

DELINEATION OF HEAVY MINERAL ZONES FROM COASTAL TRACT OF NEWARA BEACH, RATNAGIRI DISTRICT, MAHARASHTRA STATE, INDIA

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ABSTRACT

The coastal tract of west coast of Maharashtra has attracted many research workers to carry out research on different streams like tectonisms. The beach sand of the coast is characterized by high concentration of heavy minerals. In order to understand the mineralogy and pattern of heavy minerals, the present investigation was carried out along the northern coastal tract of Newara, Ratnagiri district in Maharashtra State. The sediment analysis was carried out by adapting standard methods of modal, petrography, bulk density and mechanical analyses techniques. The study revealed that the sands from the area are concentrated with heavy minerals like Ilmenite, Magnetite, Hematite, Rutile and Zircon.

KEY WORDS: Coast, Delineation, Heavy mineral zones, Newara beach, Ratnagiri

INTRODUCTION

The Socio-economic development of any nation is pivoted on the mineral resources available for utilization. The mineral deposits are of primary and secondary origin. The mineral deposits with primary origin include magmatic, hydrothermal and metamorphic while minerals with secondary origin include residual, supergene enrichment and placers. The west coast of Maharashtra, the coastal tract has attracted many researchers to carry out research on different streams like tectonisms (Powar *et al.* 1979b; Powar, 1993), Geomorphology (Sawant, 1980), Neo-tectonics and Sedimentology (Sukhtankar, 1989) etc. The shore line along the west coast of India provides fascinating opportunity to research workers due to richness in heavy mineral content (Sundararajan *et al.*, 2009; Gujar, 2010; Abhineetkumar, 2011). To understand characteristic occurrence, mineralogy, distribution pattern of heavies etc., standard investigation methods were carried out.

Area of Investigation

The present study area is Newara beach which is part of Kokan coastal belt in Maharashtra State. It is North-South extended narrow strip from North of Ratnagiri (Lat. 17° 00' N & Long. 73° 10' E and Lat 17° 25' N Long 73° 25' E) having about 50km stretch with average width of 2Km. (Figure-1). The area lies in the Survey of India topographic sheets 47 G/3, 47G/7 and 47G/8 (scale 1:50,000), and falls under humid to tropical humid climate, with average annual rainfall of 3000mm and temperature variation between 25°C to 44°C. Geologically the area is largely occupied by older Deccan Basaltic flows (Cretaceous age) and younger Laterites (Tertiary age). The beach sediments are relatively youngest (Quaternary age). (Figure-2)

METHODOLOGY

The present study is mainly intended to delineate rich zones of heavy mineral concentration along with the mineralogy of heavy minerals and concentration of heavies in different size fractions. To achieve these objectives, field observations were supplemented with adaption of standard methods of techniques for sampling and laboratory studies. The samples collected were analyzed for bulk density measurements, sieve analysis, modal analysis, petrography etc. The results are depicted in Map.

RESULTS AND DISCUSSION

From the reconnaissance survey during field studies it is revealed that the concentration of heavy minerals is abundant on Newara beach situated north of Ratnagiri, hence the study area.

Sampling- With an aim to have better representation of quality and grade of heavies, the grid type sediment sampling (200mts along and 30 mts across the beach) (Figure- 3) method was used. The samples were collected up to water table in high tide zone or up to 2mts depth away from shore by auger.

Bulk density analysis- The collected samples were dried to remove excess moisture and tightly packed in a hollow cylinder of known volume. It was weighed and bulk density values were calculated by dividing known volume of cylinder. From these values heavy mineral concentration map was prepared (Figure-4) for Newara beach.

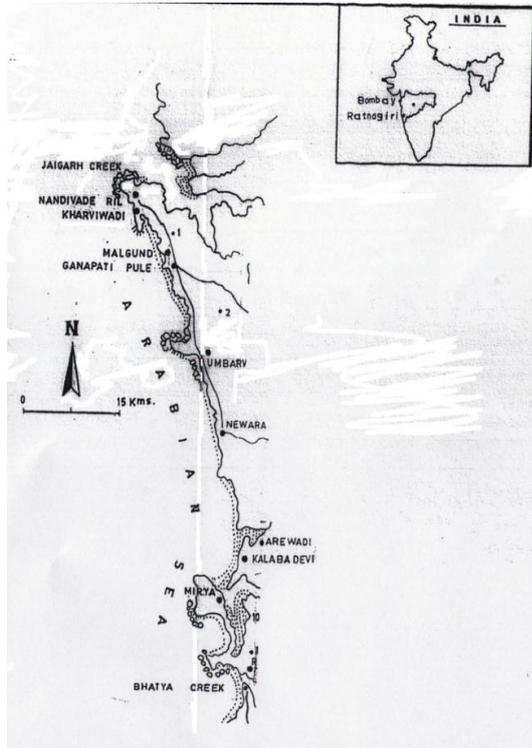


Fig.1: Area of Investigation

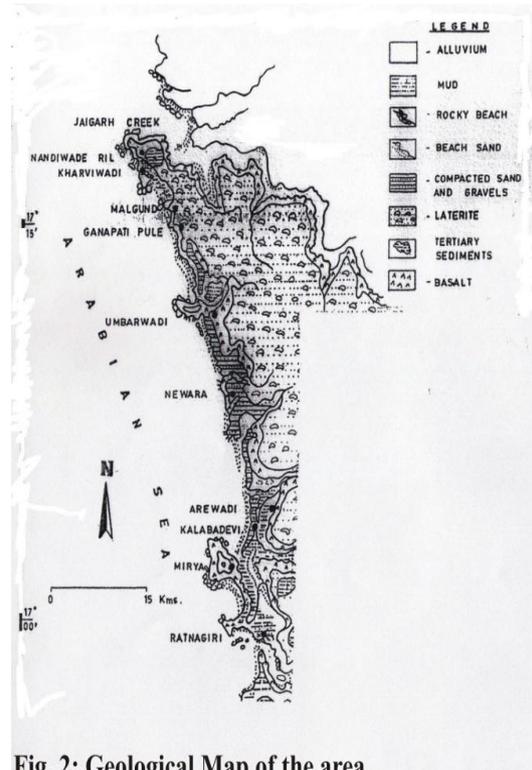


Fig. 2: Geological Map of the area

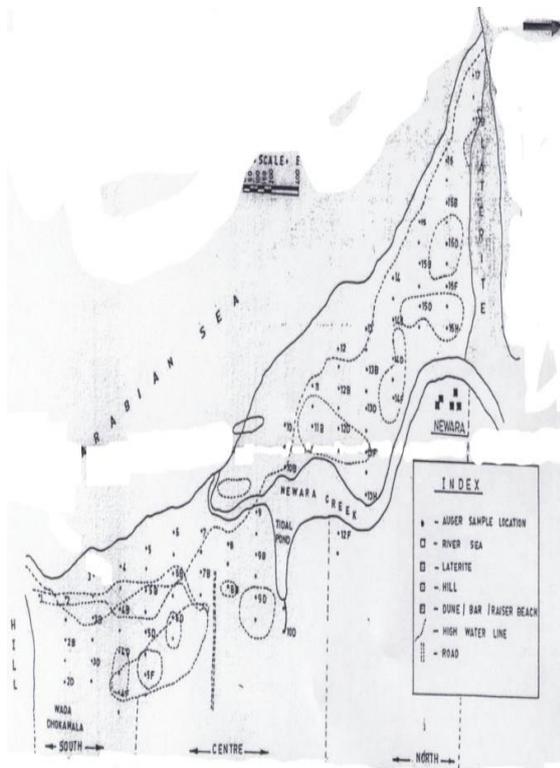


Fig.3 : Sample location map of the area.

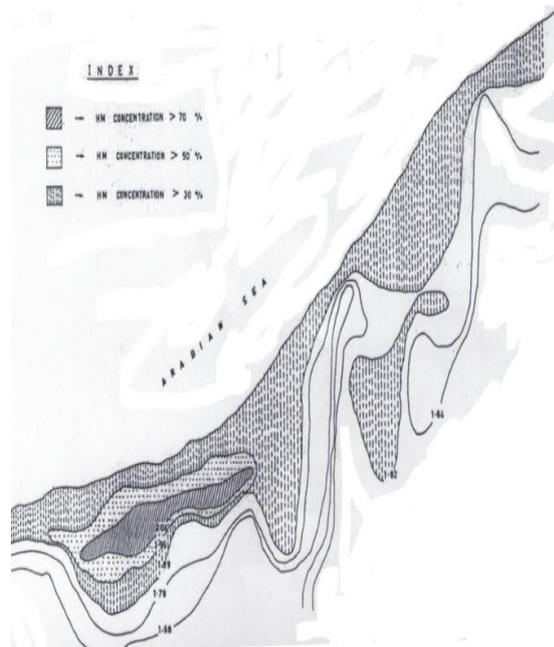


Fig4: Heavy Mineral Concentration map of the area



Plate I : Photomicrograph showing Opaques and Zircon minerals.

Mechanical / Sieve analysis- After careful washing, acid treatment and drying, 40gms of each processed sand samples were used for sieve analysis.

Liquid and Magnetic Separation- All sand samples were treated with 100 cc of bromoform for 30 minutes to separate heavy minerals. Thus collected heavy minerals were subjected to electromagnetic separation. For effective separation of Ilmenite from magnetic minerals Frantz Isodynamic separator was used.

Microscopic and modal analysis- The separated heavy minerals were mounted on glass slides for microscopic studies and modal analysis (plate 1). After counting, heavies were converted to population percentage.

Conclusion

Field observation showed that the concentration of heavies in the form of heavies is maximum on Newara beach, north of Ratnagiri. Using bulk density values, heavy mineral distribution map for Newara beach was prepared. The map showed that the southern part of the beach has high bulk density values (> 2), signifying maximum concentration of heavies. This productive zone has average strike length of 1300 mts and width of about 80 mts. Mechanical analysis of sand samples indicated highest concentration of heavy minerals in 300 mesh size fraction. The heavy mineral concentration was observed to increase with decrease in size. Modal analysis indicated abundance of heavies in the sand samples as- Ilmenite, Magnetite, Hematite, Rutile, Zircon etc.

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