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MECHANICAL AND CHEMICAL ANALYSIS OF BEACH ROCK MATERIAL IN DIVE AGAR AND SURROUNDING REGION

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ABSTRACT

In recent years the material analysis is gaining importance in geomorphic study of beach and beach rock material. Beach rock (Karel) is the characteristic features found in the study area According to Gulcheir (1961) the lithified beach material is called beach rock The fragments of shell provide cement for lithification of beach material. It is calcareous in nature. High temperature in tropical areas assist the cementation processes and consolidation takes place in the inter tidal Zone. Several distinct layers beach rocks have been observed at Dive Agar, Aravi and Velas in the study area. Davis (1977) suggest that the beach rocks are found in a coasts where shore is retreating and thus it indicates negative change of sea level. The beach rock in streams and dunes show homogeneous mass consisting of sand and line shell fragments. Beach rock provide raw material to cement factories and their blocks are used for building compound walls and construction of houses.

KEYWORDS: *Homogeneous, Beach rocks, Lithification, Cementation.*

STUDY AREA:

The study area is narrow strip of costal land extending between 18º 3' N to 18º 18' N Latitude and 72º 5' to 73º 58' Longitude length of the study area is about 25 km and width varies from 5 to 10 km.(Fig. 1: Location map)

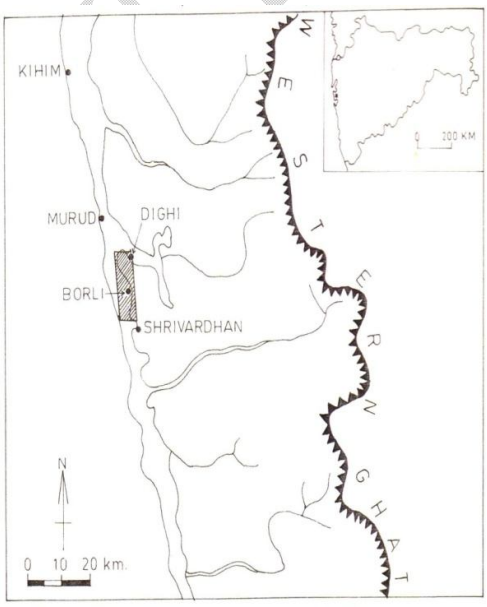


Fig.1: Location Map

METHODOLOGY:

Data from the Dive Agar, Aravi and Velas Beach. Collected samples mechanically and chemically.analysed. The result analysis have been tabulated. The grain size distribution is graphically represented by using statistical techniques.

Aravi Beach Rock (Karel) Material :

Beach rock material was analysed by seiveing machine. Five karel samples are taken from 'Aravi karel'. having varying depth. At Aravi depth of karel is nearly 10 feet and a continuous platform like structure having their layers incline towards the sea, so that we may conclude that it was a old sand bar, but now it is fully lithified. There is a 5 to 659 Km. gap presents upto Valvati village. The tidal water enters inland upto Valvati by the tidal stream. The whole sand bar (karel) is backed by tidal channels.

Aravi Karel							
Aravi	Median	Mean	Skewness	Sorting	Kurtosis	Clay in %	Calcium in %
S1	2.6	1.76	0.05	0.7	0.99	11.0	30
S2	0.15	2.16	0.85	0.3	0.34	2.85	56
S3	-0.25	0.33	0.119	0.25	1.116	5.3	46
S4	-1.0	1.35	0.32	1.2	1.34	3.7	44.8
S5	-1.55	0.9	-2.75	0.27	-0.635	6.6	40
Velas Karel							
S1	-2.33	0.7	0.52	2.0	-1.74	0.21	38.8
S2	-2.8	-1.43	0.31	1.475	1.25	1.5	50.4
Dive Agar Karel							
S1	-1.8	0.16	0.39	1.865	2.06	1.2	80.2
S2	-3.7	-1.13	0.36	1.8	-0.23	1.8	62.2
S3	-3.63	-1.68	0.36	1.89	-1.048	2.0	25.0
S4	-1.43	0.87	0.609	1.165	1.28	90.0	00
Dive Agar Dune							
S1	1.9	2.82	1.82	0.75	0.828	0.5	42.0
S2	0.55	1.2	0.35	1.695	0.81	1.0	40.0
Source: Calculated and Compiled by author							

Aravi karel material shows a significant variation in mean and median size distribution. In case of all samples which are taken from Aravi beach rock. The median size on the phi scale vary from -0.25 to 2.6 where as mean size vary from 0.9 to 2.16. First sample shows highest median value while second shows highest mean value. All the samples indicates that are positively skewed. The skewness varies from -2.75 to 0.05. The sorting index varies 0.3 to 1.2 and shows poorly sorting condition. Kurtosis curve indicates very platy kurtic, platy kurtic and leptokurtic condition. First and third sample shows platykurtic, second and fourth indicates very platy kurtic and fifth shoes lepto kurtic condition. The percentage of clay is very less in old samples then other batches. Calcium percentage is also higher in all samples. It is apparent that calcium carbonate is an important constituent of beach rock. First sample contains least amount of calcium carbonate. The maximum observed carbonate content of beach rock is 56%. It increased slightly towards the bottom high percentage of calcium helps to lithify the old sand dunes or beach. (Fig 2)

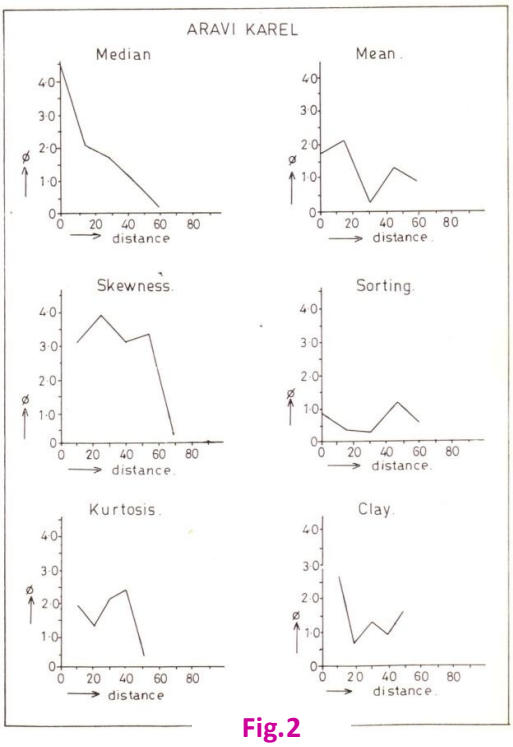


Fig.2

The frequency distribution curve shows there is a similar gap between all samples found at the size group 2.5. In the first sample which are taken from the top of the platform. 60% of the total weight is concentrated a group between Ø1.0 to Ø 2.23 and 14% is concentrated between Ø 2.5 to Ø 4.23. eighty five percentage weight of the total weight of second sample concentrate between the size group of Ø 1.73 to Ø 4.33. In third sample 65% of total weight concentrate between Ø 1.23 to Ø 3.3 size group. Fourth sample shows 48% of the weight concentrate between Ø 1.0 to Ø 3.0. The last sample shows same as

fourth sample. (Fig 3)

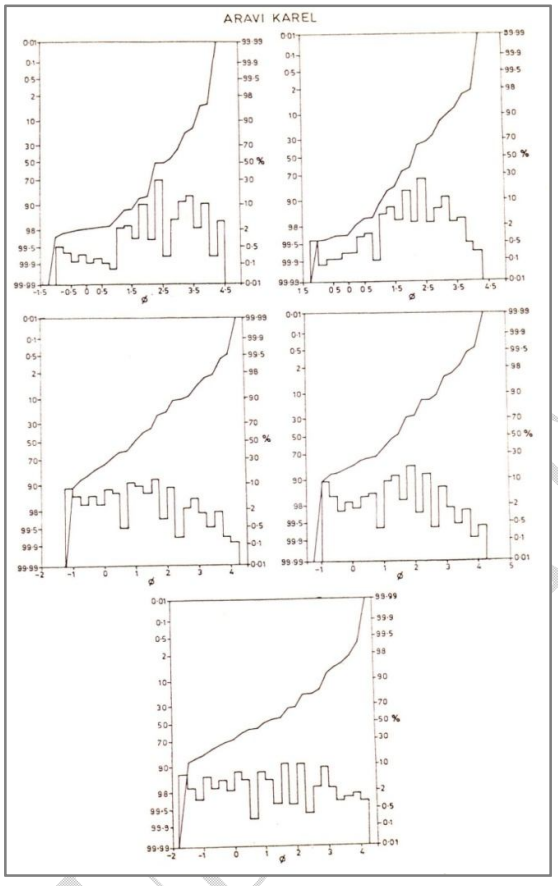


Fig.3

VELAS KAREL ANALYSIS:

The occurrence of karel on Velas beach is along roadside, but in small patches consisting small pieces of rocks, pebbles, lateritic pebbles and shells. The proportion of shells is higher in Velas karel most of the port of beach rock was removed by the waves at high tide period.

Two samples are collected from Velas karel. One was taken from the top of beach rock and second from the bottom and analysed. The median value is -223 and-28 meen value is 0.7 and -1.73. The skewness values shows positively skewed condition. Sorting index is 2.0 and 1.475. Percentage of clay is very less in the top sample and it slightly increase towards the bottom. The bottom samples have 1.5% clay.

The percentage of calcium is also higher in the bottom sample, it is about 50.4% and in the top sample it is 38.8%.Velas beach rock material is very coarser material and it consists of the marine and fluvial both type of material which curve through the small gullies.

The probability graphs shows many changes taken place in the karel material. Frequency distribution curve on histogram shows many gaps. Only the material concentrated in the size group of Ø -3.0 to Ø 4.5. The material is very coarse. (Fig 4)

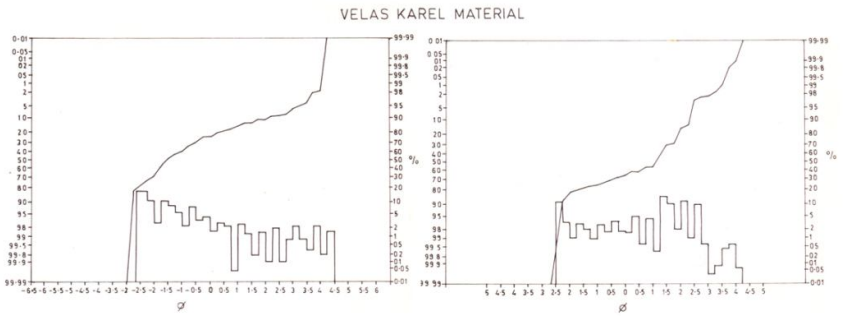


Fig.4

Dive Agar Karal Material:

Wide and extensive beach rock is found of Dive Agar having 10 meter depth Four samples are collected from each layer of well section Today it is occupied by coconut plantation and settlement.

The values of mean, median, skewness, sorting, kurtosis are obtained from analysis of samples Median value varies from -1.43 to -3,7 but the difference in all median values are not significant. The mean values also shows very slight difference varies from 1.13 to 0.97. The skewness value indicates very positively skewed condition and sorting index shows poorly sorted condition. First sample is very leptokurtic, second and third is very platy kurtic and fourth is leptokurtic. Calcium percentage is highest in all samples it varies from 0% to 80.2%. In the sample fourth there is absence of calcium carbonate. The first sample having highest 80,2% of calcium. Percentage of clay is higher in fourth sample i.e. marine clay (fig.5)

The frequency distribution curve shows a number of gaps there is a wide gap between size groups of Ø 1.73 to Ø 3.0 in the fourth sample and also there is absence of material in this group. In the first sample the size group Ø -1.8 to Ø 0.5 having 62% of its total weight and 35% concentrate in the size group of Ø 0.73 to Ø 3.0 Second and third sample having 70 to 76% of their total weight is concentrated between the size group of Ø -3.6 to 0 and fourth sample having material only Ø 1.5 to Ø 4.23 size groups. (fig 6)

Dive Agar Dune Material:

Two samples are collected from Dive Agar dune material. One from windward and other from leeward side. Windward side material having black in colour while the leeward material is white to because of the small pieces of shells and white sand. But the analysis of that material do not show a significance difference. The median value is 1.9 and 0.55, mean value is 2.82 and 1.2 sorting and kurtosis values are 0.75, 1.675 and 0,828, 0.8 and skewness values are 1.82 and 0.35 fig.5. Clay percentage is very less in both sample but calcium percentage is higher about 30% and 40%. The material is very fine toward the lecward side and highest concentration of its total weight is in the size group between Ø 2.23 to Ø 24.23 and leeward side the highest concentration of material is between size group of o.0 to $ 2.0. Frequency distribution curve shows number of gaps but all they are not similar coarse material is found on the leeward side of sand dune. (fig.7.)

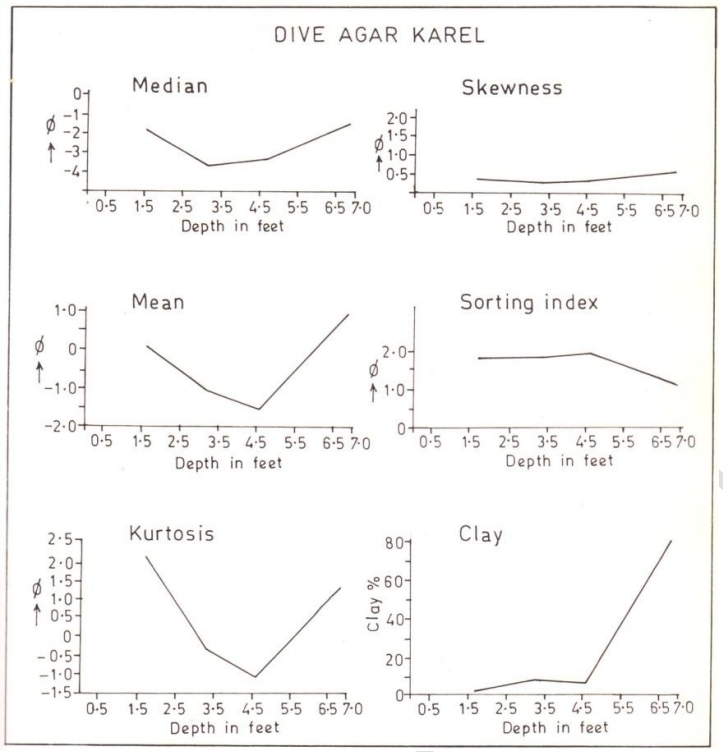
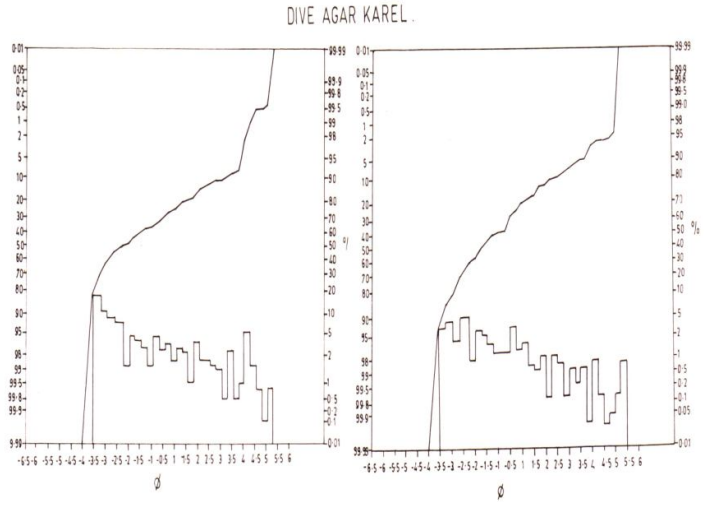

DIVE AGAR KAREL
Median
Skewness
Mean
Sorting index
Kurtosis
Clay
Clay %
Depth in feet
0·5 1·5 2·5 3·5 4·5 5·5 6·5 7·0

Fig.5


DIVE AGAR KAREL

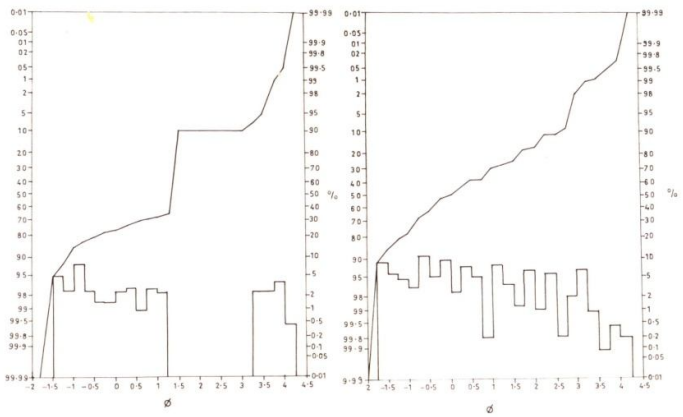


Fig.6

DIVE AGAR DUNE MATERIAL

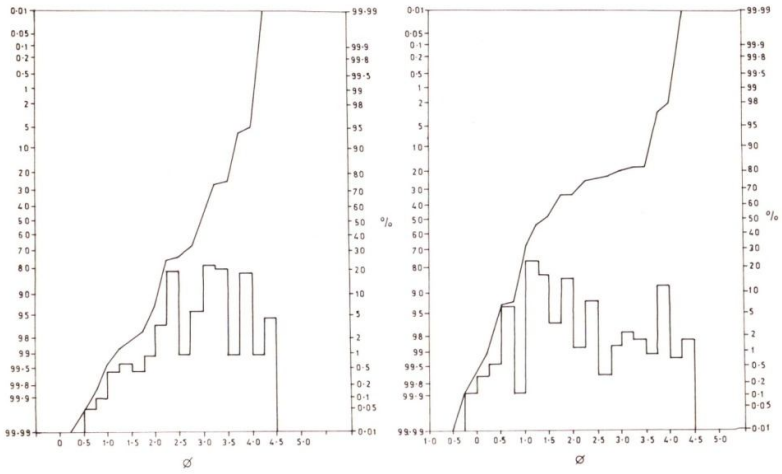


Fig. 7

CONCLUSIONS:

High concentration of calcium in beach material is a major source of cementing material in process of lithification since the proportion is considered to be an important factor in development of beach rock (Karel).It provides media for the plant growth particularly in the back shore zone which restrict the movement of sand dune and make them quasi permanent in nature. It also provides protection from the stormy waves.

Karel scattered in different parts and found at different depths clearly indicates different phases of marine regression. Beside these morphological evidences it may be noted that during Shilahar denasty Dive Agar was a major settlement in this part of konkan and Mhasala was an inland port in Ptolemy's map gives clear indicatation that during recent part sea level was slightly higher than present so as make it possible for the vessels to reach Mhasala which is about 50 km. inland from sea.

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