

# Recent Underwater Explorations at Dwarka and Surroundings of Okha Mandal

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## Abstract

Onshore explorations were carried out in Dwarka, Bet Dwarka, Aramda, Kachhigadhi, Okhamadi and Amrapura area. At Dwarka about 1.6 km<sup>2</sup> area was explored between water depths of 1.5 to 20 m off Samudranarayan temple. Diving was carried out at about 40 locations and 29 buoys were marked with the archaeological findings. Similarly underwater explorations were also undertaken in north and south of the present Bet Dwarka jetty at five different locations. Archaeological findings of the exploration in 1998 have been reported in this paper.

## Introduction

The present paper reports the results of underwater exploration carried out in Dwarka and Bet Dwarka waters in 1998 to ascertain the extent of stone structures and anchors beyond the 10 m water depth off Dwarka, and some new evidence from Bet Dwarka. Onshore explorations at Dwarka, Bet Dwarka and Aramda brought to light evidence on maritime activities such as stone anchors, dockyard and boat motifs.

## Previous Works

The excavation at Dwarka by Deccan College, Pune (1963) revealed antiquities datable to the 1st-2nd century B.C./ A.D. (Ansari and Mate 1966). Excavation by the Archaeological Survey of India (1979-80) in the forecourt of Dwarkadhish temple uncovered the remains of a Vishnu temple datable to the 9th century A.D. Further digging revealed a habitation belonging to the 1st century B.C./ A.D. (Rao 1990: 63). The earliest settlement of mid-second millennium B.C. was noticed in layer 10A and 11 in trench DWK 3 which yielded Lustrous Red Ware of the 15th century B.C. (IAR 1979-80) which might be contemporary with the *Mahabharata*.

The Marine Archaeology Centre of the National Institute of Oceanography (NIO) has been carrying out underwater explorations off Dwarka regularly since 1983. A large number of dressed stone blocks of different shapes and sizes were noticed at water depths of 3-7 m. (Rao 1987; Rao *et al.* 1994). The most important findings include a large number of stone anchors that signify the volume of maritime activities at Dwarka since the Early Historic period.

Geophysical survey was carried out in 1989 at 3 to 20 m water depths. The echograms revealed that the nature of seabed is generally uneven and rough. The most prominent feature observed is a channel in the form of symmetrical/asymmetrical cuttings (Vora *et al.* 1991).

Earlier excavation near Nilakantha Mahadev temple behind Dhingesvar Mahadev at Bet Dwarka Island revealed an early historic settlement. Onshore explorations in 1979 (IAR 1979-80: 29) revealed a number of potsherds belonging to the protohistoric (2000 B.C.) period in the cliff sections near Siddi Bawa Pir on the southeast point of the island. Marine archaeological explorations since 1981 yielded a large quantity of pottery (Rao and Gaur 1992; Gaur 1990; Gaur *et al.* 1994) and other antiquities (Rao 1990) of the late Harappan period (2000 -1500 B.C.). During the above exploration stone anchors were not found.

## Methodology

Onshore and intertidal surveys were made in Dwarka, Bet Dwarka, Aramda, Sakkarkheda and Okha Madhi to look for the possible important archaeological locations for underwater exploration. At Aramda only onshore exploration was undertaken. While carrying out coastal archaeological surveys, features such as cliff sections containing human habitation relating to marine archaeological studies were noticed. These explorations were carried out by checking coasts between Aramda and Kachchhigadi. Important archaeological findings were documented by photographs and drawings and GPS positions of these locations were recorded.

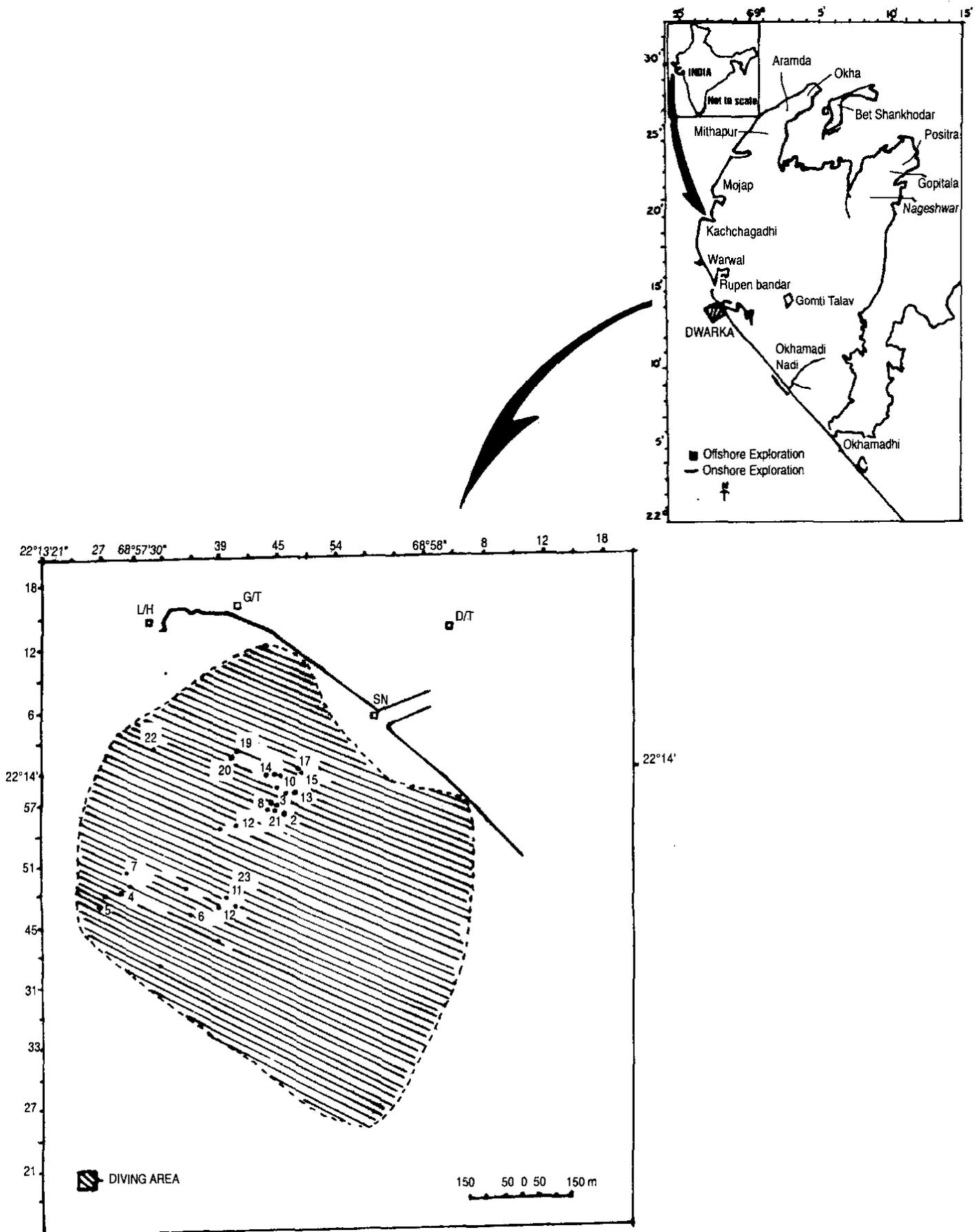


Fig. 1: Okha Mandal area: locations of onshore and offshore examples

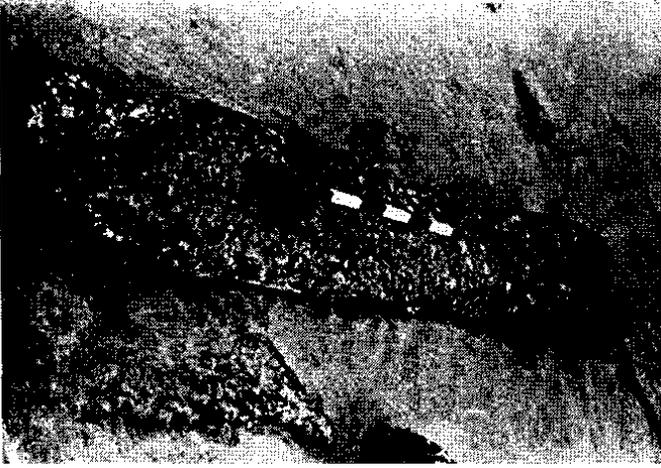


Fig. 2: Grapnel stone anchor in intertidal zone at Dwarka

Diving operations were initiated from a convenient place in front of Samudranarayan temple and were gradually extended along the coast as well as towards deeper waters. Each diving team covered an area within a circle of about 50 m radius. Diving was undertaken at several places in shallow waters (1.5 m to 8 m) and at eight locations in deep waters (10 to 20 m). A buoy was tied to each location wherever archaeological objects such as structures and anchors were noticed. Underwater findings were recorded by using an underwater TV camera and a still camera. Each object was drawn on a different tracing sheet.

### Dwarka

Intertidal zone explorations were undertaken between the lighthouse in the north and Sakkarkheda in the south. Offshore exploration was concentrated opposite to the present Dwarka town near the lighthouse to the south of river Gomati (Fig. 1).

#### Intertidal Zone Exploration

Four stone anchors were noticed during low tide in Dwarka waters. Among them three grapnel type anchors were lying about 0.5 m underwater even during low tide. They have a circular upper hole (rope hole) and two square holes below (Fig. 2). Grapnel anchors are made out of locally available sandstone. A broken triangular anchor lying on a rocky beach area and exposed during low tide is made of sandstone. The presence of several anchors in the intertidal zone suggests that these anchors were also used as mooring stones for boats.

A single-holed stone object was noticed further south of these anchors. It is lying at a higher area compare to the anchors. This is perfectly conical in shape with a circular hole in the centre. The chisel marks in the hole were also noticed. It is made out of conglomerate and is reddish in

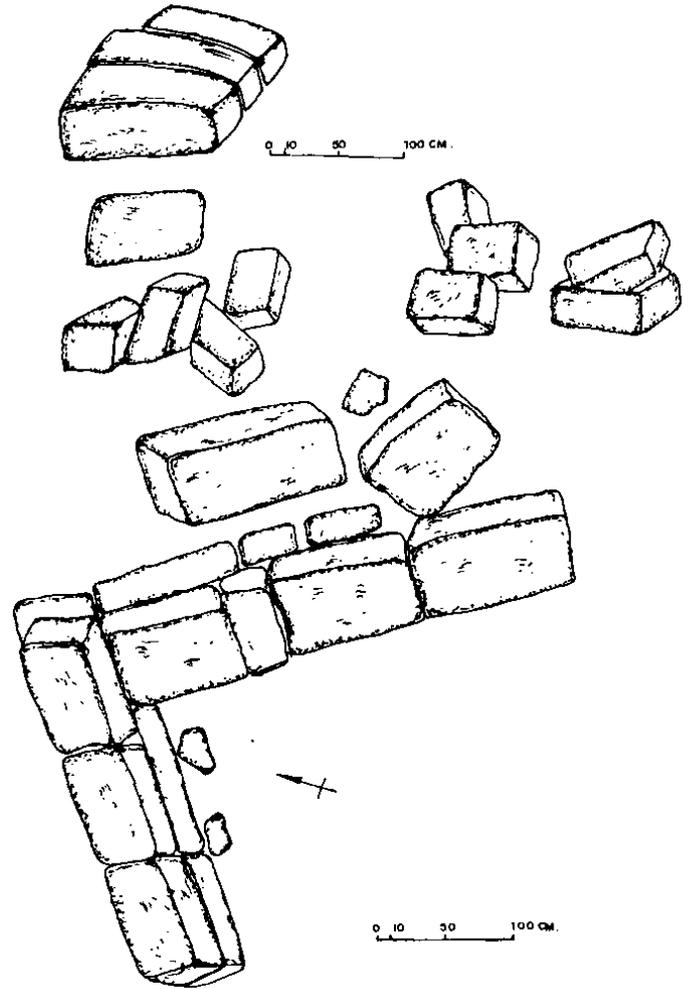


Fig. 3: L-shaped stonewall in Dwarka waters

colour. The object appears to be unused as there are no rope marks or marks of erosion.

#### Offshore Explorations

Diving operations were undertaken in an area of 1.6 km<sup>2</sup> (22° 13' 27" to 22° 14' 08" N; 68° 57' 24" to 68° 58' 06" E). A total of 173 dives spanning over nearly 123 hours were carried out at various water depths with a maximum depth of 23 m.

A large number of scattered stone blocks were noticed opposite to the river Gomati. Three fallen walls at buoy nos. 3, 10 and 15 were noticed. An intact L-shaped wall was noticed at buoy no. 15 (Fig. 3). The wall measured 3.25 m in the north-south direction and 2.5 m in the east-west direction. The maximum width was 50 cm. The average size of a stone block was 100 x 50 cm. A few more scattered blocks were observed near this structure. Several rectangular stone blocks were found at buoy no. 3 and most of them were buried in the sediments. The average size of the blocks is 90 x 50 cm. A number of similarly scattered

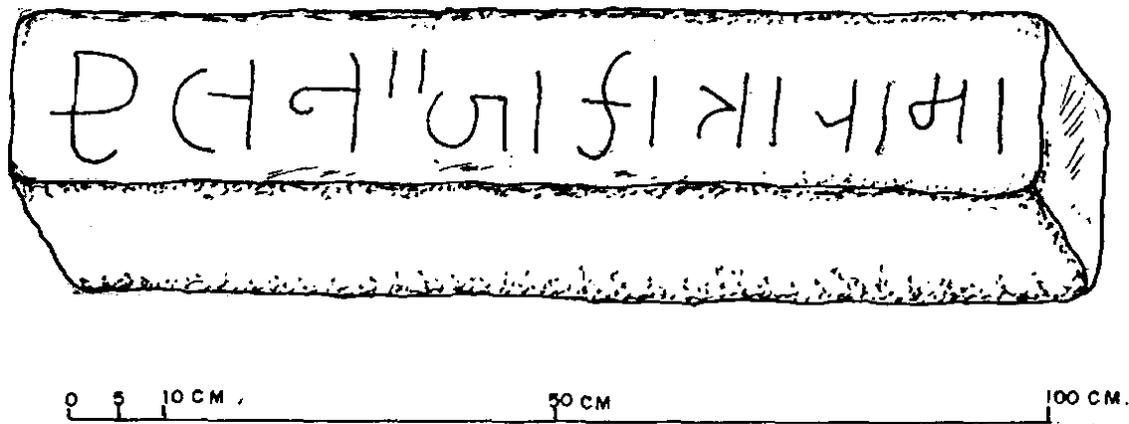


Fig. 4: Gujarati inscription on a stone block found off Dwarka

stone blocks were found at buoy no. 10. The average size of these blocks is about 100 x 50 cm. Several scattered stone blocks were found at buoy no. 13. These are either 50 x 20 cm or 100 x 50 cm in size. A stone block measuring 100 x 20 cm with a Gujarati script was also noticed at buoy no. 17 (Fig. 4).

Three bastions were also located at buoys 8, 13 and 24. The bastions at buoy no. 8 and 13 were covered with sand while a bastion at buoy no. 24 was exposed. The height of the bastion is 85 cm. and width of one block was 40 cm; several other rectangular and square stone blocks were noticed in its surroundings. A triangular stone anchor was noticed at buoy no. 2. The remaining buoys represent a large number of rectangular, square and also irregular stone blocks.

A rocky cliff running parallel to the shoreline for more than 100 m with an average height of 1 m was noticed in water depths of 9-11 m. A few holes were also seen on this

ridge. The maximum height was about 2 m and minimum 0.5 m. The ridge is filled with fine sand, and its the southeastern side is perhaps associated with one of the submerged Gomati river channels (Vora *et al.* 1991). A thick growth of vegetation was also noticed. A two pronged iron anchor was noticed beneath the cliff area; buoy no 17 was tied to it. One grapnel stone anchor was also found at buoy no. 11 near the ridge area. It has a circular hole on the top and two square holes in the bottom. It is postulated that the cliff might be the remnant of ancient shoreline and served as a mooring point for boats.

Three grapnel anchors were noticed in a water depth of 6-8 m. These anchors have a circular upper hole and two square holes below (Fig. 5). All are made out of locally available sandstone. The anchors have a very rough surface. These anchors were trapped in between the rocks. Three broken triangular anchors were noticed in 7 m water depth. They are made out of calcareous rock and have very smooth surface. The presence of a large number of stone anchors (Fig. 6) indicates that Dwarka was very active port in the past. Different types and shapes of anchors suggest that boats of different origins and sizes visited Dwarka. Apart from triangular and grapnel anchors two ring stones were also noticed here. They have a flat bottom and are semi-spherical round on the top. One across hole of 15 cm diameter was noticed. They are made of sandstone.

Diving in 20 m water depth parallel to the shoreline yielded a strip of rocky formation with a width 10-15 m. At a few places it is raised to 1 m and at other places it is buried below 5 to 10 cm thick sand. Seaweed growth was not observed. Fine and white sand towards the shore with occasional rocky patches observed. No significant finding was noticed in this area.



Fig. 5: Grapnel stone anchor from Dwarka waters

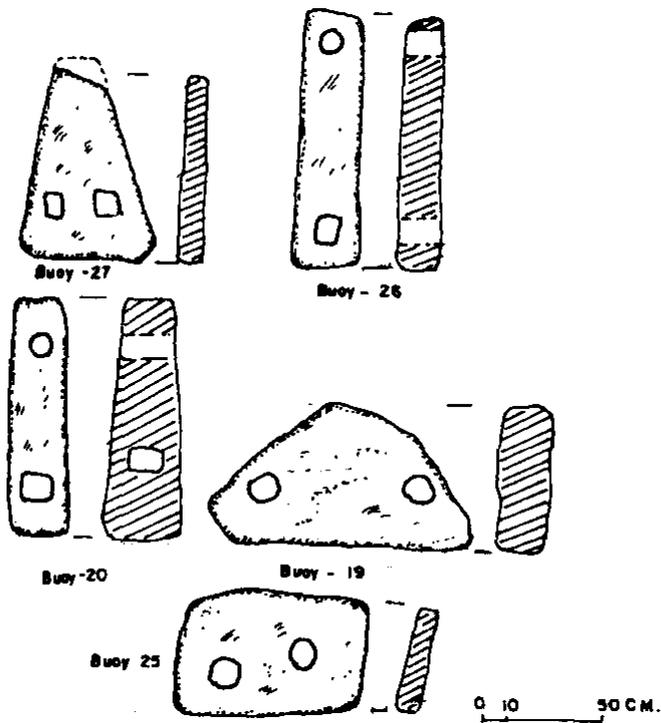


Fig. 6: Stone anchor from Dwarka waters

## Bet Dwarka

### Onshore Exploration

Near-shore explorations were carried out near Khuda Dost tomb where an early historical site was located (Fig. 7). The area is protected from high waves and storm and gets submerged during high tide. A few potsherds in the section were noticed here. Near the Nilakantha Mahadev temple, while digging a water-tank a large quantity of Late Harappan pottery was found. During explorations of BDK-I and II areas, it was observed that the shoreline touches the lower portion of the protohistoric habitation during the



Fig. 7: Historic site exposed on Bet Dwarka Island

highest tide. During the low tide two terraces were noticed which usually get submerged during high tide. A high cliff section towards north of present Bet Dwarka jetty revealed the habitation of medieval period. A large quantity of pottery was also noticed in intertidal zone area.

### Intertidal Zone Exploration

Intertidal zone explorations were carried out to the north and south of the present Bet Dwarka jetty. A broken rectangular stone anchor of reddish colour was noticed at the northern side of the jetty. Its lower half is preserved with two rectangular holes over the rough surface. It is made of locally available conglomerate rock. Two worn out iron cannons were noticed which are presently being used as mooring for the boat. Further north near the Pir tomb one square stone, reddish in colour with a smooth surface and a circular hole in the centre was noticed. It is buried deep in the sediment.

Two stone anchors and two iron cannons were noticed on the southern side of the jetty. A worn out (Fig. 8) stone anchor was noticed at low water line. It is perfectly triangular in shape with rough and uneven surface. A hole on the top is broken and two holes at the bottom are square shaped. The anchor is made of locally available calcareous rock of grey colour. Another rectangular stone anchor was found buried in clays. This is one of the heaviest anchors found at Bet Dwarka. Two holes at the bottom are rectangular and the hole at the top is circular. Rope marks could be seen in the circular hole. This is made of locally available yellow sandstone having a smooth surface. Both these anchors were retrieved. Two cannons were found to be buried in the sediments that are used for mooring.

### Offshore Exploration

A total of 15 dives spanning over 10 hours were undertaken between 1.5 and 6 m water depth. The area is prone to



Fig. 8: Broken triangular stone anchor from intertidal zone at Bet Dwarka

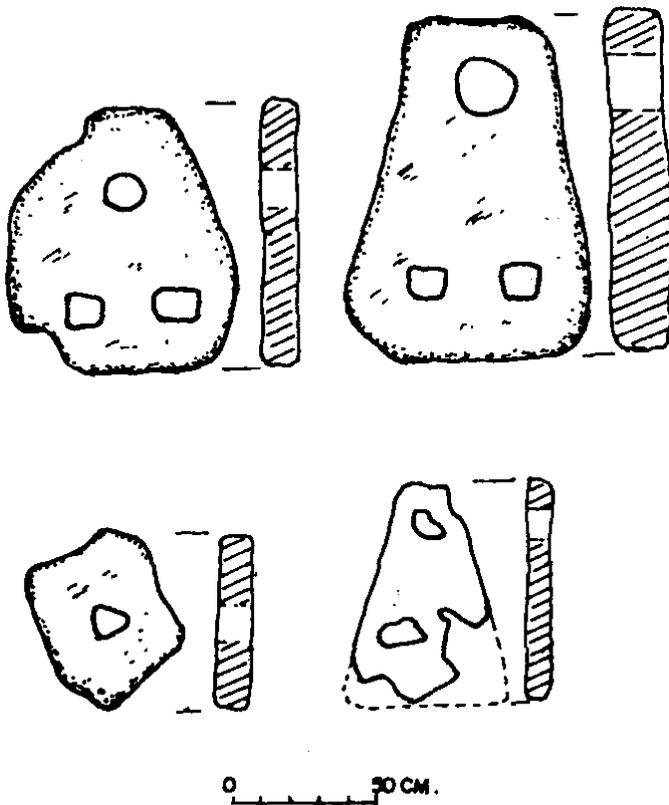


Fig. 9: Stone anchor from Bet Dwarka waters

strong current because it is exposed to open Arabian Sea. Diving is difficult here and hence underwater working time gets limited. Exploration revealed five triangular and worn out stone anchors at water depths of 5-7 m (Fig. 9). They are made of locally available rock and have a rough and uneven surface. Heavy growth of barnacles was noticed on them.

### Armada

The village Armada is located on a high table land about 7 km towards south of Okha port. A creek opens to the sea in the northeastern side of the village. During high tide, a vast area gets submerged. An onshore and intertidal exploration was carried out to search for any remains of an ancient port or harbour in this region.

Three (2 broken and 1 intact) anchors were noticed near the present jetty (Fig. 10). The intact one (Fig. 11) is now being used as mooring stone for large boats. The presence of stone anchors at this place also indicates it to be an important and active port in the past.

An old triangular dockyard (125 x 30 m) was noticed to the south of the present jetty. Its stonewall is now collapsed and covered with mud. It gets submerged during high tide. Its entrance is from southeast corner. It has been silted up and hence it is not in use now. About 700 m to

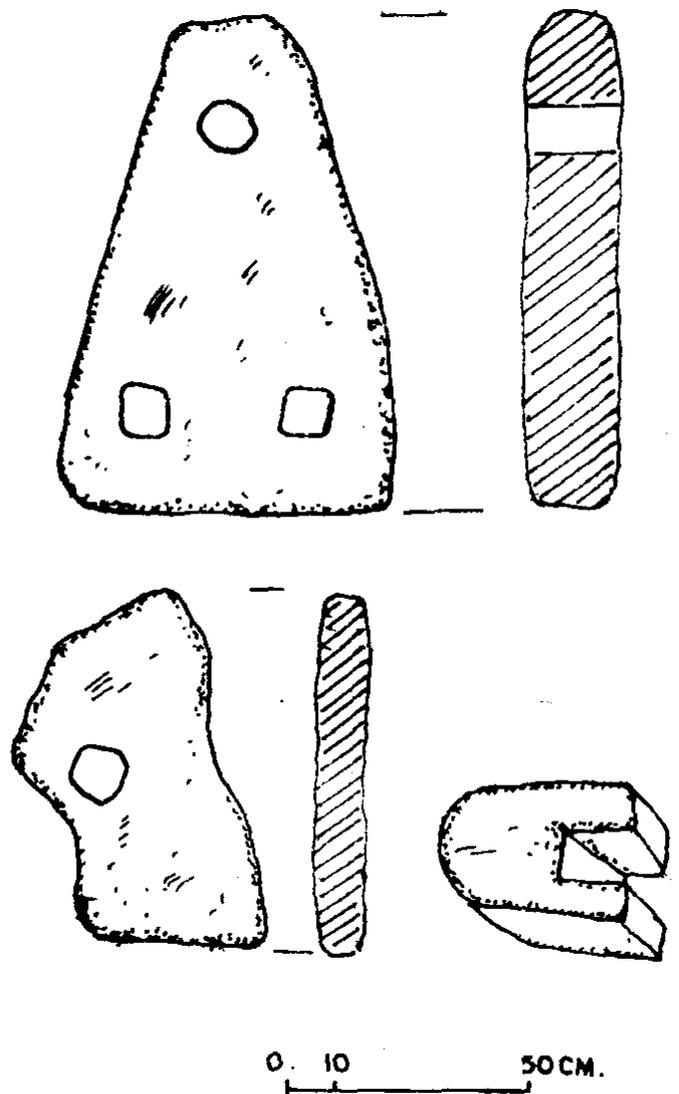


Fig. 10: Stone anchor from Armada

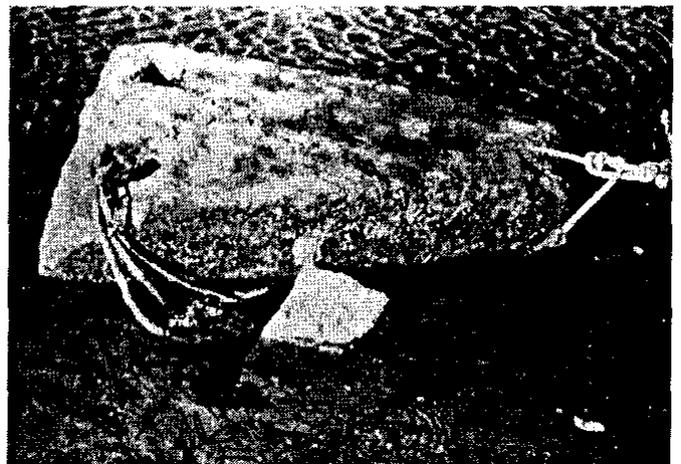


Fig. 11: Triangular stone anchor in intertidal zone at Armada

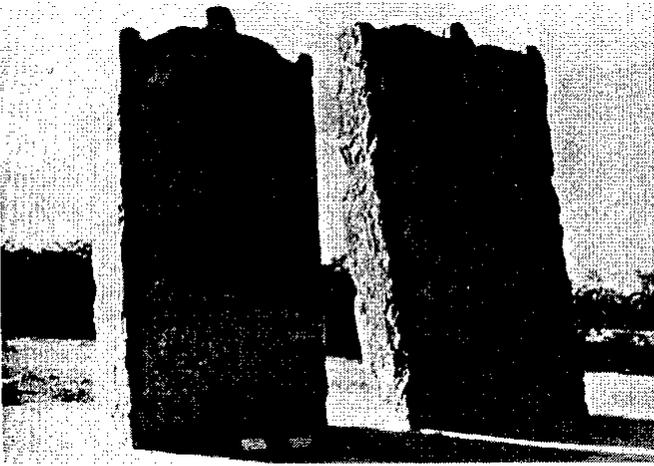


Fig. 12: Boat motifs on hero stones at Armada

the south of this old dockyard, a jetty was noticed during low tide. This extends up to the high water line. No other archaeological objects were found here.

Several hero stones (3 with boat motifs) were noticed to the extreme west of the village (Fig. 12). Hero stones with boat motifs are known as Kharwa tomb. Kharwas were the early navigators and perhaps these stones were erected in their memory. One of them is 200 years old, and other two seem to be younger than that.

### Discussion

A large number of stone anchors (triangular and grapnel) were noticed during previous explorations as well as in the present study, indicating the vigour of ancient maritime activities in Dwarka area.

Triangular anchors have been reported from the Mediterranean Sea (Frost 1970), Egypt (Frost 1979), and from the Maharashtra coast of India. The anchors of the Mediterranean and Egypt are dated to the Bronze Age. A few anchors from Israel (Grossmann and Kingsley 1996) and Maharashtra coast are dated to the historic period. Rao (1990: 84) has dated anchors found from Dwarka to 1400 B.C. by comparing them with those of Syria and Cyprus in the Mediterranean. The discovery of similar stone anchors at Malwan (Tripathi and Gaur 1997) and at Vijaydurg (Tripathi *et al.* 1998) provides support to the view that these anchors belong to the historic period (or even of later date) and may be related to Indo-Arab trade.

Rectangular or grapnel shaped stone anchors are associated with Arab trade. A large number of these are reported from Siraf (Whitehouse 1970), East African coast (Chittick 1980) and on both sides of the Indian and Sri Lankan coast. Hence, the date of the Dwarka anchors may be similar to those at Malwan and Vijaydurg. The raw material used for the Dwarka anchors is mostly locally

available calcareous and yellow conglomeratic rock. This indicates that these anchors were locally manufactured.

It is very difficult to assign a date to the Dwarka structures, though they have been dated by Rao (1988: 50) as of two periods: Protohistoric and Early Historic periods. A stone block near the structures bearing Gujarati script indicates a late date (probably late medieval period). Therefore, the previously assigned date of the underwater structure of Dwarka needs to be reconsidered. Some serious doubts have been expressed about the dating of the Dwarka structures (Tripathi 1996: 54; Kenni 1995: 97) particularly about those recovered from underwater explorations.

### Conclusion

Onshore and offshore explorations of Bet Dwarka Island have clearly demonstrated a long cultural sequence beginning from protohistoric period (2000 B.C.) to modern period, which points to the importance of its location. The earliest settlers occupied most of the southern and eastern coast of the island, which are very well protected from the high waves and storm. Also, they must have exploited the marine resources of the Gulf, such as conch shells and fish. The occupation on the southern and eastern sides also suggests that they maintained contacts with the mainland towards Positra and Nageswar, other than protohistoric sites.

Harappan pottery recovered from the south and east coasts of the Bet Dwarka Island suggest that early inhabitants had selected the two sheltered sides for habitation. These two sides of the island are protected from the high waves and current. The present high water line along the southern coast touches the protohistoric settlement indicating a rise in sea level in the last 4000 years. Similarly an Early Historic site on the western coast of the island under the intertidal zone also suggests a rise of sea level since the beginning of the Christian era. Explorations and excavations in Okha mandal have so far uncovered two protohistoric (Harappan) sites at Nageswar and Bet Dwarka, and historic period sites at Dwarka, Bet Dwarka, Dhrasanbel, Positra and Pindara. Most of the modern Dwarka village probably came into existence during the late medieval period.

### Acknowledgments

The authors are grateful to the Director, NIO and acknowledge the help rendered by Shri. S.B. Chitari, Shri. Umesh Sirsat, Shri K.A. Sheikh and Mahendra This is a NIO contribution no. 3527.

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