

Marine archaeological investigations in inferring shoreline / sea level changes along the Indian coast

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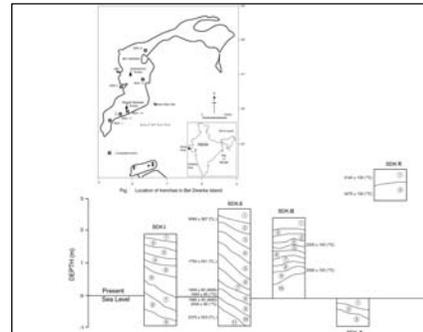
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Studies on sea level changes are of major interest to decipher implication of global warming and its impact on coastal belt. Out of many methods to draw inferences on cause and effect analysis, geological investigations, especially marine, are considered to be most reliable as the samples are undisturbed through centuries and can lead us to provide the trend to enable us predict the future scenario. The marine geological studies, based on sedimentological, geomorphological or micropalaeontological proxies accompanied by reliable dates provide the clues on the sea level in the past. Our recent studies have indicated that marine archaeological investigations also provide critical data to understand the same, at times more effectively.

Archaeological finds, when they can be related to give information are ideal proxies to understand the past natural events, e.g. shoreline and sea level changes. Artefacts found underwater may help in deciphering local sea level variation, change in sedimentological regime and / or tectonic disturbance in the region. Shoreline shift, either emerging or retreating, is well documented by remnants of erstwhile Civilizations. The earliest idea that sealevel may have changed several times have come though our ancient Indian text, Mahabharata. Similarly, Sangam literatures (3rd Century BC to 3rd Century AD) give graphic description of the destruction of the settlements by the sea. Several archaeological sites have revealed occurrences of tectonic disturbances from the excavations, for instance Harappan sites at Kalibanga in Rajasthan and Dholavira in Khadir Bet of

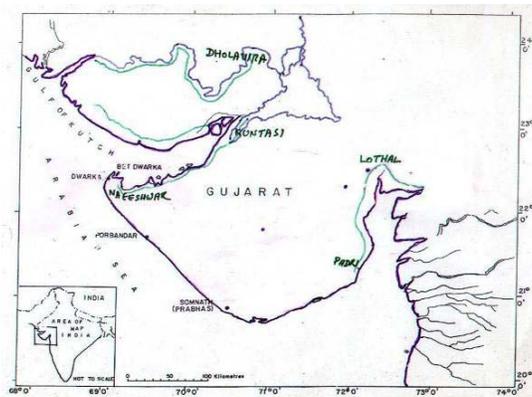
investigations were limited to prove the existence of artefacts underwater and thereby the submergence of ancient civilisation. With the time, systematic



investigations were undertaken to study the shoreline shift and related sea level variations, if any.

Archaeological sites along the Gujarat coast were studied in detail to find out if there was any marine connection. Based on the findings, those which were found to have the relevant were used to infer the ancient coast line and subsequently to draw ancient coastline of Gujarat, which based on artefacts of the sites can be dated to late Harappan period, i.e. 3500 yrs B. P.

Our archaeological studies in Bet Dwarka island suggest that at least two historical period sites gets submerged - one complete and one partially - in the sea during high tide which indicate sea level rise in recent past. Archaeological excavations undertaken near one of these sites revealed a very interesting cultural sequence commencing from Protohistoric period (3800 years BP) to historical period (1600 years BP). Excavation was carried on in six trenches up to the lowest level of archaeological findings. The results from



Kachchh in Gujarat.

National Institute of Oceanography has initiated marine archaeological investigations in 1981. Initially, the

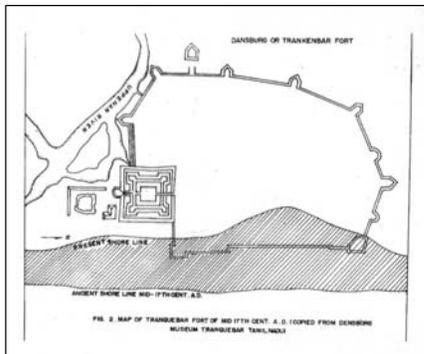


these trenches suggest that the oldest habitation was situated below the present high water line.

This is an indication of a lower sea level during that period of settlement. ¹⁴C ages and archaeological data suggest a time bracket for these habitations between 2050 and 1650 years BP (Calibrated). The analysis of sea level versus ancient settlement suggests that around the Christian era sea level was lower by 2 m than the present. One trench yielded the evidence of liquefied material in lower level, which was identified as tectonic event and date of this event is 1980±40 years BP. Perhaps this event might have destroyed another historical period site on the western coast of the Bet Dwarka Island. At a near by site, Pindara, remnants of 1000 yrs old temple are now found in intertidal zone, clearly indicating advancing shoreline.

Explorations along the Chilika Lake have yielded stone anchors and monolithic stone pillars. Explorations at Manikapatna located on the bank of Chilika Lake brought to light terracotta ring wells of historical period, which gets submerge during high tide show the evidence of shoreline changes along the Chilika Lake.

In Tamilnadu, Poompuhar, an active port before the beginning of the Christian era and now defunct, show



presence of brick structures in the shallow waters and ring wells in the inter tidal region, confirming retreat of the shore line in the area. World heritage temple complex at Mahabalipuram was supposed to have six temples submerged in the sea during last 1500 yrs or so. Underwater explorations in the area indicated presence of some man made structures in the water depth ranging from 3 – 6 m. If the present finds are confirmed to be remnants of erstwhile temples, it would mean landward shore line shift.

Therefore the studies of coastal archaeological sites have been useful proxies to understand the local shorelines change caused either by sealevel variation or seismic activity.

Suggested Readings:

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