CHAPTER 4

4.1 Physical set-up of the Alibag tahsil of Raigarh district:

Konkan constitutes a narrow belt between the western mountain range (regionally known as Western Ghats) and Arabian Sea. It stretches about 720 km from the River Tapi in the north up to the River Terekhol in the south and encompasses six districts viz. Thane, Greater Mumbai, Mumbai, Raigarh (former Kolaba), Ratnagiri and Sindhudurg (previously under Ratnagiri). The coastal zone of Maharashtra extends from 15°43’N and 20°10’N and longitude between 72°39’E and 73°30’E. The coastline is indented by numerous river mouths, creeks, small bays, headlands, sandy and rocky beaches, promontories, cliffs etc. In the north of Mumbai it is wide up to 100 km, which gradually decreases towards south and near Vengurla, it is hardly 40 km. The coast is indented with number of beaches, 15 rivers and 5 major estuaries and over 30 backwater regions. According to the surveys by the State Government agency Maharashtra, the total area of all the coastal districts is 30645.5Km² comprising built up land (1.58%), agricultural (44.14%), forests (19.48%), wastelands (28.72%), water-bodies (4.13%) and land under grasslands, mining areas and saltpans; (1.95%).

Evolution of Western Ghat has played significant role in the genesis of Konkan. The tectonic uplift initiated by the collision of Indian and Eurasian Plate during Early Tertiary has resulted in the formation of Western Ghat escarpment. The western extension of the uplifted Cenozoic plateau that was submerged under waters of the Arabian Sea has evolved as Konkan. This narrow coastal belt is arranged in step like terraces, pointing to the recent oscillations in the sea level and of submergence as evident from the drowned valleys, lagoons and sand bars. Wave cut cliffs and platforms are also common along the coastline indicating changes in the sea-level. (Source: District Census book 1991)

The basaltic flows and intrusive, Inter trepan and laterite capping are common geological features of Maharashtra coast. A greater part of the coastal belt of Maharashtra is developed as a resultant of several morpho-dynamic cycles. The basement of basalt flows was formed by extruded Deccan Volcanic activity during Late Cretaceous – Early
Tertiary period with a minor metamorphosed Dharwars in the southernmost section of Sindhudurg. The Precambrian granites and gneisses, quartzite’s and amphibolites are exposed in the region around Vengurla that continues up to the Karwar (Karnataka state). The coast displays a variety of landforms developed due to fluvial and marine activity, both erosional and depositional during the Tertiary and Quaternary periods.

(Source: District Gazetteer of Raigarh district)

According to the forest classification by Champion and Seth (1968), the vegetation of Konkan comprises of a) Inter tidal swampy forests on the tidal saline sediments along the estuaries and creeks, b) Plateau vegetation at lower elevations or plains representing moist to dry deciduous forests c) Semi evergreen forests are interspersed with the patches of Montane subtropical evergreen forests and West coast semi-evergreen forests along the ghats. Some of the coastal areas are also endowed with small grassland and scrublands especially in Thane and Raigarh districts.

The topography of the Konkan coast is congenial to settlement. In this area, bays, peninsula, estuaries and capes coexist, and the combination of the influences of the land and the sea is seen. The narrow and broken coastline causes creeks and inlets in the Arabian Sea, whose tides thereby deeply penetrate into the country. This favours the growth of a number of littoral ports which are naturally protected. This is one of the few areas of the sea-boards of India that is sheltered from the sea. The settlement pattern in this region is intimately connected with both littoral and estuary ports. The towns are formed in the estuaries at points where the tides carry in the boats.

Maharashtra has a coastal line of about 720 km and rivers of about 3.2 thousand km and canals of about 12.8 thousand km length. The number of marine fishing villages/hamlets in Maharashtra is 386. The area suitable for marine fisheries; is 1.12 lakh sq.kms, for inland fisheries 3 lakh hectares and for brackish water fisheries 18,600 hectares. Out of the 1.12 sq.km area is for marine fisheries. 55.5 thousand Km². is upto 72 meters in depth and is being harvested at present. The potential of fish catch from this area has been estimated at 6.3 lakh tonnes per year. (Source: The State Profile of Maharashtra by S.I.S.I. (Small Industries Services Institute), Mumbai 2000-2001)
4.2 Raigarh district of Maharashtra

The total area of Raigarh district in Konkan is 7148000 Hectares. Its latitudinal-extension is from 17°.51’ N to 19°.80’ N and longitudinal extension is from 72°.51’ E to 73°.40’ E. The maximum temperature is 40.4°C and the minimum temperature is 16.1°C. The average rainfall is 3884.3 mm. As per the census 2001 the total population of the district is 22.07 lacks and the population density is 308 per sq. km. The sex ratio is 976 females’ per1000 males and the literacy rate is 77%. This district has 15 tahsils and 1919 villages (Source: Census Book District Raigarh)

4.3 Location of Alibag tahsil of Raigarh district

The study area selected; is Alibag tahsil in Raigarh district of Maharashtra state, India. The tahsil has 50148 ha of geographic area and has about 54.5 km long coastline. The Alibag-tahsil has 189 villages and two towns with population of 221661as per 2001 census. The area extends between latitudes 18° 56’ N to 18° 29’ N and longitudes 72° 51’ E to 73° 04’E. The area is surrounded by sea coast on its north East, North and Southern part. (Source: Census Book District Raigad)

Alibag is situated at 18° 38’ 29” north latitude and 72° 52’ 20” east longitude, on the west coast of India around 35 km south of Mumbai. The nearest Jetty is Mandva from where catamarin or ferry services are available to Gateway of India, Mumbai. Alibag is the head-quarter of the Raigad district of Maharashtra. In Alibag tahsil there are 214 villages. (Resource: Raigarh District Gazetteer 2006)
LOCATIONS MAP OF THE STUDY AREA

DISTRICT BOUNDARY
TAHSIL BOUNDARY
TAHSIL HEADQUARTER
BONDI
VARSOLI
REWANDA

Figure: 4.1 Location map of the study area
Figure 4.2 Village Boundary Map of Alibag Tahsil
There are 17 fishing villages with 3093 fishing families in Alibag tahsil.

1 Rewas 2 Bodni 3 Navkhar 4 Mandva 5 Sasvane 6 Agarsure 7 Navgaon 8 Thal 9 Chalmal 10 Warsoli 11 Alibag 12 Sakhar-Akshi 13 Nagaon 14 Chaul 15 Theronde 16 Rewdanda 17 Agrav. The total population engaged in fishing is 7732. (Source: Fisheries Department, Alibag works under the Director of fisheries, Maharashtra.)

All these fishing villages are placed at more or less equal distance from each other, along the coast of Alibag tahsil. Houses in all settlements are almost parallel to the coast. Almost all fishing villages are linear type of settlements. Most of the settlements are located on the creeks i.e. small and large sea-water inlets. Fishing boats are anchored...
on the mud flats in these sea water inlets. Repairing of boats during the slack period is a common feature at every fishing settlement. These sea water inlets are protected areas and the fishermen can protect their fishing boats from the effects of the open seas. In the topographical sheets (47 B/13 & 47 B/14) cultivated areas are colored yellow. All fishing settlements have rice fields in the vicinity of them. Presence of dense mangrove vegetation, swampy areas and exposed rocky areas of the coastal parts are the common geographical features at and around each fishing village. In almost all villages many houses of the fishermen are near the high tide line and in some settlements even on the mud flat. All fishing villages are away from the dense reserved forest areas but a thick belt of coconut, betel-nut, casuarinas (in Marathi Suru), mangrove and other trees are found in the vicinity of almost all fishing villages. A temple, a place for the fish-auction, primary school, office of the cooperative society, shops that provide diesel, ropes and other hardware, large open grounds for drying the fish are other important features which are found at all fishing settlements in Alibag tahsil. In all fishing settlements proportion of non engineered houses is more than semi-engineered and engineered houses. The roads inside the settlements are narrow. Almost in all fishing settlements one main road passes through the settlement on either side of which the growth of houses and other structures is found. Many settlements still do not have modern sophisticated cold storage facilities. During monsoon season the roads become muddy and water gets accumulated at many places in the villages. Coastal embankments are found at some settlements but they are not sufficiently strong and tall. (Source: Field observations)

The main occupation of the people in these fishing settlements is fishing. Out of the 60% of the fish production of Mumbai comes from the fisherman of residing in the villages of Alibag tahsil. (Source: Fisheries Department, Alibag)

The people in these settlements are known as “Koli”. Majority of “Koli” people have their surname as “Nakhawa” or “Koli”. Fishing is their main occupation and the second major occupation of the people in these fishing villages is farming. It contributes to the production of Rice in Raigarh district (Raigad is second largest district in production of rice in India). The farming population is called as “Agri”. “Agri” and
“Koli” are two sub-castes belonging to Hindu religion. The people of these two sub-castes are mainly native to Alibag tahsil of Raigarh district.

The major marine fish caught in these villages include mackerel, sardines, Bombay duck, shark, ray, perch, croaker, carangid, sole, ribbonfish, whitebait, tuna, silver belly, prawn, cuttlefish, etc. (Source: Fisheries Department Alibag work under the Director of fisheries, Maharashtra.)
Geo-Environmental Assessment of the Fishing Settlements in Alibag Tahsil of Raigarh district, Maharashtra.

Figure 4.3 Base Map
With the advent of GIS, it is possible to store and retrieve all the theme maps on the computer by digitization in a systematic manner. The detailed methodology followed for the investigation in the above map (Base Map) of the study area. Various layers like Arabian Sea, Settlement, island, creek Sand and mud deposition have been generated in the above base map.
Figure: 4.4 Geomorphic Map
Geomorphic maps are drawn using digital mapping, aerial photographs and satellite images.

Geomorphic knowledge is applied for the study of settlement. It is beneficial for planning, development and management of fishing settlement.

Physiographically, the region is a distinct strip of low land, interspersed by hills, rounded hills, (northern side of the Kundalika River, almost in central part of the Raigarh district), rising in elevation from sea level to 380m, at places to more than 370m. There is a mud and sand (stone) deposition in west part of the Alibaug tahsil near the coast line of Arabian Sea.

Two main rivers are flowing in the Alibag tahsil named Kundalika and Amba. The drainage pattern of the area is centrifugal (radial from the hill tops in all direction and flow down slope of the hill flanks. The Kundalika and Amba both rivers are perennial and all other streams of the area are seasonal.
Figure: 4.5 Contour Map
Contour map shows the elevation of the study area. That helps to infer about the distribution of highest and lowest points of the study area.

The study area shows that highest elevation lies away from the water body, and the lowest elevation lies near water body. The range variation is from 0 m. to 320 m. above the mean sea level.

The three selected fishing villages i.e. Bodni, Varsoli and Revdanda villages situated where the contour value is 0 m.

In general contours are very sparse. This indicates that most of the area is occupied by the plain.
Figure: 4.6 Land use / land cover Map
Land is the most important natural resource in the environment. Land resource embodies soil, water & associated features involving the total ecosystem of late growing population. Accurate information on land-cover change and the forces and process behind is essential for designing a sound environmental planning and management. Land-cover analysis provides the base-line data required for proper understanding of how land was used in the past and what types of changes are to be expected in the future. Studies of land-cover changes also yield valuable information for analysis of the environmental impacts of human activities, climate change and other forces. Such analysis is of great use to the resource manager because it provides information that would help in resolving conflicts between human use of natural resources and the function of natural systems (Pyrovetsi and Karteris 1986). A change in land-cover can negatively affect the potential use of an area and may ultimately lead to degradation and loss of productivity.

4.4 Land Use/Land Cover

Land Use Land Cover Analysis of Study area performed to provide a land resource inventory of the area. The analysis was carried out using Survey of India Toposheet (1975), (47B/13 and 47B/14) using on screen visual interpretation method.

Land Use Land Cover Analysis confined to classification was performed using Survey of India (47B/13 and 47B/14,197) topographical sheets. Forest area, Scrub area, settlement area, Agriculture area, swamp area, mud area, stone deposition area were demarcated and delineated on the basis of conventional symbols. The area under every category is measure and tabulated. The map has been prepared along with the legend. The proportion of Agriculture is higher and accounts 49066 acres i.e. almost (50%) of the total geographical area.
**Table 4.2 Land Use/Land Cover classes**

<table>
<thead>
<tr>
<th>Category</th>
<th>Area (acre)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>49066</td>
<td>49</td>
</tr>
<tr>
<td>Mud</td>
<td>9423.7</td>
<td>9</td>
</tr>
<tr>
<td>Forest</td>
<td>13017</td>
<td>13</td>
</tr>
<tr>
<td>Scrub</td>
<td>14181</td>
<td>14</td>
</tr>
<tr>
<td>River</td>
<td>5129.5</td>
<td>5</td>
</tr>
<tr>
<td>Settlements</td>
<td>6239</td>
<td>6</td>
</tr>
<tr>
<td>Swamp</td>
<td>2102.4</td>
<td>2</td>
</tr>
<tr>
<td>Stone Deposition</td>
<td>961.63</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100120</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*Source: Toposheet data (1975) (47B/13 and 47B/14)*

**Figure 4.7 Land Use/Land Cover classes**
4.5 Land Use/Land Cover Analysis of the Study Area

In the study area the total forest area stands for 13017 acres i.e. 13% of the total study area.

- **Scrub**: In this category the scrub area occupies highest that is for 14181 acres and accounts for 14% of the total study area of catchment.

- **River**: The water-body accounts 5129.5 (5%), the surface water-body that is found in the study area in the form of river.

- **Agriculture**: As most of the terrain is plain the total agriculture area comprises of 49066 acre. This has the share of almost 50% in the total geographical area of catchment.

- **Settlement**: Settlement area is identified with the help of signs & symbols. Built-up area included 6239 acre (6%)

- **Swamp**: Total Swamp area comprises 2102.4 acres of land. This has share of 2% in the total study area.

- **Stone Deposition**: Total Stone deposition area comprises of 961.63 acres. This has share of 1% in the total study area.

- **Mud**: Total mud deposition area comprises of 9423.7 acre. This has share of 9% in the total study area.