

**QUATERNARY SEA LEVELS AND ARCHAEOLOGICAL SITES IN
COASTAL PARTS OF WESTERN INDIA
INTRODUCTION
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INTRODUCTION

It is well known that early human communities living in the coastal parts of Gujarat and Maharashtra have been affected by changes in their environment – changes which can be basically regarded as being of geological nature. It is an old concept that Coastlines have altered as sea level has changed in Quaternary times as a result of increase or decrease in the volumes of glacial ice, modified in some cases by tectonic uplift or subsidence of more local nature. Some other changes are concerned with the coastal depositional and erosive features.

The miliolite limestones of Kutch and Saurashtra, and the 'Karals' or beach-dune complex rocks of Konkan are some of the best I know coastal sedimentary rocks studied in the context of archaeological sites in the last decade.

Changes in the estuarine zone around Sopara (Bombay) during the Late Holocene times (Ghate, 1988), around Lethal near Ahmedabad (Rao, 1973) and at Dwaraka during Mid Holocene times (Rao, 1988) have been well documented. However, it often happens that the exact pattern of change of one factor or another is known for a particular site, and results from sites elsewhere are extrapolated. There is considerable confusion about the nature of such changes and their possible effects on coasts. In this paper we will focus on complexities involved in sea-level change and their possible effects on coastal archaeological sites. Sites discussed are as

1. Maharashtra.
2. Paleolithic sites in coastal part of Saurashtra.
3. Mesolithic and Early Historic sites around Bombay, Maharashtra.
4. Mesolithic and Harappan sites in coastal Saurashtra.

**PALEOLITHIC SITES AROUND MALVAN, SINDHUDURG DIST.,
MAHARASHTRA.**

A good number of Middle Paleolithic sites were discovered on the laterite surfaces at elevations varying from 10m to 50-60 m above the sea level and 10-20 km. inland from the present shore. These laterite surfaces range in age from Late Neogene to Early Pleistocene and are the result of wave cut erosion and ground water weathering in near coastal environment (...). The site of Haddi, a little north of Malvan, situated on the floodplain of the Gad River is only couple of meters above sea level. The site was excavated by Guzder (1980). She has argued that the Middle Paleolithic occupation on the bank of the present saline creek of the Gad was occupied during the lower sea level of the glacial period. Depending of the extent of sea level of lowering the site of Haddi would either have existed as a low alluvial terrace or if the sea level was lower by 10 to 100 m, this surface would have assumed the position of an elevated plateau similar to those presently observed further inland (Guzder, 1988). Culturally, Paleolithic sites around Malwan, are a little amorphous in character and cannot be easily classified as Lower and Middle Paleolithic. These sites are unique in tropical humid parts of the West Coast, as only a few convincing paleolithic sites have so far been discovered in the Konkan, coastal Karnatak and Kerala.

PALEOLITHIC SITES IN COASTAL PARTS OF SAURASHTRA

The Saurashtra peninsula has preserved large number of surface as well as stratified Lower and Middle Paleolithic sites in coastal as well as inland situations. Lower palaeolithic tools occurring below the thick miliolite limestone in a channel gravel bed at Umrethi dam site on the river Hiran in Dist. Junagarh and in a Adi-Chadi-wao near Junagarh are one of the oldest palaeolithic sites in India (Marathe, 1981: Bhaskaran et al 1986 and Bruckner 1987}. The miliolite limestone is either of shallow water marine origin or of near coastal aeolian or of inland aeolian origin. Some of the coastal miliolites near Porbandar are likely to be older than the Late Pleistocene (12,000-50,000) (...) on miliolite are minimum ages only. It therefore, appears that the paleolithic tools found in the fluvial gravels at Adi-Chadi-Wao and Umrethi are much older than 2,000,000 years B.P. and belong to the phase of lower sea level of the Middle Pleistocene. It thus appears that Saurashtra peninsula was first occupied by early man when sea level was low and the climate was drier than that of today.

Early man witnessed, minor transgressive and regressive phases of sea during the Late Pleistocene. This is indicated by Late Acheulian and Middle Paleolithic sites in fluvial gravels capping the miliolite of Middle Pleistocene age. On the right bank of the Bhadar the tool bearing gravel has been capped by a thin miliolite dated to around 50,000 yrs. B.P.

(Bhaskaran et al, 1989). Sankalia (1965, 1972), Rao (1959}, Sounder Rajan (1967), Chakrabarti (1978) and Lele (1988-89) have discovered Middle and Late Acheulian sites in stratified context in northern and eastern coastal parts of Saurashtra. Besides suitable source of raw material, sea level fluctuations seem to have determined locations of these sites. There is a tremendous scope for future geo-archaeological studies in Saurashtra.

MESOLITHIC AND EARLY HISTORIC SITES AROUND BOMBAY, MAHARASHTRA.

Todd (1939), Malik (1959), Guzder (1981) and Ghate (1988) discovered surface mesolithic sites in the littoral zone of the coastline of Bombay. Many of these sites occur on low hillocks and hillslopes in the coastal zone. Ghate collected microlithic tools in 'Karal' (a beach-dune camp lex araneceous shelly limestone) near Nala Sopars. C-14 dates on shells indicate a mid-Holocene age (3250 + 110 B.P) of the 'Karal', Guzder (1980)(...). These rocks range in age from Late Pleistocene to the Late Holocene and indicate complex fluvio-marine processes of the Late Quaternary. Dating of shelf carbonate to 9 to 10,000 yrs. B. P. (Nair and Hushimi 198C) occurring 180 m below the sea level and about 100 km west of Bombay clearly show that the sea level was low during the Terminal Pleistocene and those to the present level around 6000 B. P. (Kale and Rajaguru 1986). In the absence of primary well stratified Mesolithic sites it is very difficult to reconstruct detailed relationship of the Holocene in this part of tropical world.

Recent geomorphological studies of Early Historical sites of Sopara, Chaul, Revendra etc. around Bombay by Ghate (1988) reveal interesting changes in the esturine landscape. These changes are due to shifting of stream courses, variation in the supply of sediment load, fluctuations in stream discharge and in the wave dynamics. Changes of these nature seem to have affected Early Historical settlements. Future excavations of some of promising sites and detailed geomorphological and geochronological studies will throw good light on the problem of sea level changes and their effects on Early Historical settlements.

MESOLITHIC AND HARAPPAN SITES IN COASTAL SURASHTRA

Like in mainland Gujarat, Saurashtra is rich in Mesolithic sites. Many of them occur in stabilized surfaces of coastal dunes, particularly between Veraval and Porbandar in the southern part of the peninsula (Sperling and Goudie 1975, Marathe 1981). Recently we discovered large number of microlithic tools in a stratified context at Kuntasi and Jhinjora in Dist. Rajkot. At Kuntasi, microliths have been found in fluvial silt below the habitational deposits of Harappan period, and at Jhinjora, (a place 1 km inland from the Rann of Kutch) in the lithified beach complex rock which is 10 km above sea level and is capped by a stabilized sand dune. Microliths are also found at Shikarpur 2 km away and on the right margin of the Little Rann of Kutch. Microliths at Kuntasi are certainly older than the Harappan period (i.e., 4500 yrs. B.P). Gupta's (1975) geochronological work in the Little Rann of Kutch indicates that the sea level was definitely high by a few meters around 6000 B.P. Probably these stratified Mesolithic sites belong to this period only. We11 known Harappan site of Lothal occurs in the south eastern zone of Saurashtra and its dock-yard context is very interesting. Recently Nigam (1987) carried out foraminiferal studies sediments associated with this structure and has convincingly supported Rao's (1973) hypothesis of the dock-yard at Lothal. If this hypothesis is accepted then there is clear evidence for the regression of sea in post-Harappan times. At another Harappan site of Kuntasi, excavated by Dr. Dhavalikar, preliminary geomorphological studies carried out by us show that Kintasi was a creek port during the mid-Holocene.

Late Holocene changes in sea level are documented at Dwarka and Prabahspatan. According to Pathaket al (1987) Dwarka coast is being eroded at the rate of 4m/yr., since the turn of the present century.

CONCLUSIONS

This brief survey of some of the archaeological sites in coastal strip of Western India clearly shows that the sea level stood several meters higher than the present one during the Late Neogene and was never significantly higher than the present during the Quaternary. Early man's entry in the semi-arid parts of the coastal strip of Gujarat has taken place sometime during the low sea level phase of the glacial stage of the Middle Pleistocene. Since then, early man seems to have occupied coastal zone of Gujarat intermittently, migrating to (...) transgressive phases in Saurashtra. On the other hand, in humid tropical part of Konkan, human occupation during the Late Pleistocene is thin and the region might have been penetrated during the relatively dry climate of the later. Late Pleistocene (60,000- 10,000 yrs. B.P), when the sea level was low by scores of meters. The early/mid Holocene showing intelligent use of tropical humid as well as semi-arid coastal environment. The Harappan and Early Historic communities settled in coastal strip and had a maritime trade outside India.

Present knowledge about sea level changes and archaeological sites in this region is based on inadequate chronological data and on sketchy field observations. Future detailed geo-archaeological studies will bring out new information on man-land relationship in tropical coastline of India.

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