of a channel leading to the ancient port of Mombasa. These anchors found in Mombasa reflect the ships of many countries having visited Mombasa port and had trade contacts with Arabia, India, Kenya, Mediterranean and adjoining regions. However, there is no evidence yet of how many centuries stone anchors were used along the Kenyan coast. All the three stone anchors found off Mombasa resemble in shape and size the anchors found along the Indian, Sri Lankan and Oman coasts, as well

as the Mediterranean region (Gaur *et al.* 2005: 113–129, 2008: 24–57; Tripathi *et al.* 2014: 115–143; Tripathi 2014: 973-986; Tripathi *et al.* 1998: 1–8; Tripathi *et al.* 2003: 93–106; Souter 1988: 331–342; Vosmer 1999: 248–263) but they differ in terms of period.

Until now, no direct evidence suggest that composite stone anchors were introduced by Mediterranean mariners in the Indian Ocean region. Composite stone anchors have been recorded in the Indian Ocean region but fewer in number than in the Mediterranean Sea. So far, no Indo-Arabian types of stone anchors have been recorded from the Mediterranean and other seas. This suggests that boats used a variety of stone anchors according to the necessity and nature of the seabed. The excavations at Siraf port brought to light Indo-Arabian stone anchors from stratified layers datable to the 8th to 11th century AD and similar evidence so far has not been reported anywhere beyond Siraf. As all anchors of Mombasa are made of locally available shelly limestone, it substantiates that all of them belong to the local mariners. It cannot be ruled out that these anchors were introduced either by Arab or Indian mariners or that mariners from Kenya might have sailed in the Red Sea, Persian Gulf and Indian Ocean region for maritime trade and found these anchors suitable in their waters, subsequently adopting them for their waters. This also reflects the transfer of technology. As it is mentioned that Mombasa has been a port since historical times and was frequently visited by mariners of different countries, some of the boats might have lost their anchors and these are left over anchors. Until additional evidence comes to light further statements cannot be made on the origin of the stone anchors of Mombasa. In maritime archaeological studies stone anchors played a critical role and it has been possible to facilitate some conclusions about them such as material, typology, form and origin. In recent years, studies on maritime trade have provided new evidence about trade patterns and cultural contacts between countries.

As has been demonstrated, scholars around the world have obtained evidence through studying stone anchors. Over the years such studies have provided new information on stone anchors of different countries, thus, adding additional and comparative data on this subject. All these types of anchors were used for centuries simultaneously and in the absence of direct and indirect evidence, it is certainly complex to try to put them into definite time brackets. In view of the above, thin section petrography and X-ray powder diffraction (XRD)

analysis of the anchors could determine the source of the rock material and reveal whether these anchors belong to mariners of Mombasa or foreign mariners.

Stone anchors have been reported for the first time from the Mombasa waters of Kenya and similar type of anchors have been reported from inshore sites of other parts of Africa. Considering that the maritime history of Africa, which lies on the trade route between the Red Sea, the Persian Gulf and the Indian Ocean, is datable to the third millennium before Christ if not earlier, the number of stone anchors so far recorded from African countries is small. Hopefully, future explorations will see a greater discovery of such anchors. Similarly, it is essential to note the reuse of stone anchors anywhere along the African coast that may provide additional information, and whether stone anchors have been reported in places other than Mombasa, Kenya, should be looked into more meticulously.

Acknowledgements

The authors would like to thank the Director General, National Museums of Kenya, and Director of the CSIR-National Institute of Oceanography (NIO), Goa, India, for their encouragement and support. The cooperation rendered by SEACOM, EASSY, TEAMS, TELKOM (K) Limited and Kenya Ports Authority during the Underwater Cultural Heritage Impact Assessments of Mombasa is greatly appreciated. The authors also thank anonymous reviewers for their important comments, which improved the manuscript. The authors also acknowledge their colleagues for their support both in field and lab and to Rudra Prasad Behera and Satish Chitari for preparing figures.

References

- Abungu, G.O., 1994, The new finds along Kenyan coast. *Kenya Past and Present* **26**: 11–41.
- Bitá, C., 2015, The potential of underwater archaeology in Kenya: A short communication. In: S. Tripathi (ed.), *Shipwrecks around the world: Revelations of the past*. Delta Book House, New Delhi: 486–510.
- Bitá, C., 2014, Ngomeni shipwreck, report and future plans. *Underwater Archaeology Project Report*. National Museums of Kenya, Mombasa.
- Bitá, C. and Wanyama, P., 2011, *Archaeological impact assessment study report for the proposed capital dredging works at Kilindini channel and second container terminal at Port Reitz in Mombasa County, CHIA Report*. National Museums of Kenya, Mombasa: 9–43
- Bitá, C. and Wanyama, P., 2007, *Preliminary intertidal and underwater archaeological survey of Lamu archipelago*. Research Report, Fort Jesus Museum, Mombasa.

- Blot, Jean-Yves., 2015, Triangular identities: In search of *fragata Santo António de Tanna* (Vasai/Goa 1680, Mombasa 1697). In: S. Tripathi (ed.), *Shipwrecks around the World: Revelations of the past*. Delta Book House, New Delhi: 72–113.
- Boxer, C.R. and de Azevedo, C., 1960, *Fort Jesus and the Portuguese in Mombasa, 1593–1729*. Hollis and Carter, London.
- Breen, C. and Lane, J.P., 2003, Archaeological Approaches to East Africa's Changing Seascapes. *World Archaeology* **35**.3: 469–489.
- Casson, L., 1989, *The Periplus Maris Erythraei*. Princeton University Press, New Jersey.
- Chami, F., 2006, *The Unity of African Ancient History: 3000 BC to 500 AD*. E and D Vision Publishers, Dar es Salaam.
- Chami, F., 1994, Tanzanian Coast in the First Millennium AD. *Studies in African Archaeology* **7**: 7–104.
- Chittick, H.N., 1980, Stone anchor-shanks in the Western Indian Ocean. *International Journal of Nautical Archaeology* **9**. 1: 73–76.
- Curry, B.N., 1999, *Anchors*. Chatham Publishing, London.
- Freeman-Grenville, G.P., 1975, *The East African Coast: Selected documents from the first to earliest nineteenth century*. Clarendon Press, Oxford.
- Frost, H., 1991. Anchors sacred and profane; Ugarit-Ras Shamra, 1986; the stone anchors revised and compared. In: Yon, M. Yon (ed.), *Ras Shamra-Ougarit, VI: Arts et Industries de la pierre*, ERC Paris: 355-410.
- Frost, H., 1985, Stone anchors; Criteria for a Corpus. *Thracia Pontica*, **3**: 352–369.
- Gaur, A.S., Sundaresh., Vora, K.H., 2008, *Underwater Archaeology of Dwarka and Somnath*. Aryan Books International, New Delhi.
- Gaur, A.S., Sundaresh., Vora, K.H., 2005, *Archaeology of Bet Dwarka Island: An excavation Report*. Aryan Books International, New Delhi.
- Kirkman, J., 1952, The excavations at Kilepwe. *Antiquaries Journal* **32**: 168–184.
- Matthew, G., 1963, The East African Coast until the coming of Portuguese. In: R. Oliver and G. Matthew (eds.), *History of East Africa*. Clarendon Press, Oxford: 94–128.
- McConkey, M. and McErlean, T., 2007, Mombasa Island: A maritime perspective. *International Journal of Historical Archaeology* **11**.2: 99–121.
- Matthew, G., 1963, The East African Coast until the coming of the Portuguese. In: R. Oliver and G. Matthew (eds.), *History of East Africa*, Oxford: 94–128.
- Patience, K., 2006, *Shipwrecks and Salvage on the East African Coast*. Dar Akhbar Al Khaleej, Bahrain.
- Piercy, R.C.M., 1978, Mombasa wreck excavation, preliminary report. *International Journal of Nautical Archaeology* **7**.4: 301–319.
- Piercy, R.C.M., 1977, Mombasa wreck excavation, preliminary report. *International Journal of Nautical Archaeology* **6**.4: 331–347.

- Pulak, C., 2005, Discovering a Royal ship from the Age of King Tut: Uluburun, Turkey. In: G.F. Bass (ed.), *Beneath the Seven Seas*. Thames and Hudson, London: 34–47.
- Raban, A., 2000, Three-hole composite stone anchors from a medieval context at Caesarea Maritima, Israel. *International Journal of Nautical Archaeology*, **29.2**: 260–272.
- Rory, Q., Wes, F., Colin, B., Donal, B., Paul, L., Athman, L., 2007, Process-based models for Port evolution and wreck site formation at Mombasa, Kenya. *Journal of Archaeological Science* **34**: 1449–1460.
- Sassoon, H., 1980, Excavations at the site of early Mombasa. *Azania* **15**: 1–42.
- Sassoon, H., 1982, The mosque and pillar at Mbaraki: a contribution to the history of Mombasa. *Azania* **17**: 79–97.
- Sheriff, A., 2002, *Slaves, Spices and Ivory in Zanzibar*. James Carrey, Oxford.
- Souter, C., 1988, Stone anchors near Black Fort, Galle, Sri Lanka. *International Journal of Nautical Archaeology* **27.4**: 331–342.
- Toth, J. A., 2002. Composite stone anchors in the ancient Mediterranean: Typology, Chronology and their role in the reconstruction of ancient trade, A Proposal. *Acta Archaeologica Academiae Scientiarum Hungaricae* **53**: 85-118.
- Tripati, S., 2014, Stone anchors of India: Findings, Classification and Significance. In: H. V. Tilburg, S. Tripati, V. Walker, B. Fahy and J. Kimura (eds.), *Proceedings of the 2nd Asia-Pacific Regional Conference on Underwater Cultural Heritage*, Honolulu, Hawaii, **2**: 973–986.
- Tripati, S., Gaur, A.S., and Sundaresh., 2014, *Maritime Archaeology and Shipwrecks off Goa*. Kaveri Books, New Delhi.
- Tripati, S., 2003, Anchors from Goa waters, central west coast of India: Remains of Goa's overseas trade contacts with Arabian countries and Portugal. *Bulletin of the Australasian Institute for Maritime Archaeology* **27**: 97–106.
- Tripati, S., Gaur, A.S., Sundaresh and Bandodker, S.N., 1998, Historical period Stone anchors from Vijaydurg on the west coast of India. *Bulletin of the Australian Institute for Maritime Archaeology* **22**: 1–8.
- Vosmer, T., 1999, Indo-Arabian stone anchors in the western Indian Ocean and Arabian Sea. *Arabian Archaeology and Epigraphy* **10**: 248–263.
- Wilson, T.H., 1982, Spatial analysis and settlement patterns on the East African Coast. *Paideuma* **28**: 201–219.
- Upham, N.E., 1983. *Anchors*. Shire Publications, London.
- Wachsmann, S., 1998, *Seagoing ships and seamanship in the Bronze Age Levant*. Chatham Publishing, London.

S No.	Material	Width in cm	Length in cm	Lower hole	Upper hole	Weight in kg	Type of anchor
1	Shelley limestone	Top: 50; Bottom: 63	95	16	13	258	Composite
2	Shelley limestone	112 x 134 x 90	122	19 x 17	17 x 13	496	Composite
3	Shelley limestone	Top: 20 x 30; Bottom: 33 x 37	148	—	16 x 18	715	Indo-Arabian

Table 1. Dimensions of stone anchors found in Mombasa waters.



Fig. 1 Mombasa and other major ancient trade centres along Kenyan coast.

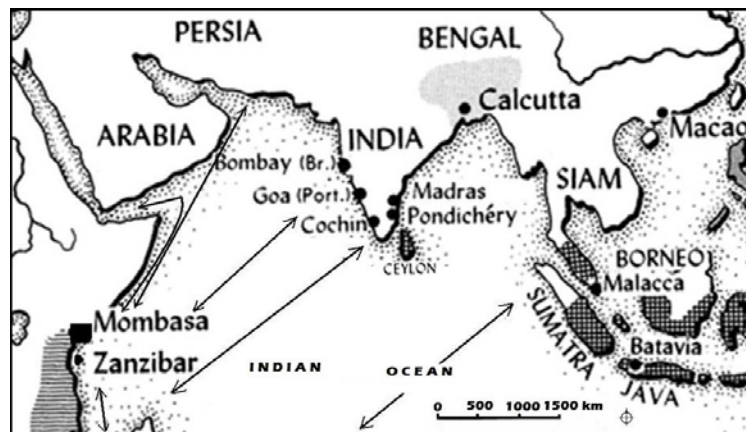


Fig. 2 Trade routes between Mombasa and Persian Gulf and Indian Ocean countries.

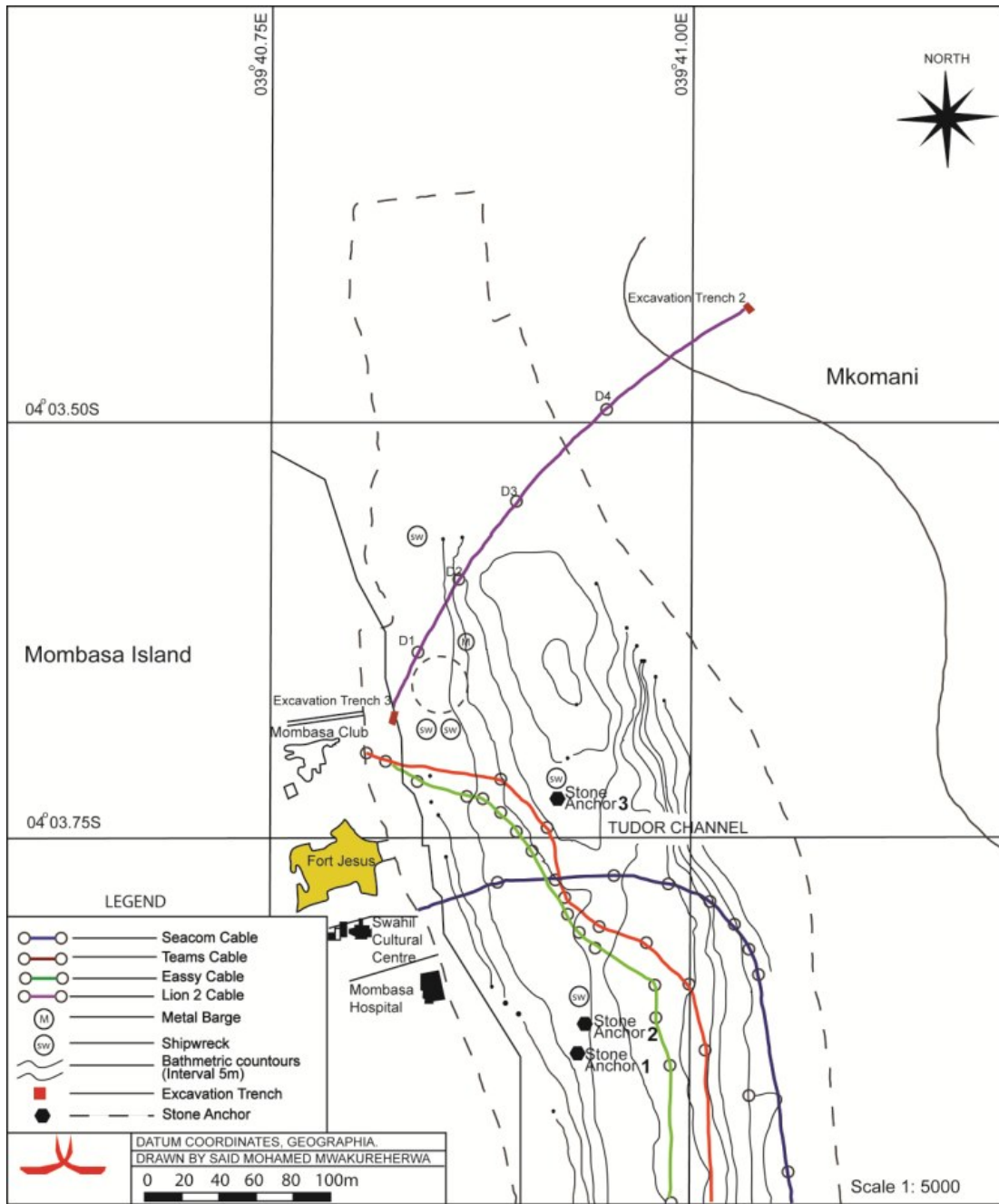


Fig. 3 Survey map of Tudor Channel showing location where stone anchors were found.

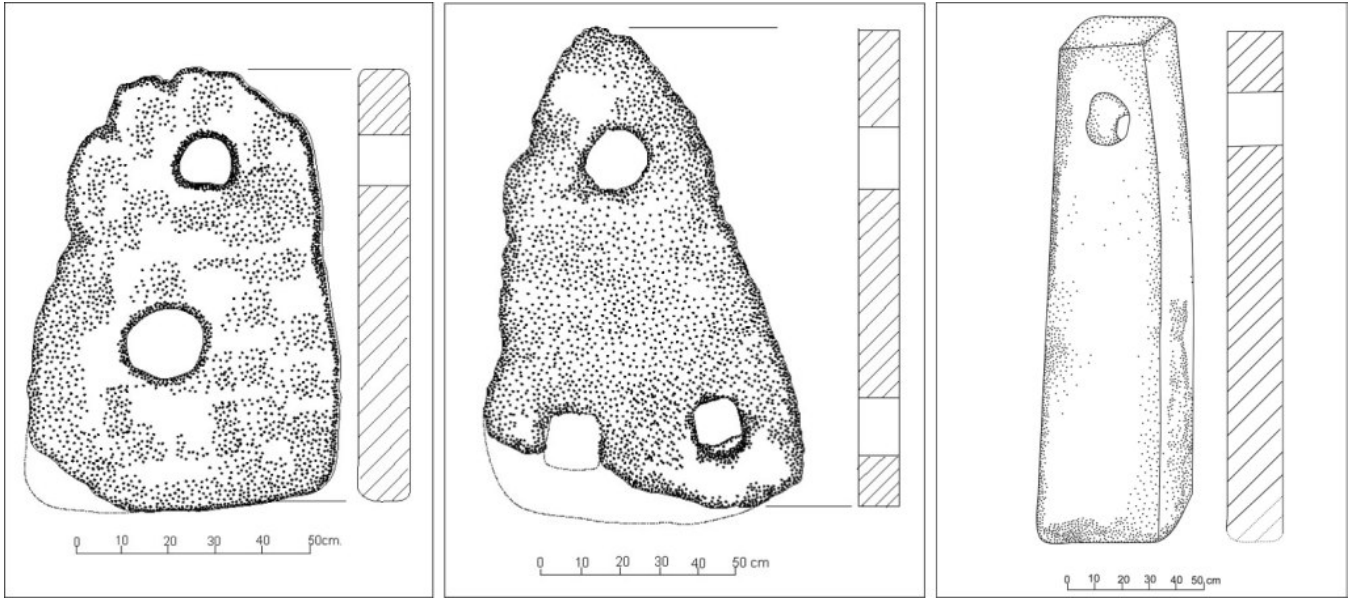


Fig. 4 Stone Anchors recovered from Mombasa waters, Kenya (Rudra Prasad Behera and Satish Chitari).



Fig. 5 a-c. Stone anchors recovered from Mombasa waters displayed at the Fort Jesus Museum, Mombasa (Photos: Fort Jesus Museums, Mombasa).