

Maritime Archaeological Explorations of Goa: Findings and Interpretations

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Abstract

Maritime archaeological explorations have been initiated in Goa waters for locating shipwrecks and port installations in coastal waters and riverbanks. Explorations have been carried out in Sunchi Reef, St George's Reef, Baga, Grande Island, Aguada waters and Gopakapattana. The explorations at Sunchi Reef have brought to light shipwreck remains of an early 17th century AD. The evidence suggests that the wreck belong to the Portuguese Period. The exploration off St George's Reef has revealed the remains of the 19th century shipwreck of the Basel Mission Company. Further, underwater explorations brought to light stone anchors from Sunchi Reef, Grande Island and Baga waters and a number of iron anchors have been retrieved from Aguada waters. Onshore exploration and trial scraping at Gopakapattana revealed stone walls of well-dressed laterite blocks running perpendicularly as well as parallel to the river Zuari. At some places the walls lie buried in the sediment and have also been discontinued. Several bastions occur at regular intervals along one wall; six stone steps lead from the shore to the main wall.

Introduction

Maritime Archaeology is an inter-disciplinary study and also termed as Underwater Archaeology or Nautical Archaeology. The main objective of 'nautical archaeology' is to study different types of seagoing vessels, their construction techniques and various kinds of usages, whereas 'maritime archaeology' encompasses all kinds of maritime activities, which includes trade, commerce, exchange, water transport technology, seafaring, coastal settlement, ports and harbours. There are a number of port-towns and other habitational sites, which existed in the past, but may be now either under the sea or away from the sea due to relative changes in sea level and any other reasons. Similarly, several ships have wrecked in shallow and deep waters due to inexperienced navigation, natural calamities, warfare, overloading, etc. The rapid industrialisation and harbour development activities in coastal zones may destroy the evidence of bygone civilizations forever. It is therefore, imperative to make, maritime archaeological investigations mandatory in the coastal zone, where any kind of developmental activities are taking place, such as development of ports, harbours, industry, tourism etc. Antiquities and artefacts lying in underwater are our cultural heritage.

It is the responsibility of maritime archaeologist to bring them to lime light and preserve them for posterity.

Maritime History of Goa

Goa is almost triangular in shape and whole of the western side is surrounded by the Arabian Sea and the rest area by the Western Ghats. Goa is identified as 'Aegidii' or 'Aegidioi' by the author of the Periplus of the Erythraean Sea (AD 100) (Schoff, 1974), Kouba or Kowa by Ptolemy, the Greek Geographer of AD 150 (McCrinkle, 1885) and Gowa by Pliny. Chandrapura, the modern Chandor on the bank of river Paroda, (a tributary of the Zuari) was the oldest port of Goa. The excavation at Chandrapura has yielded the Satavahana bricks and pottery, which are assignable to the 2nd century BC (Heras, 1932). The other ports were Vallipattana and Revatidwipa (present Redi) in Maharashtra from where ships sailed up to the African and Arabian coasts for trading cotton goods, diamonds, precious stones, spices and perfumes (Shirodkar, 1990). The Gopaka copper plate of Jayakesi-I of the Kadamba dynasty mentions that the capital was shifted from Chandrapura to Gopakapattana around AD 1049 probably this was due to silting of the river. The finding

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of Roman coins, amphorae sherds and pottery from Pilar tank near Gopakapattana indicate that Roman ships were called in ports of Goa during the Satavahana period (Costa, 1997). The Shilaharas and Kadambas were maritime powers and had maintained their trade contacts with West Asia and East African countries (Gune, 1990). Further, the maritime activity of this region has been reflected in four memorial stones in which scenes of naval battle with ships have been depicted and these stones are exhibited in the Archaeological Museum, Old Goa. The series of naval attacks of the Kadambas of Goa on North Konkan during the 12th century have probably been depicted on these memorial stones (Rajagopalan, 1987).

Afonso de Albuquerque, the Portuguese ruler conquered Goa in AD 1510 from Adil Shahi Sultan of Bijapur not only to rule Goa but also to capture the shipbuilding industry of Goa and adjoining regions. During the Portuguese regime merchants from Arab countries, China, Java, Maldives, Mozambique and Sri Lanka visited Old Goa for trade and commerce because Old Goa was the main commercial city. Old Goa had also shipbuilding yard, garrison, mint etc. The shipbuilding centres of Portuguese India were at Bassein, Cochin, Daman and Old Goa. The dockyard at Old Goa was the most organised naval organisation of the Portuguese regime. The important ships that were built in Goa shipyard were *Nau Cinco Chagas*, *Galeao Bom Jesus*, *Madre de Deus* and *Nau S. Joao Baptista*. The ships plied between India and Portugal were usually had a capacity of 400 tons. The tonnage of ships exceeded up to 600 tons after AD 1570 (Mathew, 1988).

Shipwrecks in Goa Waters

Unfortunately information on shipwrecks in Goa waters prior to the Portuguese period is not available. The Marine and other Portuguese records related to shipping which are kept at the India House, Lisbon, states that in between AD 1497 to 1612 a number of ships were wrecked during their voyage from Portugal to Goa and back (Mathew, 1988). Similar records are housed at the Goa State Archives, Panaji; indicate a majority of shipwrecks have occurred in the shallow waters off Goa mainly due to uneven topography and severe storms. A number of marine records mention

that maximum Portuguese ships have been wrecked at the sand bar of the river Mondovi. A ships were wrecked in Goa waters, are *S. Cristovam* wrecked in storm on 17th August 1594 while coming back to Goa. The nau *Santo Andre* left Lisbon under the command of Brito de Melo on 17th February 1607 and reached Goa in May 1608 and wrecked at a bank off Goa. The other Portuguese ships namely *Nossa Sra Dos* and *Remedios* sunk on the bank off Goa on 28th January 1616 in a storm and the people onboard were saved; however, the cargo was lost (Gudigar and Sundaresh, 1992). Twelve Portuguese ships were bound to Calcutta (Kolkata) sank near Aguada bay off Goa. Similarly seven smaller ships were lost at Nerul River in April 1648 during cyclonic wind and one million xerafins were lost. In 1651, five Portuguese sailing ships namely the *St. Helena*, *S. Joan*, *Evangelista*, *St. Francisco* and *St. Thome* set sail from Portugal to Goa, only two ships could reach Goa coast and they were also wrecked in storm on 10th March 1651. A Portuguese *Pataxo Santa Tereza de Jesus* was ready to sail to Bassein and Chaul but sank in the bar off Goa on 18th May 1658. Some cargo was saved and some was robbed. There was a small bag of precious stones onboard Manoel Dias that went down in the sea. This ship was carrying Royal money and other goods (Chauhan, 1988). Similarly, the *Brig Champion* wrecked at the sandbars near the entrance to Goa waters in September 1862.

Shipwreck explorations

Underwater explorations have been carried out off Sunchi Reef and St George's Reef, Grande Island, Baga, Old Goa and onshore explorations at Gopakapattana. The nature of seabed, current pattern, water depths and visibility are different from site to site. The findings of Sunchi Reef, St George's Reef Grande Island, Baga, Old Goa and Gopakapattana have been described below.

Sunchi Reef

Sunchi Reef region is shallow, full of laterite boulders both smaller and bigger and falls under high-energy zone. A large area was thoroughly explored at a water depth of 3 to 6 m and more (Fig. 1). The remains of the wreck is scattered in a large area. In course of underwater exploration a barrel of a handgun, four cast

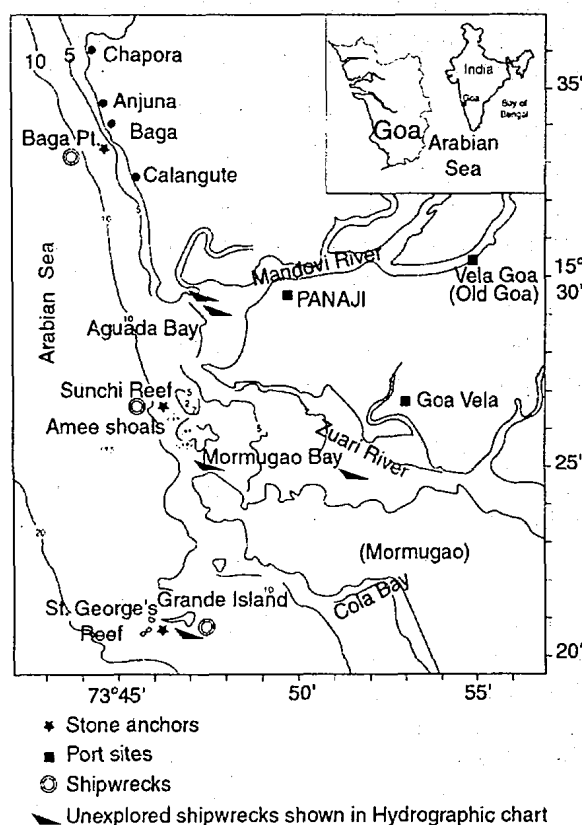
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iron guns, an iron shot, stone ware sherds (Martaban pottery), bases of glass bottles, elephant tusks of different sizes, hippopotamus teeth, metal handle and dressed granite stone blocks were recovered (Sila Tripathi et al., 2004).

The brass barrel of a handgun was trapped and half buried below the dressed granite blocks. Its length is 56 cm and weights 2.200 kg. The thickness of the barrel is more at the back than the front side. The barrel has two notches, out of these, the one on the front side is intact and the other on the back is broken which are meant for fixing screws to the wooden part provided below the handgun. It has got screw thread at the back-side for fixing the wooden part of the gun. The gun and other wooden parts attached to the barrel are missing. No other remains of the gun were found in the nearby area. The length of each gun is approximately 2 m and the exteriors of guns are heavily encrusted and overgrown with barnacles and mussels. The muzzles of two guns are lying horizontally on the seabed whereas the rest two are angled towards the seabed (Pl. 23). The guns have swivels on both sides but do not have any lifting rings, have two reinforcements and the chase. As these guns are smaller in size can be easily transported and fired from close range. Similar kinds of guns have been kept in the Archaeological Museum at Old Goa and at various places in and around Goa. The cast iron shot of 1.218 gm was found on the western side of the guns. The surface of the shot is uneven, slightly conical at the top, flat at the base. After retrieval cracks have formed due to dehydration and the interior portion of the shot is fully rusted. Further, due to the flaking nature marine water has seeped inside the shot. Subsequently water was removed from the shot in the lab. A two fluked long iron anchor found in the nearby zone of the guns, which has fallen in between laterite boulders. Barnacle and other marine growth have taken place. Similar size and shape of anchors are kept in the Archaeological Museum at Old Goa and Goa State Museum, Panaji (Sila Tripathi et al., 2003a).

The exploration led to recovery of eight elephant tusks measuring from 65 to 32 cm in length. All these tusks were buried in the sediment and only small portion was visible. Out of the eight tusks two are inscribed,

one has 3 English letters "ICM", out of which "CM" is visible clearly and the first letter "I" has been worn out. The second tusk has some geometrical designs (Pl. 24). These tusks have been underwater for a long duration and have become soft, brittle, flaky and degraded. Further, nine hippopotamus teeth of different sizes were unearthed which were also partly buried in the seabed, on the east and Northeast side of the guns (Pl. 25). As these teeth were in underwater for long period hence have turned brownish, originally these were white. Marine growth is also present on these teeth.



1. Sites where marine archaeological explorations have been carried out.

Survey in the adjoining area brought to light stone ware 'Martaban' potsherds belong to rims having loop handles, bases, lids and body parts (Pl. 26), which were lying either in the crevices of laterite or partly buried in the sediment. Due to long exposure to marine environment paint and glaze coat has been washed out whereas on some sherds still the dark brown glaze coat

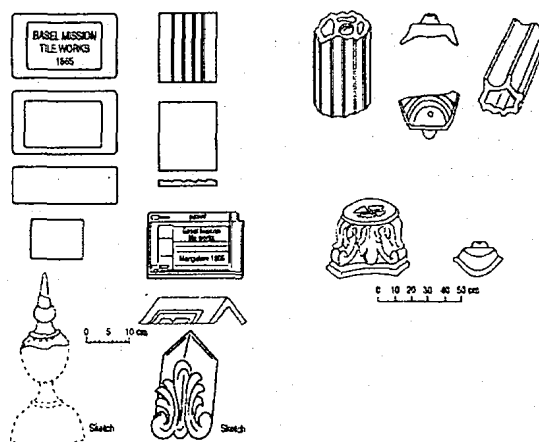
is present. From the size and shape of these sherds it indicates they belong to storage jars. In addition to the loop handles on rims, sherds with dark brown glaze coat, raised dots around the neck, linear glaze coat designs and projected floral designs have been collected during exploration from the wreck-site. Thermo luminescence date of pottery shows that they are 360 ± 40 years old.

A number of square and round glass bottle bases were also recovered from the same site. All are dark green in colour and marine growth is present on them. The exploration also yielded broken Chinese ceramic sherds consists of bases, rims, body parts and lids. Blue on white paintings are present both on inner and outer side of these sherds. Majority of Chinese ceramic are broken and not a single intact jar, bowl or a plate has been found during exploration. Further, a number of dressed granite blocks are also noticed in the wreck site (Pl. 27). These blocks are lying at random over a large area. One of the blocks retrieved which measures $85 \times 43 \times 12$ cm and some are much bigger than this one. It is possible that these blocks were used as ballast. These blocks have been lying underwater for a long period and helped marine organisms to grow on them.

St George's Reef

The St George's Reef is lying on the eastern side of the Grande (Grandi) Island (Fig. 1) and the shipwreck remains are noticed at 15 m water depth containing various types of terracotta building materials such as inscribed chimney bricks, roof, ridge and floor tiles, column capital and drum (Fig. 2) (Sila Tripathi et al., 2003b). These artefacts are scattered over a large area. The bricks are made of white clay, moulded and inscribed; 'Basel Mission Tile Works 1865' on the obverse and the reverse is plain. Some of the floor tiles are also stamped like bricks on the reverse and have four deep grooves while the obverse is plain. The Corinthian type of capital is hollow inside and one end is closed. All these artefacts are well burnt and made of well-levigated clay. Marine growth noticed on all these artefacts. Two long timber of the wrecked ship found near the reef. The timber is having some groove marks on the topside and the lower side is plain and smooth with a 'U' shape. The C^{14} dating ($114.3 \pm 1.5\%$) of the timber belonging to the wreck suggests that the wreck is 115 years old and therefore

the wreck is assignable to the Nineteenth century. The anatomical analysis of wood indicates it to belong to the *Lagerstromia microcarpa* syn *Lagerstromia lanceolata* species, for which the trade name is 'benteak' (Sila Tripathi et al., 2005).



2. Terracotta artefacts retrieved from St George's Reef wreck.

Grande Island

The explorations off Grande Island yielded a steel-hulled cargo vessel with cabin, hatch and bridge (Pl. 28). These are scattered over a large area, probably less than a century old. The cabin is ransacked, its lower deck and hull, which lie, covered by thick layer of sand. It appears that the ship might have sunk in a storm after it lost anchor and drifted towards the rock near the shore of the island.

Baga

Similarly, explorations were carried out off Baga to locate shipwrecks between three to six meter water depths. The underwater exploration off Baga confirmed the existence of a metallic wreck in 6 m water depth. The wreck is buried in the sediment and only a little portion is visible. The sea floor of the diving area is rocky with thick vegetation growth. The shipwreck remains could not be recorded due to poor visibility.

Stone and iron anchors

Besides the shipwreck findings in Sunchi Reef an Indo-Arabian type of stone anchor also found on the eastern side of the wreck. The anchor was trapped in between the laterite. It is made out of laterite, uneven surface and highly fragile state. Its one lower hole is

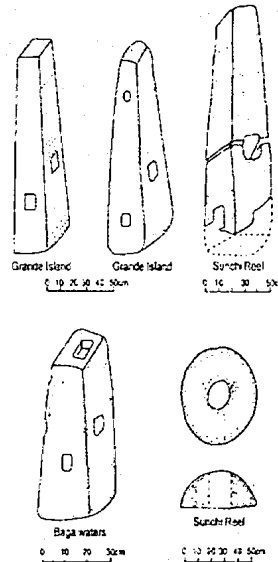
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broken and the other hole is eroded. The stone anchor does not have the upper hole. The length of the anchor is 114 cm and weight 100 kg.

Similarly, two Indo-Arabian types of stone anchors have been retrieved off Grande Island (Fig. 3). The raw material of one stone anchor is sandstone, its length is 108 cm and weight is 113 kg. Deep chisel marks are distinctly visible all over the surface. The upper hole and lower two holes are smaller in comparison with size of the anchor. The upper portion of the anchor is round instead of square. The other stone anchor does not have the upper hole whereas lower holes are present. The raw material of the anchor stone is quartzite sandstone, its total length is 115 cm and weight is 130 kg. The surface of this stone anchor has been nicely chiselled leaving parallel lines all around the surface.

The underwater explorations off Baga yielded a stone anchor having two rectangular piercing with a rectangular cutting on the apex. The total length of the stone anchor is 53cm, weighs 51kg and is made out of tremolite schist. At first glance the anchor stone looks like an Indo-Arabian type of stone anchor, the broader side is trapezoidal in shape and narrower side is nearly rectangular. There are some worn out marks on the anchor surface (Sila Tripathi, 2002). Unlike stone anchors, explorations in Goa water has also brought to light a number of iron anchors. The 'Admiralty Long Shanked' iron anchor has been noticed on the northern side of the guns off Sunchi Reef. The iron anchor is 3.10 m in length and the shank of the anchor is clearly visible where as the arms are lying in between laterite boulders. The anchor does not have the wooden stock, which might have decomposed. Similarly, the swivel ring, which was used for securing the cable, has also been destroyed by corrosion. The length of one fluke is 1.10 m long and other fluke cannot be measured as it is lying in the crevices of the laterite. Heavy barnacle and other marine growth are noticed on the anchor.

Similarly, a 2.65 m long iron anchor with 2.53 m long wooden stock was also found off Aguada bay. Iron nails have been used to join the wooden stock together (Pl. 29). The anatomical analysis of the wooden stock



3. Stone anchors retrieved from Goa waters.

shows that it belongs to the *Tectona grandis* for which the trade name is teak. A thick coat of yellowish cement material has been applied on the surface of the anchor and wooden stock. The anchors of Sunchi Reef and Aguada bay are similar to those are kept at the Archaeological Museum, Old Goa and the anchors which have been retrieved by the Captain of Ports during dredging at the Aguada bar (Sila Tripathi et al., 2003a).

Old Goa

Underwater explorations were carried out between Captain of port jetty and the boatyard of the Pentagon Engineers in the river Mandovi off Old Goa. The riverbed in the region was smooth and covered with thick deposit of fine silt. In course of exploration and air-lifting celadon, Chinese and local made potsherds were recovered. Further, metal detector survey yielded some iron clamps and a shovel, which were buried in the sediment (Sila Tripathi et al., 2002).

Gopakapattana

The onshore exploration and trial excavations at Gopakapattana revealed 3 laterite walls, which are running perpendicular and parallel to the river Zuari. Well-dressed laterite blocks of different sizes have been used for the construction. At some places these walls

are buried in the sediment and are also disturbed. In one of the walls several bastions noticed at regular intervals and six stone steps leading towards the shore side (Pl. 30). Steps are attached to the main wall, but due to seepage of water further excavations could not be carried out to reach to the lowest step. All these stone structures are noticed very close to the royal road of the Kadambas (Gudigar, 2000).

Discussion and Conclusion

Marine archaeological explorations in Goa waters revealed remains of shipwrecks at St George's Reef and Sunchi Reef. The wrecks could have been caused by grounding of the ships in shallow submerged rocks due to human error in navigation or inclement weather. The Sunchi Reef wreck lies in the high-energy shallow water zone and environment of the region is not conducive for the preservation of shipwreck remains. The location of the wreck clearly indicates that the ship struck the submerged rock and subsequently sank. In Sunchi Reef no remains of the ship and cargo have been noticed except pottery, guns, shot, granite blocks, etc which are scattered over a large area. The current action in the working area is strong and some times poor visibility refrains to salvage the remains of the wreck. Iron anchors were used extensively by the Portuguese both in naval and merchant ships during the 16th-18th century AD. The finding of the anchor indicates that the ship of Sunchi Reef cannot be of an Indian origin. Generally, ships carry a number of anchors however in Sunchi Reef wreck has yielded only one anchor. It is not known whether the ship was carrying only one anchor or more.

The discovery of the wreck off St George's Reef has elucidated the history of the *Basel Mission Company* and its trading activities in the past century. The concentration of artefacts on the south and southeastern side of the reef suggests that the ill-fated vessel was coming from the southern side of Goa (either from Mangalore or Calicut) when it struck the reef and foundered. Basel Mission was a missionary organisation of Switzerland that had come to India in AD 1834. The mission had a number of tile factories at different places between Malabar and South Canara; the first of these was set up at Jeppo, Mangalore in AD 1865 (Raghaviah, 1990). The underwater exploration and

metal detector survey did not reveal any metallic anomalies at St George's Reef; it appears that the ship could have been a wooden hulled sailing craft. The timber, which was found near the reef, clearly indicates that the wooden ship might have struck the rock and wrecked.

The Sunchi Reef and St George's Reef wrecks probably are of wooden hulled ships. On the basis of the thermo luminescence dating of pottery (360 ± 40 years) and radiocarbon dating of ivory (740-560 years BP) the wreck at Sunchi Reef may be dated to the Portuguese period (early 17th century AD), whereas the radiocarbon dating of the timber ($114.3 \pm 1.5\%$) of St George's Reef shows the wreck is more than a century old. The findings of Indo-Arabian type of stone anchors in Goa waters indicate that mariners those who had visited ports of Gujarat, Maharashtra, Kerala and Lakshadweep had also called on the ports of Goa, because similar kind of stone anchors have been reported from these places.

The explorations at Gopakapattana have not yielded any datable findings, which can support to date to these structures. On the other hand large-scale explorations and excavations would be helpful to understand these stone structures and purpose of construction. However, the artefacts, which have been displayed at Pilar Museum, Pilar have been collected from Gopakapattana and adjoining region show that Gopakapattana was served as an ancient port. Systematic offshore explorations were carried out in Goa waters mainly for exploration and excavation of shipwrecks in shallow as well as deeper waters. Explorations off Goa water suggest that this region possess rich potential for shipwreck archaeology. Further in-depth explorations should also be carried out at these sites and the results may bring new evidences on the maritime and shipwreck archaeology of Goa. In absence of reports on maritime activities off Goa, the artefacts described in this paper provide new information of this aspect. However, further studies will help to unravel the maritime history of Goa.

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