



The Mariner's Mirror

The International Quarterly Journal of The Society for Nautical Research

ISSN: 0025-3359 (Print) 2049-680X (Online) Journal homepage: <https://www.tandfonline.com/loi/rmir20>

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Dr A. S. Gaur , Mr Sundaresh & Dr Sila Tripathi

To cite this article: Dr A. S. Gaur , Mr Sundaresh & Dr Sila Tripathi (2007) REMAINS OF THE ANCIENT PORTS AND ANCHORAGE POINTS AT MIYANI AND VISAWADA, ON THE WEST COAST OF INDIA: A STUDY BASED ON UNDERWATER INVESTIGATIONS, The Mariner's Mirror, 93:4, 428-440, DOI: [10.1080/00253359.2007.10657039](https://doi.org/10.1080/00253359.2007.10657039)

To link to this article: <https://doi.org/10.1080/00253359.2007.10657039>



Published online: 22 Mar 2013.



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REMAINS OF THE ANCIENT PORTS AND ANCHORAGE POINTS AT MIYANI AND VISAWADA, ON THE WEST COAST OF INDIA: A STUDY BASED ON UNDERWATER INVESTIGATIONS

By A.S. Gaur, Sundaresh and Sila Tripathi

The Saurashtra coast has played a prominent role in the maritime history of India since the emergence of the Indus Civilization (3000–1700 BC) of the Bronze Age in the Indian subcontinent. The important excavated Indus sites along the Saurashtra coast are Lothal,¹ Padri,² Prabhasha,³ Bet Dwarka⁴ and Nageshwar.⁵ Later, during the historical period, Dwarka,⁶ Bet Dwarka, Somnath⁷ and Hathab emerged as important trading posts along the Saurashtra coast.

The antiquities from underwater investigations off Dwarka, Bet Dwarka and Prabhash include a large number of stone anchors of various types such as composite,⁸ Indo-Arabia⁹ and ring stone.¹⁰

The present paper deals with the underwater explorations undertaken during two seasons (2004–05 and 2005–06) off Miyani and Visawada on the Saurashtra coast (Fig. 1) where a large number of stone anchors have been discovered. The paper also discusses the use of creeks as sheltered harbours in the past.

LOCATION OF SITES

Miyani is situated about 40km east of Dwarka. This is also famous for ancient temples dating back to the tenth century AD.¹¹ On the coast of Miyani a temple known as Harshad Mata dedicated to a goddess is situated on a high hill. A vast creek (locally known as **Meda creek**) running for a few miles in the hinterland area has been used as a sheltered harbour for country craft, particularly fishing vessels. The coastal area consists mainly of plain sandy beaches.

The small town of Visawada lies about 40km west of Porbandar and about 20km east of Miyani. The Hindu pilgrimage centre and a temple dedicated to the Lord Krishna are situated in the middle of the town. A creek (known as **Kindari Creek**) runs for a long distance, at least up to Kindar Kheda. The western side of the coast is represented by a high cliff, while the eastern coast is comprised of a sandy beach.

METHODOLOGY

Primary data were collected during an underwater visual survey, mainly through the use of a Scuba diving system. Artifacts like stone structures and anchors were located and a marker buoy was tied to each finding for detailed measurement and recording. Thereafter, important structures were manually cleared. At a few places, airlift operations were undertaken to expose the buried artifacts. The objects were plotted underwater with the help of a compass. Similarly, a GPS (Global Positioning

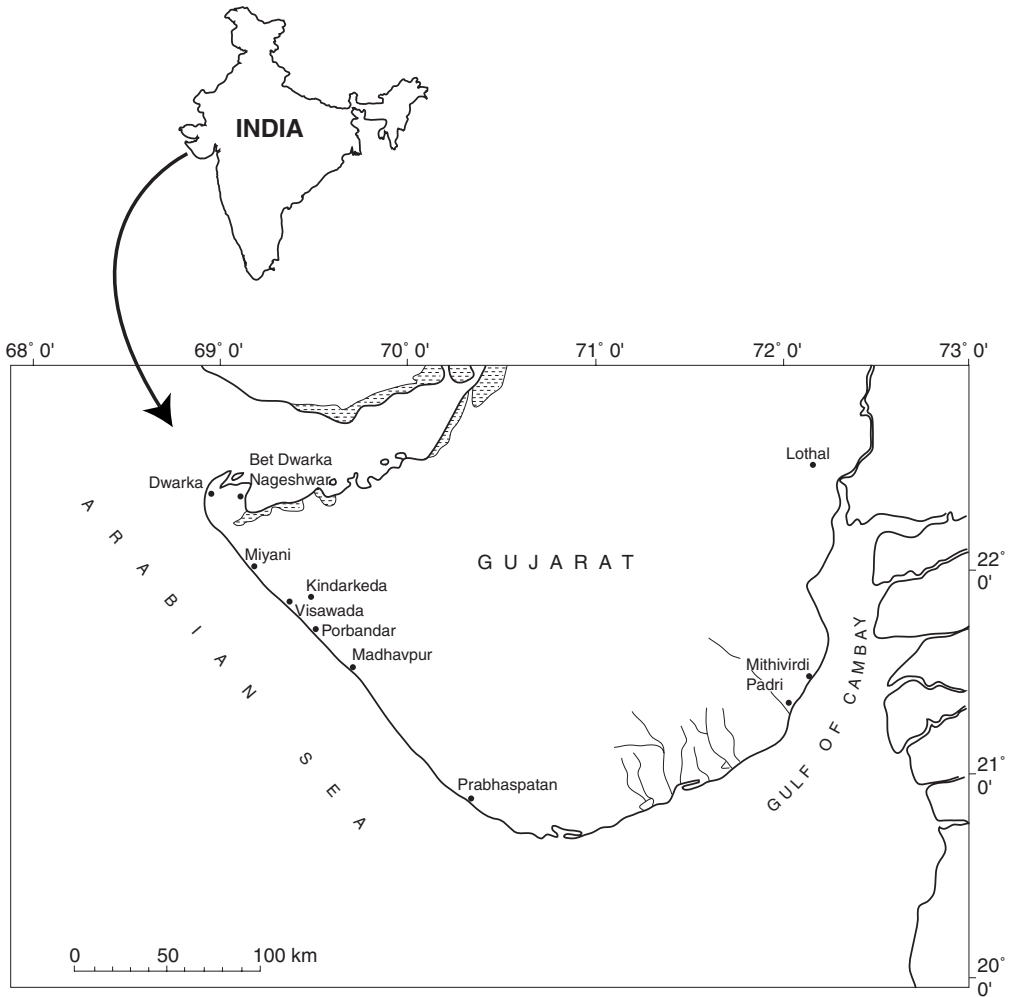


Fig. 1. Location of coastal sites in Gujarat coast. (Drawn by R. Uchil)

System) position of each object was obtained from the surface. The findings were also documented through underwater still and video cameras, and drawings.

RESULTS

The extensive underwater investigations were undertaken off Miyani (Meda Creek) and Visawada (Kindari creeks) in a water depth of 4–8m. The findings from each site are given here.

Visawada

The explorations were undertaken off Kindari creek about 500m from the coastline (Fig. 2). The seabed topography consists of sandy channels and rocky outcrops. At several places small boulders and dense growths of vegetation were observed. The water depth varies between 5m and 8m; however archaeological findings were

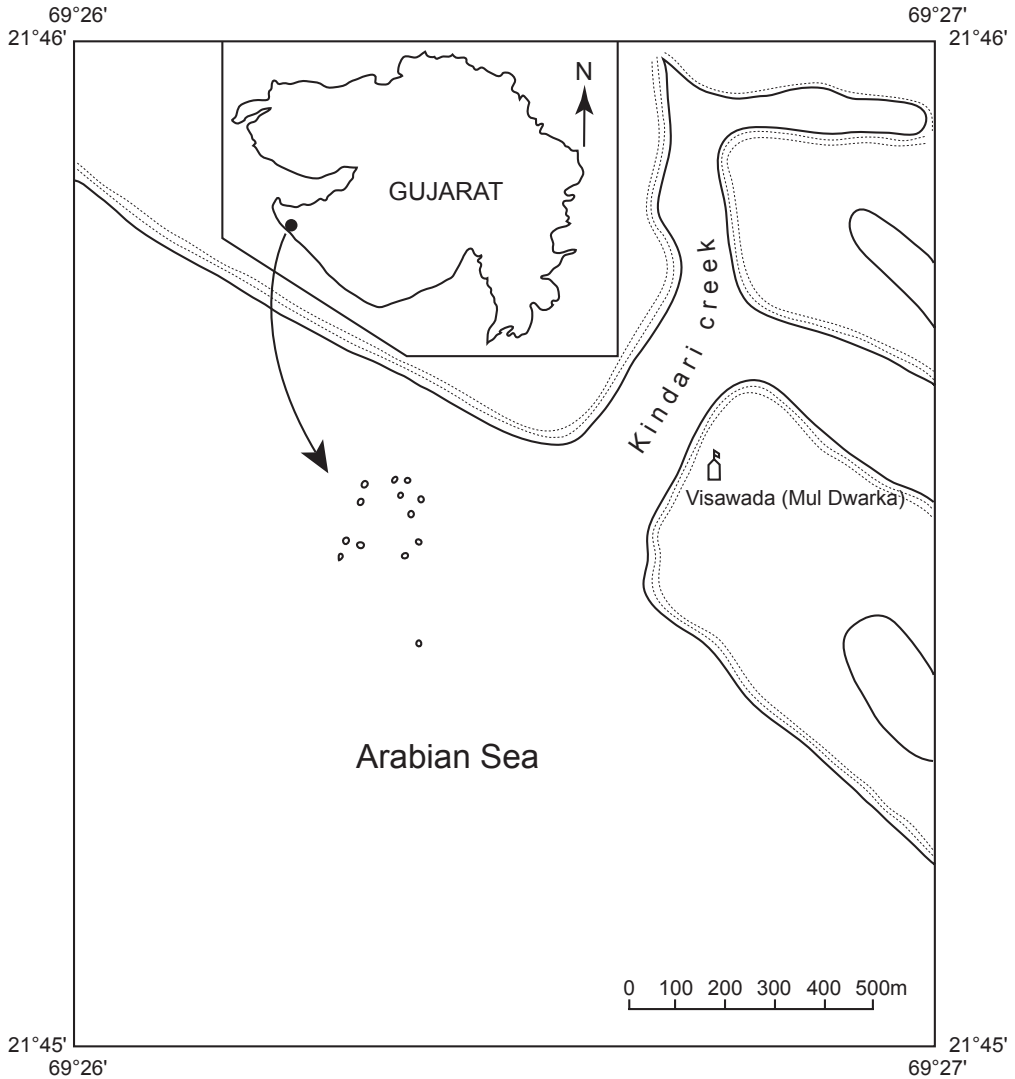


Fig. 2. Location of underwater artifacts off Visawada. (Drawn by R. Uchil)

concentrated between 5m and 6m. Fourteen stone anchors were found (Fig. 3) and they are represented by three varieties, known as composite (Fig. 4), Indo-Arabia (Fig. 5) and ring stone types (Table 1). A brief description of the stone anchors is given below.

Composite type

There are 10 composite stone anchors of different sizes. On the basis of shape they can be divided into three main groups: i) triangular shape, ii) trapezoidal shape, and iii) upper portion with semicircle.

Anchor V-1, which falls into the first category, is lying in a sandy channel and is

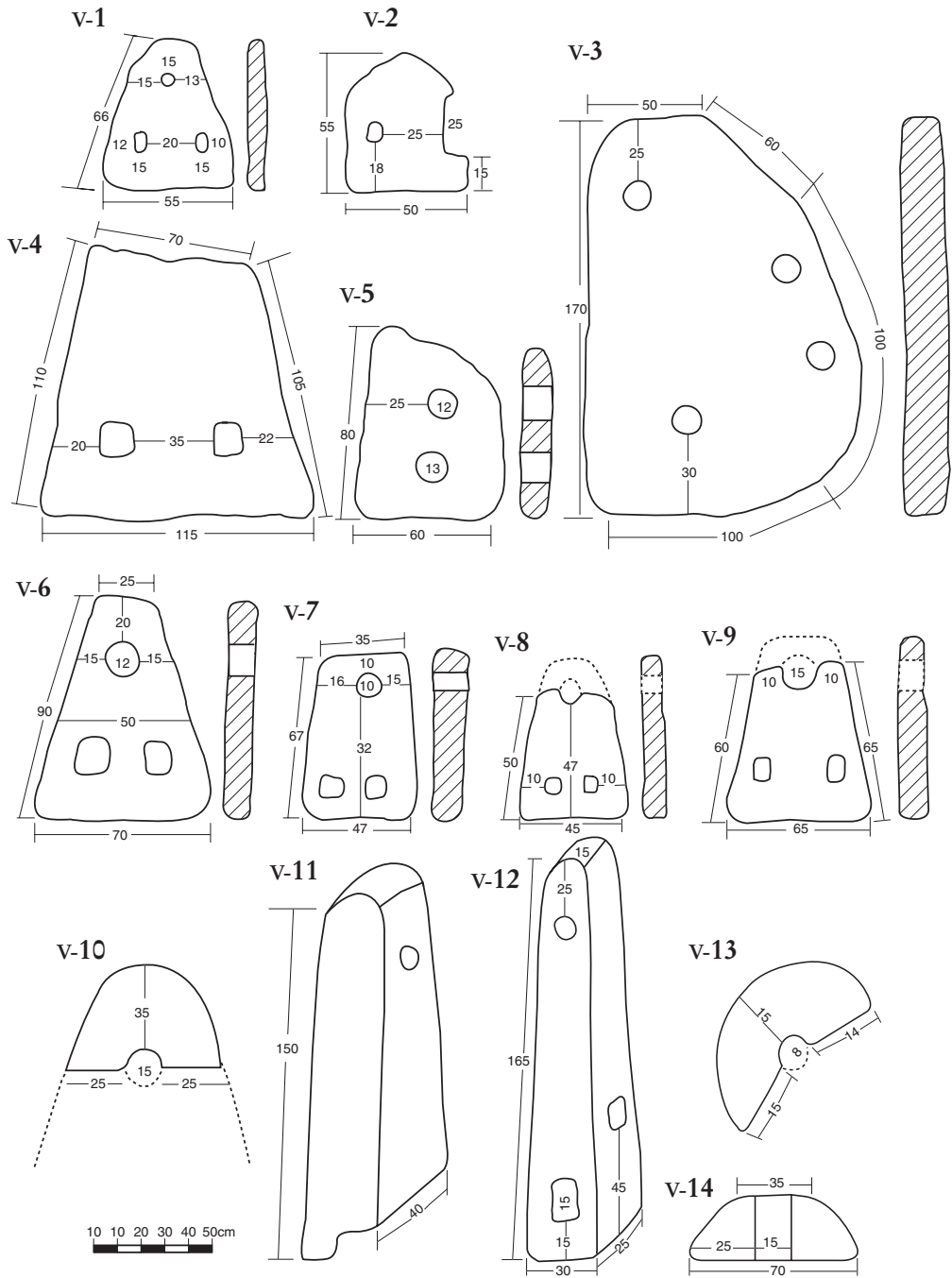


Fig. 3. Stone anchors from Visawada. (Drawn by R.Uchil)



Fig. 4. Composite stone anchor (V-6) from Visawada (scale: 15cm with 5cm divisions). (Photo: *M. Mochhemadkar*)



Fig. 5. Grapnel or Indo-Arabia type of stone anchor (V-12) from Visawada (scale: 15cm with 5cm divisions). (Photo: *M. Mochhemadkar*)

TABLE 1: Detail measurements of stone anchors noted off Visawada
(measurements in cm and weight in kgs)

Sl. No.	Type of anchor	Raw material	Est. weight	Length	Width	Upper hole	Lower holes
V-1	Composite	Limestone	38	66	55	7	5x6, 5x6
V-2	Composite	Limestone	32	55	50	--	7x6
V-3	Composite	Limestone	620	170	130/50	10	10, 10, 10
V-4	Composite	Limestone	339	110/105	115/70		12x15, 12x13
V-5	Composite	Limestone	75	80/60	60/40		12, 12
V-6	Composite	Limestone	92	90	70	12	15x13, 12x12
V-7	Composite	Limestone	59	67/70	47/35	10	10x10, 10x8
V-8	Composite	Limestone	40	50	45/30	10	6x6, 6x6
V-9	Composite	Limestone	59	65/60	60/35	15	10x10, 10x10
V-10	Composite	Limestone	59	55	65/35	15	--
V-11	Grapnel	Sandstone	324	150	40	10	--
V-12	Grapnel	Basalt	325	165	35/22	10	12x15, 13x13
V-13	Ring stone	Limestone	NA	45 (dia)	17 (height)	8	--
V-14	Ring stone	Limestone	NA	50 (dia)	25 (height)	15	--

very small in size. It has a perfect triangular shape with an upper circular hole and has two lower square holes. Anchor V-7 represents the second group, which has a larger dimension at the lower end compared to the upper; other features are the same as for the triangular shape. Anchor V-6 falls into the third category (Fig. 4) with a semicircular top and other features similar to other types of anchor. The remaining anchors have some parts which are broken; therefore categorization is not possible. One of the heaviest anchors (V-3) is lying in 5m water depth and its estimated weight is 340kg. Another anchor (V-9) is complete with all three square holes. The entire group of anchors is made from locally available limestone.

Indo-Arabia type

Two specimens of this category of anchor were discovered from Visawada waters. Anchor V-11 is broken (lower portion); an upper portion with a circular hole and a lower half with a broken hole survive. It is made of sandstone. The other anchor (V-12) is made of basalt and complete in shape (Fig. 5). All three holes are present including an upper circular and lower two rectangular holes, and chisel marks are noted on the surface. It has a circular upper section while the lower ones are rectangular.

Ring stone type

There are two anchors of this category. One is half broken and was found in a sandy channel. It is small in size and has a circular hole in the middle. The other anchor is complete in shape; however it has a rough surface. A circular hole in the middle of the stone makes it a ring type. Both anchors are made of limestone.

Miyani (Harshad Mata)

Underwater explorations were undertaken about 1km offshore of Harshad Mata temple (Fig. 6). The seabed is comprised of sandy channels and rocky outcrops. There is not much vegetation growth. In several places small gravels were also noted. The sand is comprised of a clay-like element which makes visibility very poor. Twelve artifacts were discovered here and brief descriptions of them are given below (Fig. 7, Table 2).

Composite anchor type

Two anchors of this type were discovered, one of which (M-7) is irregular in shape and has a circular upper hole; lower holes are absent. The other anchor (M-8) is perfectly trapezoidal in shape and all three holes are circular (Fig. 8). Both anchors are made of limestone.

Indo-Arabia type

There are six anchors of this category and most of them are partially buried in sediment. Interestingly, five anchors are broken, particularly the upper portion, and one lacks (M-1) an upper hole (Fig. 9). One of each (M-1 and M-2) is made of sandstone and basalt rock respectively, and the remaining four are limestone.

Ring stone anchor type

Four examples of this category were noted off Miyani. Two of them have a spheroidal shape (M-9 and M-12) with a wide middle hole, and the other two (M-10 and M-11) are of wide diameter with comparatively less height. All are made of limestone.

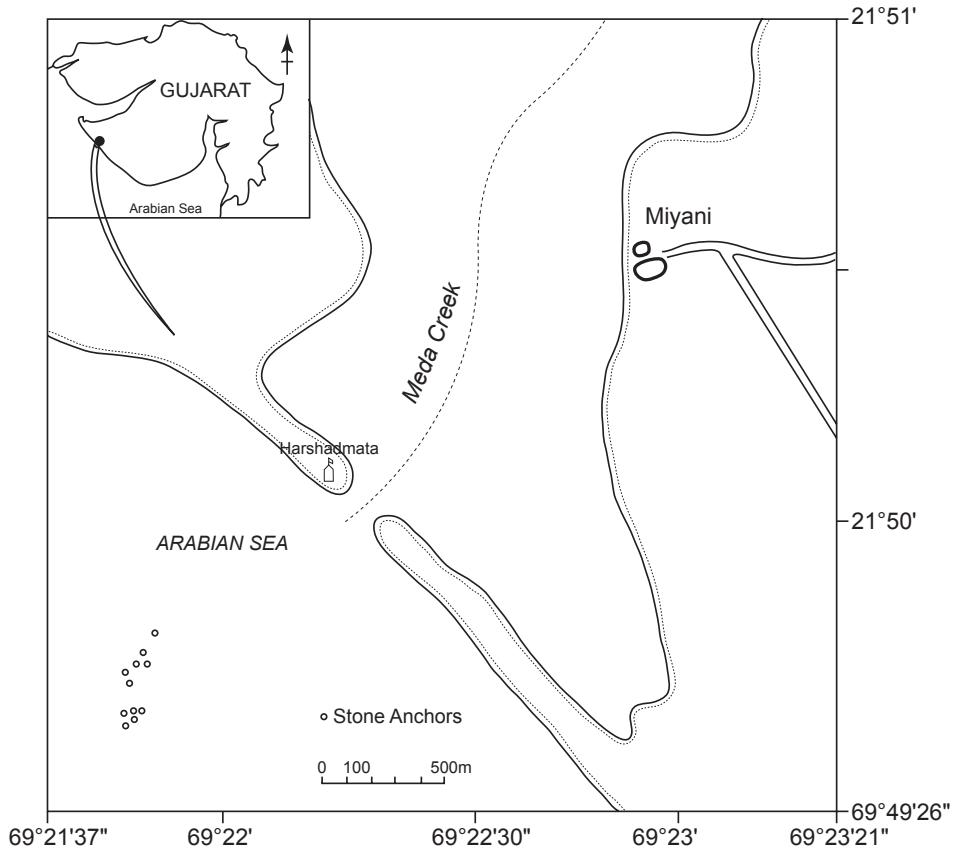


Fig. 6. Location of underwater findings off Miyani. (Drawn by R. Uchil)

TABLE 2: Details of stone anchors noted off Miyani
(measurements in cm and weight in kgs)

Sl. No.	Type of anchor	Raw material	Est. weight	Length	Width	Upper hole	Lower holes
M-1	Grapple	Sandstone	56*	85	20		12x8, 10x8
M-2	Grapple	Basalt	209	135	30/27	8	15x15, 5x15
M-3	Grapple	Limestone	101	100	25/15		10x12, 13x10
M-4	Grapple	Limestone	136	95	35/22		13x13, 3x13
M-5	Grapple	Limestone	NA	50	25	--	20x20
M-6	Grapple	Limestone	NA	65	25	5, 10	
M-7	Composite	Limestone	NA	65	40	7	
M-8	Composite	Limestone	25*	50	38/17	6	6, 6
M-9	Ring stone	Limestone	NA	65 (dia)	30 (height)	30	
M-10	Ring stone	Limestone	NA	40 (dia)	12 (height)	20	
M-11	Ring stone	Limestone	NA	45	10 (height)	12	
M-12	Ring stone	Limestone	NA	50/35	22 (height)	20	

*Actually valued. For estimated weight, limestone: 2300kg per m³, sandstone: 2400kg and basalt 2900kg per m³.

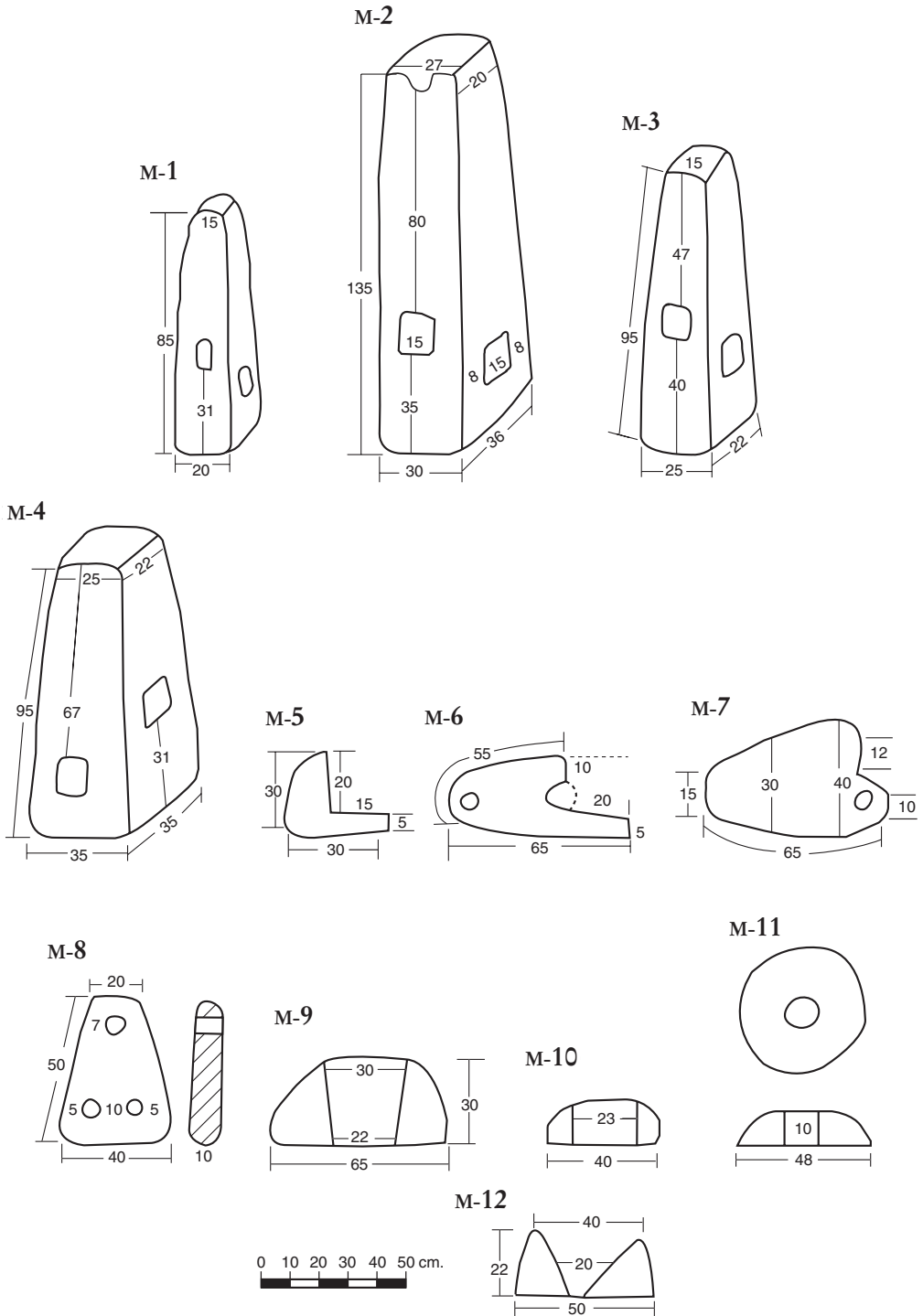


Fig. 7. Stone anchors from Miyani. (Drawn by R. Uchil)



Fig. 8. Composite type stone anchor (M-8) from Miyani waters (scale: 15cm with 5cm divisions). (Photo: M. Mochhemadkar)

Fig. 9. Indo-Arabia type stone anchor (M-1) from Miyani (scale: 50cm with 5cm divisions). (Photo: Sundaresh)



DISCUSSION

Stone anchors are representative of the existence of ancient harbours, anchorage points and trade routes. The limited period of exploration at Miyani and Visawada has brought to light some interesting results on the past maritime activities of the Saurashtra coast. The creeks and backwaters have been extensively used as sheltered harbours by ancient mariners. The stone anchors of Miyani and Visawada are similar to those reported from Dwarka¹² and Bet Dwarka.¹³ The raw materials of the anchors are also very close to these sites.

Possible dates of the anchors

Ancient literature such as Milindapanho,¹⁴ which belongs to the early centuries of the Christian era, mentions two qualities of anchor:

it fasten the ship and keeps it still even in the mighty sea, in the expanse of waters agitated by the crowding of ever varying waves and lets not the sea take it in one direction or another and secondly, it floats not but sink down and even in water a hundred cubit deep holds the ship fast brings it to rest.

A tenth-century Sanskrit text *Tilakamanjari*¹⁵ mentions stone anchors as 'when a ship halted its heavy anchors made of rocks were lowered down'. The same text also refers to ships being tied to strong wooden poles thrust deep into the earth. At the time of the launch of a ship the rocks which cut its speed were pulled up and the ropes that tied it to the pole were cut.

The literary evidence mentioned above gives some indication of use of stone anchors that can provide some indirect evidence of the period during which they were prevalent; nevertheless, the dating of anchors without stratigraphic position is a challenging task. A hoard of 26 similar types of anchor has been reported from Qalhat in Oman¹⁶ along with pottery of the early Islamic (seventh century AD) to the medieval (fourteenth century AD) period. The find spots of stone anchors along the Indian coast have a history dating back to the early centuries of the Christian era and the medieval period, such as Dwarka, Bet Dwarka¹⁷ and Somnath.¹⁸ In this case the most appropriate dates for stone anchors from the Saurashtra coast may be bracketed between the early centuries of the Christian era and the medieval period.

Of the two sites represented with different proportions of anchors, there is a majority of the Indo-Arabia type of anchor at Miyani and a majority of the composite type anchor at Visawada. Where the archaeology of these two sites is concerned, there is a marked difference in antiquities. Earlier archaeological excavations have yielded an early historic settlement near Visawada; however, about 20km north of Visawada, a late Harappan site has been located at Kindar Kheda.¹⁹ Whereas Miyani is famous for temple architecture datable to the eleventh century AD,²⁰ the archaeology of the town is not older than the early medieval period. The antiquities of the respective sites and comparative study of stone anchors from Oman and other sites along the Indian coast may be the foundation of the dating of stone anchors from Miyani and Visawada, which can be bracketed between the historical and medieval periods.

Ancient anchoring points

The most interesting aspect of this marine archaeological exploration is the identification of ancient anchoring points along the Saurashtra coast. The majority of the stone anchors were found in 5m to 8m water depth at Dwarka,²¹ Bet Dwarka,²² Miyani and Visawada, whereas stone anchors, especially ring stones, at Somnath²³ have been found in water depths of 8m to 15m. It is therefore suggested that most preferred anchoring points were at the mouth of creeks and in water depths of 5m to 15m. The exploration also indicates the preferred seabed topography as a disturbed rocky area with small sand patches.

The history of sea-level and shoreline changes along the Saurashtra coast

It is now generally agreed that the glacio-eustatic sea level stood higher than the

present at around 6000 years BC²⁴ and since then has fluctuated within a range of 2m to 6m along the Gujarat coast.²⁵ However, the study of ancient shoreline on the basis of archaeological evidence suggests that middle and southwestern Saurashtra has not undergone significant change during the last 4000 years,²⁶ though some coastal morphological features around Porbandar have changed;²⁷ whereas coastal morphology and shorelines have dramatically changed in the Gulf of Cambay²⁸ and the Gulf of Kachchh, particularly around Bet Dwarka.²⁹

Why are there no port structures?

During the study of the west coast of India some observations on the existing traditional jetties were made which revealed that the Gujarat coast does not have jetties built of wood; while going down the Maharashtra and Karnataka coasts, wooden jetties are operational, particularly in backwater areas for local fishing trawlers and canoes. This could well be connected with tidal variations, as the Gujarat coast by and large has a higher tidal range and the gulf areas more so. Tidal curves of Okha and Porbandar suggest a comparatively higher tidal range of 0–4m and 0–3m respectively, whereas the southwestern coast of India has a lower tidal range of 0–2m at Karwar and 0–1m at Cochin.³⁰ The higher tidal range results in the exposure of a larger beach area and fishermen take their boats to high water line during high tide, whilst during low tide boats remain on the sandy beaches, and they carry out loading and unloading and small repairs, if necessary, without any kind of structure. This appears to be a very old tradition in Gujarat, because a large number of stone anchors from inshore as well as the intertidal zones of Dwarka and Bet Dwarka, and one each at Armada, Tukda and Gopnath, have been recorded. However, moving southward the tidal variation reduces significantly and falls in the range of 1–2m, which does not allow a large exposure of land; also tidal currents are not strong enough for a boat to get back into the sea if it is on shore. So boats needed to be afloat continuously, which necessitated a landing as well as loading and unloading points, and wooden jetties were the affordable solution.

The tidal phenomena have not changed since time immemorial as some of the ancient texts, such as *Puranas* and Buddhist texts,³¹ and the *Periplus of the Erythraean Sea*³² record tides of extraordinary strength in the Gulf of Cambay, which is prevalent even today.

CONCLUSIONS

Findings from underwater investigations at Miyani and Visawada indicate that the Saurashtra coast, particularly the mouths of creeks, has vast potential for underwater archaeology. Various types of stone anchor are also indicators of the visit of various types and origin of boats. Ancient mariners selected anchoring points of between 5m and 15m water depth. The possible date of the composite type anchors may be the early Christian era and the Indo-Arabia type anchors can be dated to the early medieval period. The Gujarat coast lacks ancient port structures as river channels and creeks served as excellent natural harbours, well supported by the daily tidal fluctuations which helped to propel the boat up to the sandy beach and back to the sea.

Acknowledgements

We thank the Director, NIO, for permission to publish the paper. Thanks are also due to K.H. Vora for various suggestions and facility during the study. The authors thank S.N. Bandodker, S.B. Chitari, G.R. Desai and R. Uchil for their

necessary help. We are extremely grateful to two anonymous reviewers for their constructive comments and suggestions to improve the manuscript. This is NIO contribution No. 4276.

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Dr A.S. Gaur, Mr Sundaresh and Dr Sila Tripathi are marine archaeologists who have worked at the National Institute of Oceanography, Goa, for many years.

Dr Gaur has authored two books, *Harappan Maritime Legacies of Gujarat* (2000), and (with Mr Sundaresh) *Archaeology of Bet Dwarka Island* (2005). He has co-edited two books, *Glimpses of Marine Archaeology in India* (2006), and (with Dr Tripathi) *Krsnayan, a Peep into the Past, Dr K.D. Banerjee Commemoration Volume, Essays on Archaeology* (2004), and is currently working on ancient ports and anchorage systems along the Gujarat coast of India. Mr Sundaresh is currently working on coastal archaeology and shipwrecks on the south Indian coast. Dr Tripathi is author of *Maritime Archaeology: Historical descriptions of the seafarings of the Kalingas* (2000) and is currently engaged in the exploration and excavation of shipwrecks and submerged ports of India.

All three authors have published extensively in national and international scientific and archaeological research journals on various aspects of the maritime archaeology of India.