

THE SIGNIFICANCE OF HARIHARESHWAR SHORE PLATFORMS IN THE INTERPRETATION OF SEA LEVEL FLUCTUATIONS ALONG MAHARASHTRA COAST

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ABSTRACT : Very few morphological evidences have been recorded from the coast of Maharashtra to suggest the high sea during the late pleistocene. The existence of beach rocks, littoral terraces, abandoned sea cliff and caves, short platforms are reported by many, but most of these features are not undisputable. The shore platforms found at Harihareshwar in Maharashtra suggest a pleistocene strandline and the recent holocene standline.

The shore platform identified at 10 m ASL appears to be related to a high sea level in Pleistocene and that which occupies the present intertidal zone is related to a recent regressive phase in holocene. The present shore platform has been carved and developed by the present sea which came to occupy its present level 5 to 6 thousand years before present. Relatively more width and low gradient of platforms and the severe erosion of cliffs backing the shore platforms of today probably suggest a slow transgression of sea along the Maharashtra coast.

Introduction:

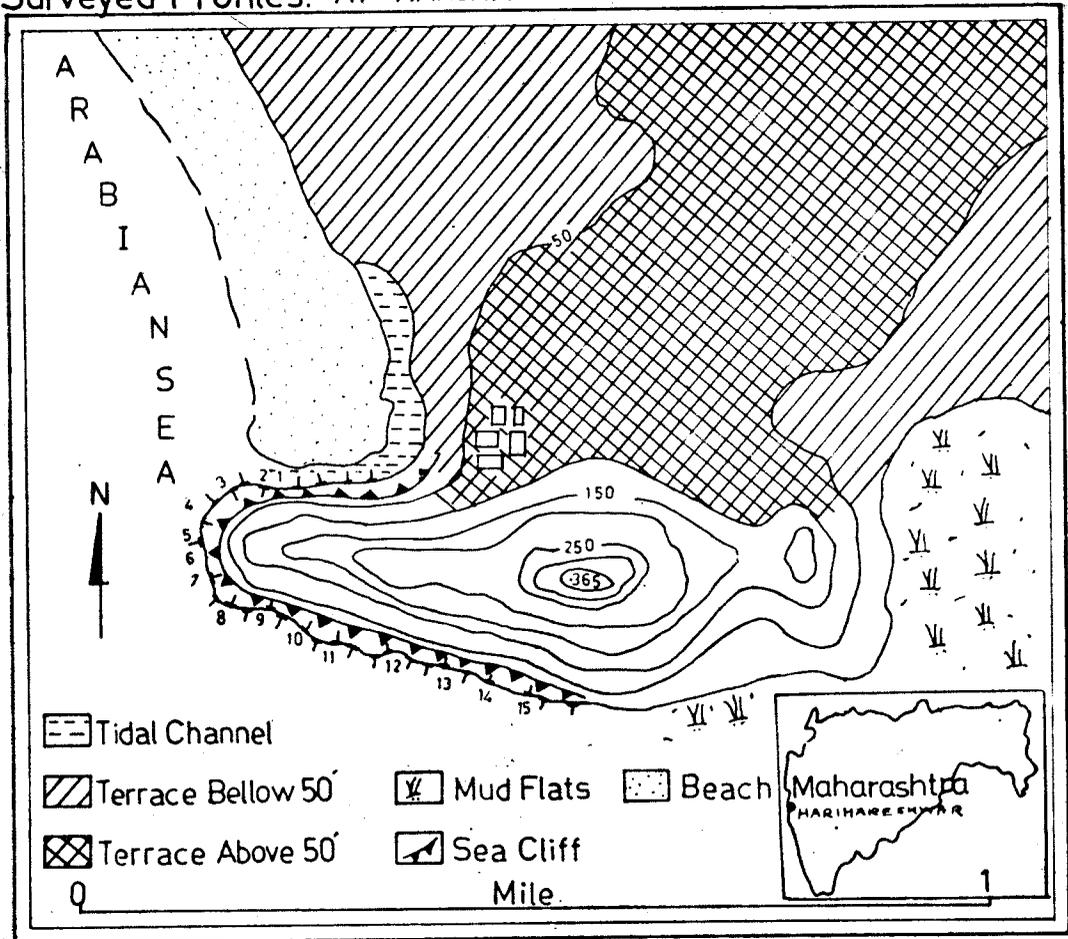
The Sea level changes that have occurred along the West Coast of India in general and coast of Maharashtra in particular, have been inferred by many scholars. Tentative sea level fluctuation curves have been suggested which are based especially on the study of coastal features like Sea cliffs, littoral terraces, beach rocks and processes like estuarine sedimentation. Some have also used the bore hole data to detect the features located on the continental shelf (Karlekar 1981, Kale 1985). In addition to these the probable sequence of strandlines has been also suggested from offshore drillings, microfaunal studies and radio carbon dating of the sediments (Kale 1985, Guzder 1980).

The inferences drawn by these studies indicate a slowly rising sea level along the West Coast of India in holocene. The rising Sea level in holocene and a higher sea in late pleistocene can however only be perceived by more evidences sited from various sites along the coast. The occurrence of old and recent shore platforms at Harihareshwar probably gives one more clue to the sea level fluctuations along the West coast of India, and severe erosion of sea cliffs at Harihareshwar, indicate a slowly rising sea level.

The shore platforms at Harihareshwar:-

The shore platform found at Harihareshwar, in Raigad district of Maharashtra surrounds the hill, projecting in to the sea. The present day shore platform

Map Showing the Location of Surveyed Profiles. AT HARIHARESHWAR



occurring in the intertidal zone is preserved to a great extent but the platform that occurs at the elevation of 10 metres ASL could be however identified with some difficulty.

The hill has a maximum height of 121 metres ASL. The hill is a basaltic hill and the upper 10 to 15 m section is a weathered section.

The intertidal shore platform is characterised by seaward low tide cliffs and a landward high tide cliff. The surface of the platform is uneven, gently inclined

and dotted with numerous shallow pools of varying sizes. The high tide cliff on the landward side has developed overhangs in its lower section and the walls and roofs exhibit an intricate mesh of honey-comb cavities. The low tide cliffs, that are sloping seawards are often covered by mosses and sea weeds. The harder quartz veins appear as sharp, small ridges running in various directions on the surface of the platform. The maximum height of the cliff ranges between 2 and 8 metres. The height of a cliff decreases northwards as a rule. Simi-

larly the low tide cliffs to the south are concave in nature, whereas northern low tide cliffs do not show any concavity or convexity. The average inclination of the intertidal platform is 1.49° . The landward zones of platforms are covered by the rock fragments and boulders tumbling down which have slid down the hill. The seaward sections are devoid of any material, even the pools developed on the platforms do not show any sediments. The pools of varying sizes occur every where on the platform. They are more or less circular, at places assuming rectangular to semi-circular shapes. The maximum axis measures from 20 cm. to 300 cm. and depth varies from 0.5 cm to 38 cm. The frequency of pools per square metre significantly increases in the section of the platform that is not sheltered and which faces the open sea. It seems

from the observation of these pools that the mechanical wave erosion and abrasion is responsible for the lowering of the platform at Harihareshwar. The height of high tide cliffs ranges between 4.3 metres and 16 m the average height being 9.8 metres ASL, (Table 1). The cliffs are inclined at an angle of 41° to 94° , the average inclination being 75.4° . The cliff faces are not smooth and regular anywhere. They display a large number of concavities and overhangs of varying dimensions. The overhangs are produced because of the basal quarrying and disintegration by storm waves. At a few places the material of quarrying can be seen deposited at the foot of the cliffs. The caving, undercutting and the honeycomb cavities are the significant morphological features of high tide cliffs at Harihareshwar.

Table : 1 The Morphological Parameters of Shore Platform at Harihareshwar

Site	Width of shore platform in Meters	Angle of shore platform in Degrees	No. of pools per Meter squares	Height of high tide Cliff in Meters	Angle of high tide Cliff in Degrees	Low tide Cliff height in Meters
1.	22.5	.5	1	16.	49	0.5
2.	45.3	.5	1	7.5	41	0.3
3.	27.5	.5	7	6.0	58	0.5
4.	30.3	2.0	3	4.3	77	0.5
5.	37.0	2.0	7	5.3	73	0.4
6.	25.0	2.0	2	10.9	77	0.8
7.	31.5	2.0	5	9.9	88	1.0
8.	32.2	3.0	4	9.2	94	0.7
9.	29.0	1.0	1	16.0	90	2.8
10.	16.0	1.9	5	10.0	90	1.6
11.	31.0	1.0	2	12.0	86	2.46
12.	34.0	1.0	2	15.0	82	1.1
13.	24.0	1.0	1	8.0	80	2.0
14.	20.0	2.0	3	8.0	72	1.8
15.	8.5	2.0	2	8.5	74	1.96

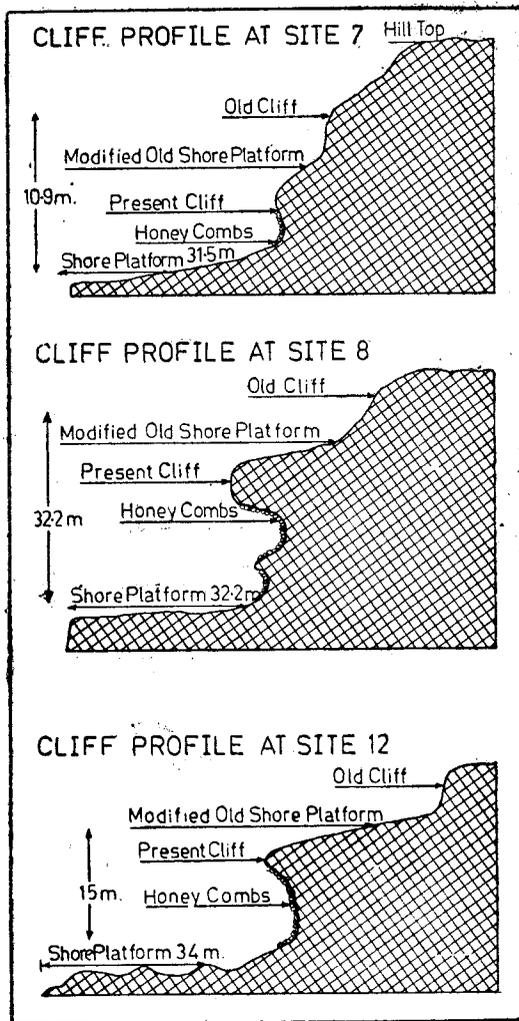
Cliff profiles at three representative sites are shown in figure 2. The flat surface at the top of the high tide cliff seen at many places and seen in profile at site 8 and 12 is an old shore platform modified by present day subaerial processes. This surface is backed by an old

sea cliff which is very difficult to identify in the field, due to its inconspicuousness. High tidal cliffs invariably show wide caves with honeycomb cavities all over the cliff faces.

Conclusion

It can be summarised that the shore platform at Harihareshwar is quite a conspicuous coastal feature on Maharashtra coast. Here, present day intertidal platform, occurs along with ancient shore platform and cliffs that are excessively eroded and modified by subaerial processes. The old platform can be recognised with reference to its association with present day cliffs and platform. It is however not possible to date these old platforms. They are probably related to eustatic changes of the past. The level at which these probable old platform occurs is 10 metres ASL and all possibility suggests a high sea level in early Holocene. The width of the ancient platforms and cliffs cannot be determined exactly as these features have lost their original shape, size and inclination.

The present day shore platform all around the hill is bordered by a low tide cliff of 1.2 m height. The low tide cliff at this height suggests the wave and tide oriented nature of these shore platforms. The present day platform is without doubt intertidal in nature shaped by abrasion carved by tidal waves. The honeycomb weathering, caving, undercutting and overhangs indicate the strength of storm waves and also suggest a rising sea level.



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