Exploration of Basel Mission Company shipwreck remains at St George’s Reef off Goa, West Coast of India: impact of the Basel Mission Co. on society and culture

Sila Tripati, Sundaresh, A. S. Gaur, P. Gudigar and S. N. Bandodker
National Institute of Oceanography, Dona Paula, Goa 403 004, India

A systematic exploration of shipwrecks has been carried out in Goa waters since 1997. Exploration off St George’s Reef has brought to light the remains of a shipwreck at a depth of 15 m, containing various types of terracotta artefacts intended for house construction. ‘Basel Mission Tile Works 1865’ is impressed on bricks, roof and floor tiles. Study shows that the company was active in manufacturing terracotta and exported it to Africa, Australia, Borneo, Sumatra, and other countries. It has been renamed ‘Comtrust’, and is still producing terracotta using the same techniques. The impact of the Basel Mission Co. on society and culture is discussed. A study of finds of wrecks in the Mangalore and Calicut areas was undertaken.

© 2003 The Nautical Archaeology Society. Published by Elsevier Ltd. All rights reserved.

Key words: shipwreck, Basel Mission Co., St George’s Reef, Goa, tiles, bricks, terracotta.

Introduction

The underwater excavation of the ship has revealed the design and construction details of numerous types of watercraft. Subsequent to the wreck event parts of the ship and cargo are washed away while other remains are preserved on the seabed. Investigation of a shipwreck is an important component of maritime archaeology; and starts with research into the history of the ship. Many developed and developing countries have made considerable progress in maritime archaeological studies by locating and excavating shipwrecks. India has undertaken systematic exploration of shipwrecks in Goa waters since 1997. These explorations have brought to light shipwreck remains at Sunchi Reef (Sila Tripati et al., 2001), Grande Island and the waters off Baga (Thakkar, 1991).

The earliest record of a shipwreck in Goa waters dates to the 11th century AD. The records of Jayakeshi I (AD 1052) indicate that the ship of Guhalladeva I (AD 980–1005), ruler of Goa, separated off from his fleet and he had to take shelter in the port of Goa (Gune, 1979). Similarly, the Hero Stones depicting naval battle scenes, now housed in the Archaeological Museum (ASI) in Old Goa, confirm the maritime activities of Goa during the Kadamba Period (12–13th century AD). However, information on shipwrecks in Goa waters prior to the Portuguese Period is not available. Portuguese marine records housed in the Goa State Archives at Panaji mention ships in Goa waters wrecked in shallow waters mainly due to severe storms, hidden rocks and sand bars. For instance, 12 Portuguese ships, en route for Calcutta (Kolkata) from Goa sank near Aguada Bay in 1648 owing to a severe storm (Gudigar & Sundaresh, 1992). Further, the Portuguese records housed at India House in Lisbon, state that between AD1497 and 1612, a number of ships were wrecked during their voyages to and from Portugal and Goa (Mathew, 1988).

Description of the survey area

St George’s Reef is located on the eastern side of Grande (Grandi) Island and to the south of Marmagao port (Fig. 1). St George’s Reef, Grande and Pikene islands off Goa appear to be detached portions of coastal headlands, now isolated from the receding coast as a result of erosion or rise in sea level. Even the present Marmagao headlands were once an island. They are now connected to the mainland by a peninsula on...
which stands the town of Vasco-da-Gama (Wagle, 1982). Longshore and tidal currents, accompanied by strong winds blowing from the Arabian Sea, have played an important role in shaping the coastline of Goa. Evidence of sea-level changes in the form of marine platforms and beach rocks in the coastal belt show that at one time the sea encroached on the plains of Goa.

St George’s Reef is submerged during the highest spring tide and has an underwater extension on its southern side. However, during the lowest neap tide the entire surface of the reef can be seen clearly. The seabed around the reef comprises coarse sand, varieties of shell and fine silt. The reef is a navigational hazard. The seabed is loose, hence artefacts have been observed protruding from it. The depth at the work-site varies on account of the gentle slope on the south and south-east side of the reef. Sometimes vigorous currents and winds churn the sediment and reduce visibility here.

**Methodology**

Marine and other related shipping records that are housed in almost all archives in India form the primary sources of information on shipwrecks. The Naval Hydrographic Survey charts also provide information on the location of shipwrecks. Based on the available data, a search for wrecks in the most likely area was initiated. The help of local divers was crucial.

Swim line and circular search patterns were adopted for exploration of St George’s Reef. During the course of this attention was paid to the occurrence of natural features such as outcrops of rock, seabed topography, water depth and current direction. The entire area was covered comprehensively in order to understand the distribution and extent of the wreck-site. The smaller and important artefacts suitable for retrieval were collected for study and analysis.

One-metre-long ‘T’-shaped iron rods were used to probe the reef to gauge the extent of the wreck-site and to understand the nature of the seabed around it. During probing, the utmost care was taken to prevent possible damage to buried archaeological objects. From a base point ‘T’ pegs were fixed on the east, south and south-western flanks and connected with rope, and their positions carefully checked and charted. Surveys using Pulse 12 boat-towed and Pulse 8 hand-held metal detectors were carried out in all directions within the site to record metallic anomalies. At some locations airlifting was carried out to ascertain the stratigraphy of the seabed and to ascertain how deeply artefacts were embedded. After ascertaining the distribution of objects, positions were taken using GPS (Magellan model NAV 5000 DLX), followed by systematic underwater exploration, documentation, recording and excavation.

**Results**

St George’s Reef slopes towards the south and south-east (Fig. 2). The remains of the wreck lie scattered in 15 m of water. Visual exploration revealed a large number of terracotta artefacts, such as a hollow column drum, chimney bricks, roof, ridge, and floor tiles, a column capital and drainage pipes (Fig. 3a–b) as well as a timber from the ship (Sila Tripati, 1998). These artefacts are scattered over a large area, with the highest number on the south and south-east side of the reef. Due to the purity of this region’s water, biological growths such as coral and orange-coloured sponge are notable. The metal detector survey did not reveal any metal anomalies, thereby indicating that the ship was probably a Country craft built of wood. Near the reef the airlifting operation was carried out to as much as 1 m below the surface of the seabed. Excavation revealed more broken roof tiles than floor tiles. Bigger pieces of tile were noticed in the upper layer, whereas fragments were found in the lower layer of the seabed. However, bricks and brick-bats were not seen during airlifting operations. Tiles and other artefacts had turned black due to long burial in the seabed. During the airlifting operation it was observed that the lowest stratum consisted of a variety of shells, barnacles, urchins, dead mussels, and compact sticky clay.
The finds

Floor tiles

The floor tiles are square with four deep grooves at regular distances and are stamped at one corner (Fig. 4). These grooves provide a grip; hence this side was to be placed on the subfloor. Floor tiles are more numerous than bricks, roof tiles and other terracotta artefacts. Each tile measures $220 \times 220 \times 20$ mm.
Bricks

Bricks are made of white clay and are used for the chimneys in surviving houses of this period. The words ‘Basel Mission Company 1865’ are stamped only on one side (Fig. 5). The bricks have a frog and measure 230 × 115 × 60 mm.

Megascopic study showed that the brick consists of coarse quartz grains (angular to sub angular in shape). The grains show a variety of colours, which are predominantly white, and a shade of pink. They are bonded together by cementing material, which is white in colour. Microscopic examination of a brick section was
carried out. A thin section showed a variety of grains among which quartz is predominant. Most of the grains are angular to sub-angular in shape. The size of grains varies from fine to coarse; fine grains comprise less than 20%, whereas coarse grains comprise 70 to 80% of the total. Other brown and opaque minerals observed in very negligible quantity (1 to 2%) are cementing material. Some portion of the section shows red coloration. Cementing material is also siliceous.

On the basis of these analyses it can be inferred that the bricks were made from local sands derived from acid plutonic rocks such as granite, granite gneiss and quartz veins. The material has not been subjected to lengthy transportation, as is evident from their angularity and coarse nature. The optical properties of quartz grains point to their derivation from quartzitic rocks. The nature of the cementing material can be confirmed by X-ray diffraction analysis.

Roof tiles
The words *Basel Mission Company 1865* are stamped on the under side of all the roof tiles. These tiles are lighter than other artefacts, and hence are more broken. Each tile measures 400 × 230 mm.

Column capital
The capital is hollow inside, and one end is closed. It is of Corinthian type. Four supports were fixed inside it to provide additional strength, and appear to intersect (Fig. 6). Prolific marine growth was noted on the outer surface. The lower end of the capital, which would rest on a fluted column, is circular while the top on which the lintel was to be placed is square.

Drum
The height and circumference of the hollow column drum are 300 and 900 mm, respectively. It is fluted and partly broken (Fig. 7). It fits the capital and was photographed with it *in situ* before retrieval for further study.

Timber
A single timber. It has a maximum length of 2 m, width of 180 mm and thickness of 160 mm (Fig. 8) (Sila Tripati, 1999). Its ‘U’ form and longitudinal rabbets suggest that it is part of the keel of the ship. The rabbets are 50 mm deep and the hog between is 100 mm wide (Fig. 9). One end is well preserved and has the remains of a carefully worked scarf with incuts from a chisel and nail holes. There are two nails on the lower side suggesting that a false keel or sheathing was fitted to it. Wood borers have destroyed the other end. This timber survived because it was partly buried.
in sediment within the reef and was not affected by current action. From the timber it is possible to infer that the ship was not large and had a wooden hull with 50 mm (2 inch) planking. It is assumed that the wreck broke up and all the other wood and organic materials were either washed away or destroyed by teredo. A small piece was collected from the timber for radiocarbon dating and botanical identification. The timber is still lying on the seabed. The timber is very degraded and affected by wood borers, hence the growth rate cannot be gauged. The result of radiocarbon dating of the sample by Dr G. Rajagopalan at the Birbal Sahni Institute of Palaeobotany, Lucknow, is a date of 114±3 ± 1.5%. The timber has been identified by Dr R. V. Rao, Institute of Wood Science and Technology, Bangalore, as belonging to the Lagerstroemia lancealata species, for which the trade name is bentek.

**Discussion**

Several ships are known to have sunk in Goa waters but not all of these are marked on hydrographic charts or mentioned in marine records kept in the Goa State Archives. Moreover, even when wrecks are shown on charts their nationality and date of wrecking are not indicated. The St George’s Reef wreck is not mentioned in any records.

The discovery of the wreck has elucidated the history of the Basel Mission Company and its trading activities in the past century. The wreck could have occurred when the ship struck the shallow submerged reef, or as a result of human error in navigation or inclement weather. The concentration of artefacts on the south and southeastern side of the reef suggest that the ill-fated vessel was coming from the southern side of Goa (Mangalore or Calicut) when it struck the reef and foundered.

Exploration yielded only one column capital, drum, ridge tile and basin. These artefacts were buried in the sediment. The column drum and capital are hollow for practical reasons: they use less clay; they are less likely to crack under shrinking stresses in firing; and they are lighter to transport. Furthermore, during erection of columns wooden posts were inserted inside them to provide additional strength.

The roof and ridge tiles are light and elegant in appearance. In addition they are cheaper, durable, more easily laid than conventional tiles due to their double interlocking design. When properly fitted they make a long-lasting, perfectly wind resistant and watertight roof. To cover 100 sq. ft. 130–140 tiles are required, depending upon the spacing. Each ridge tile covers two flat tiles on...
each side of a pitched roof. The tiles are turned out by machinery to achieve a high level of strength, finish, overlap and catch groove. Floor tiles are plain and destined for houses, offices, warehouses and factories. These tiles were in great demand as inexpensive hard-wearing material for flooring. All the artefacts are made from well-levigated clay and well fired. They do not show any spalling, cracking or other defects despite lengthy burial in a marine environment. However, marine growth has developed on them. For this reason our measurements may not be precisely identical to the factory standards.

Although the stamp *Basel Mission Company* was not found on all the artefacts, it is presumed that all were the products of this company. Similar artefacts can still be seen in old Portuguese houses in Goa.

The keel timber found on the site indicates that the ship did strike the reef and founder. Manual exploration and metal detector survey did not reveal any metallic anomalies such as a propeller or boiler, so the vessel appears to having been a sailing ship. The quantity of artefacts lying on the surface as well as buried in the seabed could be the full consignment of a Country craft. However, the exploration has so far been confined to a limited area. It appears that the vessel was loaded with only terracotta artefacts intended for house construction.

**The Basel Mission Co. and its impact on society and culture**

Since the cargo belongs to the Basel Mission Co., it is important to trace its origin and other activities. The company was established in 1834 by German missionaries from Basel, Switzerland. Along with their missionary activities, they also ventured in industrial activities. The Basel Mission Co. set up a printing press in 1841 and weaving industry in 1844. Further, they established their first tile factory at Jeppo, Mangalore in 1865, and subsequently at Calicut, Kudroli, Malpe, Codacal, Palghat, and Feroke (Fig. 10). Easy access to raw material and transport facilities led the company to set up tile factories in these areas. This was their first industrial venture on the Malabar coast of India (*Raghaviah, 1990*). Initially, bullock carts transported the tiles; subsequently boats were used for transportation (*Hofmann, 1913*).

The manufacture of tiles was a centuries-old occupation of potters in southern India. The Portuguese traveller, Duarte Barbosa who visited the Malabar coast between 1510 and 1531 made the following observation on potters (*Barbosa, 1970*), ‘Their business is to work at baked clay and tiles covering houses with which the temples and royal buildings are roofed and by law no other person may roof their houses except with palm branches’. George Plebst studied the technique of tile-making, including treatment of clay, glazing, construction of the kiln and firing process. Raw material for manufacture of tiles, namely clay or feldspar, was abundantly available on the banks of the River Netravati in Mangalore. The company introduced further technical changes in the manufacture of tiles; these included salt glazes, and gas-fired kilns in order to obtain uniform temperatures (*Bliss, 1890*). Subsequently, the company manufactured ridge tiles, both plain and ornamental, skylights and ventilators, ridge and hip terminals, finials of various kind, hanging wall tiles, ceiling tiles of many different designs, *houdris* or ceiling slabs, hollow bricks, plain and ornamental floor tiles, chimney bricks, salt-glazed stoneware, earthenware, drainage pipes, terracotta vases, flower vases and architectural terracotta items.

The Basel Mission Company introduced a fully mechanised system of manufacturing tiles, extending to mixing of clay, pressing to shape, cutting blocks, drying and firing, all of which was in earlier times done manually by potters. Tiles were exported throughout India, British East Africa, Aden, Basra, Sumatra, Borneo, and Australia (*Hofmann, 1913*). They were also exported to German colonies in Africa, as is revealed by a statement by the agent of the Basel Mission (*Raghaviah, 1990*). From the entrepot of Bombay they were exported to other parts of the country. The company also operated in other parts of the world, namely Ghana, Borneo and China, but their industrial base remained strongest on the western coast of India because of low investment costs and ready availability of manpower.

The Church-oriented Pietistic Movement was established in 1780. In Basel a society named the German Christian Society was formed with the objective of restructuring the Christianity of the world. Basel was selected as the headquarters of the Society. Basel was located on one of the main trade routes connecting France, Belgium, and Germany. The Basel Mission was founded in 1816 to train missionaries and it was supported by
Basel-based members. The Basel Mission started its work in 1834 in India at Mangalore. The Mission stressed that every convert would be educated. Further, the converts were asked to provide labour for industrial activity. The Basel Mission established industrial enterprises in Malabar and south Canara for the converts. The Church records of Codacal Parish in south Malabar state that the converts were predominantly from lower castes. The Mission was even succeeded in converting Muslims in small numbers. Apart from achieving social mobility the industrial labour had the added advantage of lessening social stratification among the converts. The general atmosphere of the Mission industries where converts from lower and higher castes worked side by side helped in the eradication of caste prejudices. Moreover, the Basel missionaries took the initiative in arranging marriages between converts from different castes.

Figure 10. Map showing the location of Basel Mission industrial activities along the Karnataka and Kerala coasts of India. (Drawing: S. B. Chitari)

The industrial activity of the Basel Mission can be divided into three phases. The early phase (1834–1852) begins with the arrival of missionaries in the Malabar coast in 1834. Industrial activities, mainly local crafts, started from 1846 onwards. In the middle phase the industrial activities increased. Handloom weaving, printing press, and mechanical workshops were established in the Mangalore region. This period witnessed the trading activity of the Basel Mission.

In 1846 the Industrial Commission was established by the Mission in order to control centrally its industrial activities. During the last phase (1882–1914) the Commission was amalgamated with the missionaries who promoted higher capital investment and expansion of industrial activities on the Malabar coast. However, in 1914 with the outbreak of the First World War, the industrial activity came to an
end. In 1919 as fallout of the First World War the Basel Mission industries were taken over by the British Government. A new company, the Commonwealth Trust, was incorporated to look after commercial ventures not only in India but also in coastal Africa. In 1977 the company passed into Indian hands, governed by an Indian Board of Directors and the Commonwealth Trust (India) Ltd, or Comtrust, came into being. Over the years Comtrust witnessed two World Wars, and both European and Indian rule. What remains intact is Comtrust, which has been a socially responsible company from its origins in the mid-19th century.

Although the company retains no specimens of products made in the 19th century, there is ample historical evidence for Basel Mission and its manufactures. The period 1865 witnessed a change in the manufacturing of tiles and other artefacts in the western India. This change had a strong impact on the traditional potters who suffered as a result. Today there are five Comtrust factories producing over a lakh of tiles a day and Comtrust tiles adorn some of the best-known landmarks in India and abroad. Comtrust has been following the same methods in selecting and sieving of clay as the Basel Mission Co. had adopted and still today the converts (both men and women) are working there. Moreover, Comtrust has maintained the same quality and standard of production. Today there is little demand for terracotta columns and Comtrust is involved in producing only tiles, bricks, flower pots, vases, ceiling slabs, and ventilators.

Conclusion

The impact made by Basel Mission industrial efforts in terms of transfer of techniques is undeniable. This resulted in the systematic application of new technical knowledge to indigenous industrial activities. The systematic offshore exploration of St George’s Reef has brought to light an undocumented wreck of the company and suggests that it was transporting its products in Country wooden ships. This is the first vessel used by the company to be identified by underwater excavation and dates to its period of expansion in the mid-19th century. Further investigations at this site may provide more information. Similarly, underwater searches carried out in Kerala and Karnataka waters may identify other shipwrecks of the Basel Mission Co.

Acknowledgements

The authors express their deep sense of gratitude to Dr E. Desa, Director of the National Institute of Oceanography, and Shri K. H. Vora, Scientist-in-Charge, Marine Archaeology Centre for their encouragement on this field. Our special thanks go to Dr Malti Nagar, Deccan College, Pune, Dr Timothy Walker, Boston University, for valuable suggestions on the manuscript, to Dr G. Rajagopalan, Dy. Director, Birbal Sahni Institute of Palaeobotany, Lucknow, for providing the C14 dating of the timber, Dr R. V. Rao, Institute of Wood Science and Technology, Bangalore for anatomical analysis of timber, and to our colleagues for their support in the field. Special thanks go to the Department of Ocean Development, Government of India for funding this project.

Note

[1] Lucknow Laboratory no. BS-1582; measured 14C Age T1=5570 ± 30 years.

References


