CHAPTER I

INTRODUCTION

The area selected for the study is a part of the West Coast of India in Sindhudurg district, Maharashtra State. The coastal tract under the present investigation stretches for a distance of about 30 km. in north - south direction, with an average width of about 10 km. It is bounded by the Achra Creek to the north and the Karli Creek to the south and lies in the Survey of India topographic sheets Nos. 47 H/8 and 47 H/12. It lies between latitude 16°, 0' N and 16°, 15' N and longitude 73°, 25' E and 73°, 32' E. The area is accessible by road from Solapur and also from Kolhapur (Fig. 1.1).

PHYSIOGRAPHY AND CLIMATE

The study area is the coastal tract which lies to the west of the Western Ghat scarp. It is plain with minor development of marshes in the western part and is marked by the presence of a few tidal inlets. In the central part of the area, a sandbar is developed at the mouth of the estuary. During floods, mud flats on either banks of the estuaries are inundated, leaving behind extensive suspension deposits.

The area experiences humid tropical climate. Months of June to September receives heavy rainfall and on an

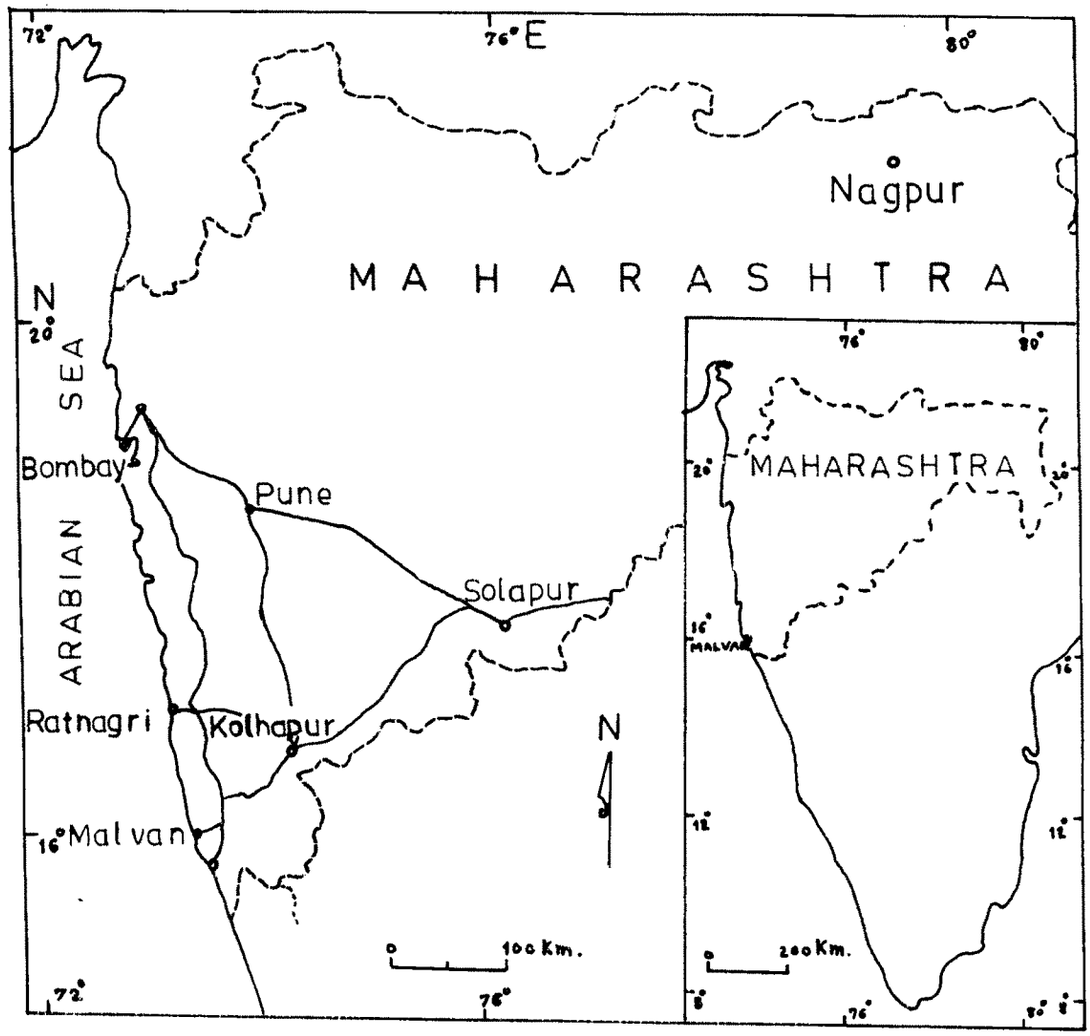

Fig.1·1 LOCATION MAP

average 3430 mm per year. During the rest of the year, the maximum temperature varies between 35°C to 40°C.

PREVIOUS WORK

The available literature on the West Coast of India is related to various aspects, such as; tectonics and its tectonic evolution, Deccan basalts and associated differentiates, geomorphological characteristics, neotectonics, Quaternary sedimentaries, palaeoclimate and palaeobotany, etc. The present area of investigation has been selected mainly to study the Quaternary sediments present along the coast and coastal geomorphology. The literature available pertaining to the Quaternary sediments and geomorphology has been examined and incorporated in the following paragraphs;

The detail study of Deccan basalt has been brought out into two volumes by Geological Society of India. These are Deccan volcanics (1982) and Deccan Flood Basalt (1988). The research papers in these volumes cover the field characters, geomorphology, geochemistry of the Deccan basalt Formation. Deccan basalts and associated differentiates have been studied by Sukheswala and Poldervart (1958), Sukheswala and Sethna (1962).

Ahmed (1972) has dealt with the Coastal Geomorphology of India including that of the West Coast of India, on the basis of data obtained from large scale topographic maps. Geological Survey of India (1980) published Special Bulletin on Geomorphology of Kerala Coast.

Subramanian, et. al. (1980) have discussed coexisting multi-planation surfaces on regional dimensions, traced on the basis of landform profiles, south of latitude 15°, 05' N in the Indian Peninsula. Senthiappan and Nair (1980) have brought out the relationship between drainage pattern and lithology and have depicted the base level changes by erosional levels. They have also discussed neotectonism of the parts of Cannanore district of Kerala. Moni (1980) has thrown light on the coastal erosion in Kerala and reported the rate of erosion as 0.4 m per year with a sea level rise of about 1.2 mm per year. Shore recession of about five meters per year at Cheriakadav and eight meters per year at Trikunnapurha has been observed from a study of the maps of Kerala Coast by Earattupurha and Verghese (1980). Nageswara Rao and Srinivasan (1980) have studied geomorphology, structure and sedimentation in the Palghat region of Kerala.

Geological Survey of India publication (1984) includes three papers on geomorphology of the Maharashtra region. Ravi

Shankar and Dubey (1984) observed tilted beds of indurated older alluvium, exposed in Gul nadi section in Tapi Basin, which is inferred as an evidence of strong neotectonic movement. Khan and Banerjee (1984)recognised four geomorphic units around Tapti - Vaghur confluence in the Jalgaon district of Maharashtra. These are, i) Present day flood plain of Tapti and Vaghur rivers, ii) Terraces of the Tapti and Vaghur, iii) Ravinous tract and iv) Mounds of Deccan basalts. Tilting and shifting of terrace blocks along NW - SE trending fault, as an evidence of neotectonic activity has also been inferred by Khan and Banerjee (op. cit).

Morpho-tectonic evolution of the southern part of the western coastal tract of Ratnagiri and Sindhudurg districts of Maharashtra has been studied by Tiwari (1984). According to him, topography of the coastal tract of Maharashtra has evolved mainly under the tectonic influence, coupled with erosional processes and the erosional surfaces from 300' above msl to successively lower elevations have formed due to periodic uplift of the tract as a whole. He has estimated the total uplift of the order of about 200 m. and has further thrown light on the eustatic Quaternary sea-level changes from the observation of dissected aggradational channel lags of the present streams and the presence of relict marine cliffs and

wave-cut platforms at 15 m. above msl, while investigating the area of about 1,500 sq.km. of the southern part of the West Coast.

Powar, et al. (1978, 1979 a and b) and Powar (1981) have made detailed studies by field mapping and LANDSAT imageries to understand geomorphology and tectonic evolution of the Konkan coastal belt of the west coast of Maharashtra.

Geological studies of the coastal tract between Alibag and Srivardhan, Kolaba District, Maharashtra; has been dealt with by Sawant (1980), wherein geomorphological characters along with Quaternary sediments of the coastal tract have been studied in detail.

Textural studies of the coastal Quaternary sediments along the west coast between Agashi Creek and Bassein Creek District Thane, Maharashtra; has been detailed by Pandian (1988).

Department of Geology, M.S. University, Baroda has published three seminar volumes, as the Quaternary Environments (1982), Quaternary Episodes in India (1985) and Quaternary Landscope of Indian Subcontinent (1991). Ganapathi and Merh (1987) studied in detail the features of the Saurashtra Coast. They have delineated the coastal features and identified that

all the coastal landforms are made up of the Quaternary sediments. Continental shelf sediments of Vengurla and Mangalore have been investigated by Hashimi, et al. (1978), depicting textural characters of sediments. Depositional environments of clastic sediments from Kalbadevi, Mirya and Ratnagiri Bays, Maharashtra have been investigated by Rajamanickam and Gujar (1988). Late Pleistocene carbonate sediments and rocks on the western continental shelf of India have been studied by Hashimi (1988).

Reddy (1976) has thrown light on wave refraction in relation to sediment transport tendency along the west coast of India. Coastal laterites of the Maharashtra State have been studied by Sahasrabudhe (1983), with special reference to its chemistry.

METHODS OF STUDY

The area under investigation is a coastal tract that extends for a distance of about 30 km. with an average width of about 10 km. A part of the toposheet was enlarged to the scale 10 cm. = 1 km. The field work was carried out in the months of October and November 1989. During the field work, lithological characters of different units were recorded

alongwith their thicknesses and areal extent and lithological map has been prepared.

For laboratory investigations, representative samples from different lithological units, in the form of beach, raised marine terrace and dune were collected. Sampling was carried out by placing a square grid on different sectors along the coast.

While carrying out sampling, the initial surface along the beach was first scraped off and a thin cylinder about 30 cm. in length with 8 cm. diameter was pierced and sample was collected. Samples were also collected from the raised marine terrace after scraping off the exposed surface.

Vertical sections, depicting the occurrence of the Quaternary sediments along the beach have also been prepared.

The laboratory investigations include textural analysis of the modern sediments. In textural analysis, the parameters investigated include size, sphericity and roundness. Statistical analysis of these textural parameters has been carried out. The analytical methods used in the present study and computation of the textural parameters have been explained, in detail, in the respective chapters.

OBJECTIVES OF STUDY

The present studies have been undertaken mainly with the following objectives;

i. to document the coastal geomorphic features and classify them according to their origin,

ii. to collect the Quaternary sediment samples for their textural analysis,

iii. to study the textural parameters, such as;size, sphericity and roundness and compute statistical parameters,

iv. to examine the interrelationship between different textural parameters and

v. to synthesise the above studies to understand the shoreline response to neotectonic activity in the area proposed for investigation.