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## THE GEOGRAPHICAL DIMENTIONS OF NORTH KANARA COAST

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**Abstract:**

*North Kanara is a land of scenic beauty, located on the north western coast of Karnataka state, the coastal region known for sea, sand and sunshine. People come to see its panoramic environment from different parts of the world. The small emerald on the north western coast Karnataka with natural aesthetic beauty, abundant greenery, beautiful and attractive sandy beaches, temples, churches, colourful and lively feasts and festivals, the hospitable people with rich cultural milieu. All these have made the North Kanra, a prime tourist attraction not only among Indian states but also among the foreign tourists. Apart from its natural aestheticism, the region has wide range of physical and socio-cultural variations. The Western Ghats, Plateaus, and sandy beaches reflects the geomorphic variations, on the other hand environment of North Kanara supports a variety of ecosystem and possesses rich biodiversity. As far as socio-cultural identity is concerned, the North Kanara known for its prosperity and socio-economic wellbeing. A striking feature of North Kanara is it has varied geographical features with thick forest, perennial rivers and abundant flora and fauna and a long coastal line, religious temples with long history has produced a rhythmic and rich local culture.*

**KEY WORDS:**

Geographical Dimentions , physical and socio-cultural , scenic beauty.

**INTRODUCTION:**

North Kanara was initially under Madras Presidency and subsequently came under Bombay Presidency. After Independence and till 1956 the district was in Maharashtra State and after States reorganization, merged into Karnataka. The cultural pattern of the people has thus been influenced both by Maharashtra and northern Karnataka. The languages spoken in this district are Kannada and Konkani. Goa being the border state, Portugal culture has also influenced the district.

The in North Kanara region itself is a district named as North Kanara is divided into 11 taluks. The capital is at Karwar, the northernmost coastal taluk and the southernmost is Bhatkal taluk. Among these 11 talukas, 5 lies in the coastal belt along the Arabian Sea. These coastal talukas are Karwar, Ankola, Kumata, Honavar and Bhatkal. Only these talukas has been taken for present study as the spatial units. The Deputy Commissioner is the administrative head of the district. The Chief Executive Officer of the Zila Panchayat has also his office at Karwar. The Zilla Panchayat consists of the elected representatives of the people. The district has four Assistant Commissioners- at Karwar, Kumta, Bhatkal and Sirsi. The Tahasildar is the administrative head of the taluk. The villages are grouped under Village Panchayats, run by elected

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## THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

representatives.

### 2 STUDY AREA

Geographically the North Kanara coast noted as a narrow coastal plain sprawling along western seaboard of Karnataka state in India known from time immemorial as Kanara coast (Singh, 1997). The latitudinal extent of North Kanara is located between 13°55' to 15°32' N latitude and 74°05' to 75° 05' E longitude (Figure 2.1). The maximum length from north to south is 140 kilometers, while maximum width from east to west is 30 kilometers.

North Kanara is with its total geographic area is 10,291 square kilometers, while length of coastline is 140 kilometers. It has with abundant natural resources. The district has varied geographical features with thick forest, perennial rivers and abundant flora and fauna and a long coastal line. It is surrounded by Belgaum district and state of Goa in the north, where, River kali makes its fluvial boundary, Dharwar, Haveri and districts to the east, Shimoga and Udupi district to the south. The western border is demarcated by the Arabian Sea, which creates a long, continuous, though narrow, coastline (Deshapande, 1992)

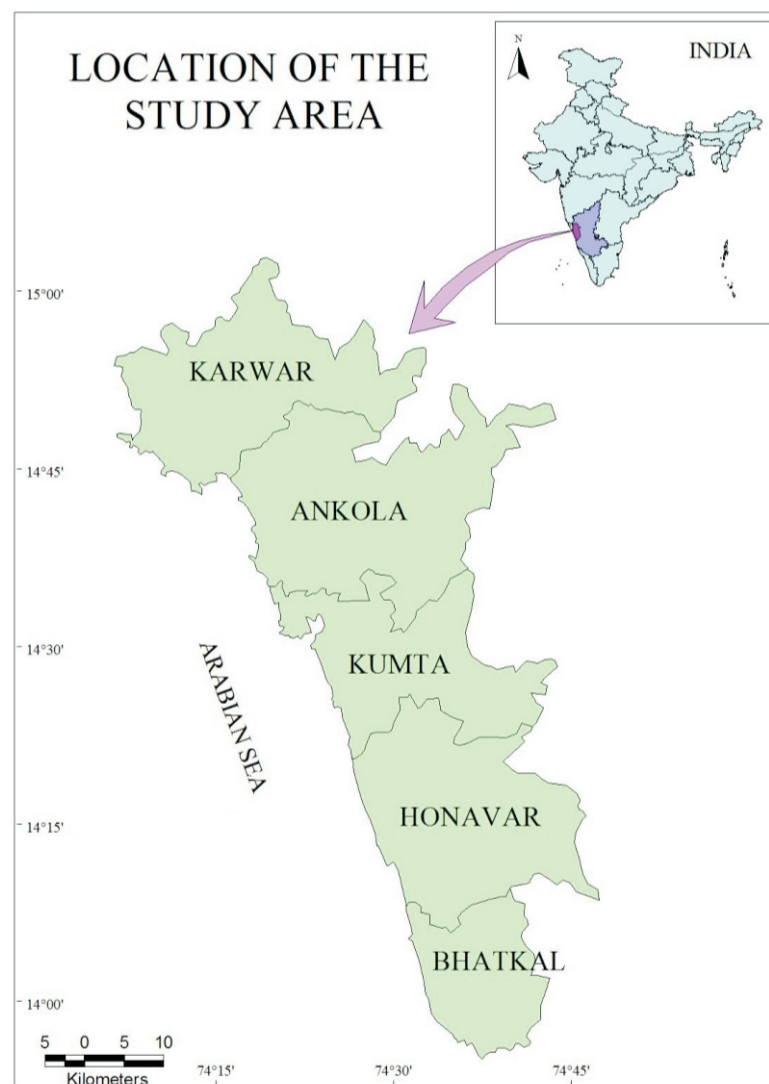


Figure 2.1

### 3. RESEARCH METHODOLOGY

The present paper is based on both Primary as well as Secondary data collection. Regarding data, secondary data has been used. An extensive literature survey has also been done covering with various dimensions of resources of the coastal zone. As far as secondary data is concerned the information collected from several institutions has given a base for the research work. For getting information about coastal issues and management, prior works of the other agencies or scholars has also consulted. The data has been suited and tabulated according to the need of the study. For analysis of the data, descriptive statistics has been used frequently. For presentation of the data, statistical and cartographic methods has been used in the form of tables, charts, pie diagrams, bar diagrams, line graphs, choropleths etc. however, selection of the above mentioned techniques have been made according to the nature of the available data and need of the study. The sketches of the various aspects of the coastal zones have been drawn using software named coral draw. Flow charts have been used to simplify the complex things in the course of the study. For spatial analysis the softwares such as Arc view and ERDAS Imagine has been used.

### 4. RESULTS AND DISCUSSION

#### 4.1 PHYSICAL PROFILE

Topographically the district may be divided into 3 distinct zones (Figure 2.2). Which are:

- 1) The narrow coastal plains and River basins.
- 2) The abruptly rising hills of the Western Ghats.
- 3) The flatter, elevated eastern zone that merges with the Deccan Plateau.

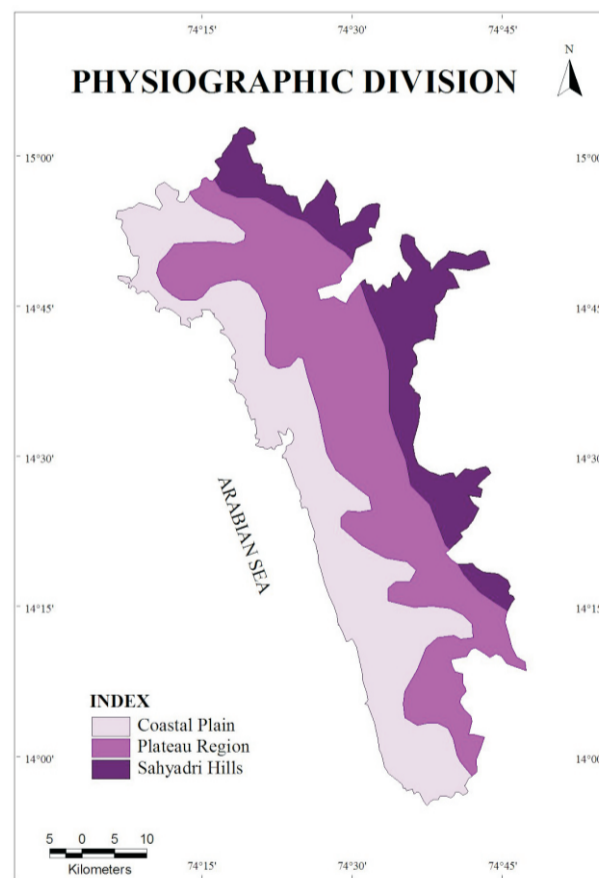


Figure 2.2

#### THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

**Zones of the Coastal Plain: The Coastal Plain has three well marked zones in the littoral plain, these are:**

- i) Along the shoreline there is a narrow belt of recent deposit, characterised with sand dunes, estuarine mud and valley plains. This zone is almost flat and elevation is almost 3 meters.
- ii) East of coastal low land, there is a parallel zone. It is an erosional platform and it extends up to 60 meters of the elevation. It is about 25 kilometers wide in the south, with deeply dissected and steep valleys are formed by the west flowing streams, usually a cliff marks the slope between the western recent deposits and the eastern erosional platforms of North Kanara.
- iii) Further east, the coastal plains consists of group of low hills the elevation range between 90 to 300 meters.

On the river banks the alluvial plains are found (Figure 2.3). Fluvial basins of alluvial formation are found in the four main rivers of Kali, Gangavali, Aghanashini and Sharavati. The Gazani or Khar lands are another important part of the plains. These Gazani lands are basically alluvial formations, which are favourable for the growth of mangroves. The bays form a part of the inner shelf zone, with depths varying from 3 to 16 m. The sea floor is flat, sloping at low gradient towards the west (Nair, 1989). Presence of Islands comprising crystalline rocks of the mainland close to the coast and a jagged shoreline are indicative of a submergent coast with comparatively thin sediment cover in the bay floor have revealed the presence of beach ridges along North Kanara coast. These aspects represent the evidences for both an emergent and submergent coast, suggesting a compound nature of coast (Bannur, 1994).

The Western Ghats rain forests have strongly seasonal climate. The Ghats have substantial tracts of the tropical lowland evergreen rain forest formation in areas where there is a dry season of up to 7 months. The most extreme case is the lowland evergreen Kan forest of Sorab, Karnataka, where a dry season of this length is regularly combined with an annual rainfall of 1500 1800 mm. (Whitmore, 1984). The Ghats forests have floristically tropical vegetation, yet in the winter dry season they are exposed to very low temperatures. According to the altitudinal ranges stops the clouds and causes the heavy rainfall during the monsoon season (Pascal, 1986).

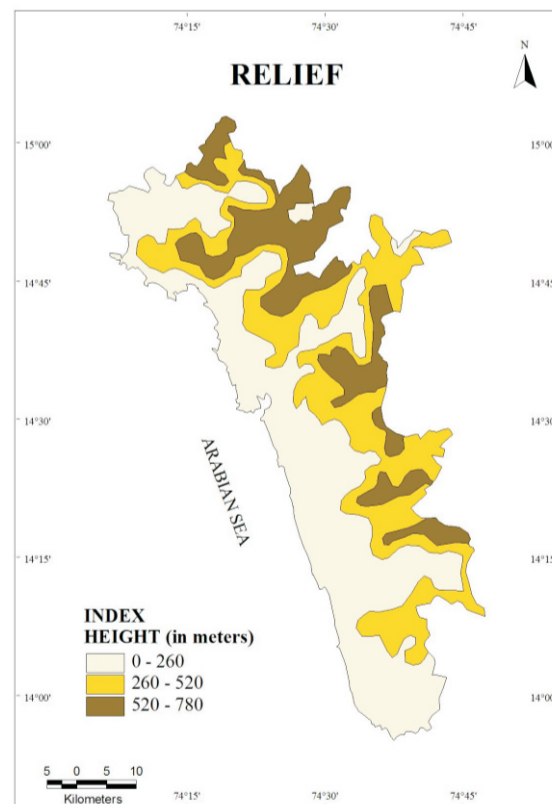


Figure 2.3



## THE GEOGRAPHICAL DIMENTIONS OF NORTH KANARA COAST

The coastal zone is the most thickly populated with a multitude of coconut clad villages. The hill chains of the Western Ghats, which run in the north-south direction, parallel to the coast, form the backbone of the district. These hills, unlike the rest of the Western Ghats, seldom exceed 600 m. These are precipitous towards their western aspect. At several points in the district, the hills run right into the sea, interrupting the continuity of the sea beaches, and providing ample rocky inter-tidal and sub-tidal habitats with their unique flora and fauna (Daniels, R.J.R 1989). The coastal plains of North Kanara is largely wave cut platform, thus it is an erosional rather than depositional. It has width of 30 kilometres over Karwar and a narrow of only 13 kilometres in Bhatkal. The average height is less than 200 meters from the mean sea levels. The coastal tract is steep like terraces due to oscillations in the sea levels during the geological past. Features indicating the submergence such as drowned river valleys, lagoons, bars, and wave cut cliffs are common. There are no large river deltas along the coast probably due to most active south west monsoon which produces wave of grater height. These have washed the coast and carried down the riverine loads into the deep sea.

### 4.2 GEOLOGY

The west coast is a recent origin due to break up of the Indian subcontinent from that of Africa and down faulting during cretaceous period. The geological features of the North Kanara coast have been emerged through a complex geological process. Large area of North Kanara region has been formed during Pre- Cambrian, Dharwar and Cuddappa period (Figure 2.4). Dharwar formation is represented by quartzite, Phylites, Chlorite and Schists, Gneisses, Granite, Mete Basalt and banded haematite quartzite, Residual hills of Dharwar gneiss constitutes a conspicuous aspect of landscape south of Honavar and Karwar. Cuddappa formation is found in between the coastal track of Kali River and Karwar headland. In eastern parts of the coastal region the Deccan trap covers the ancient crystalline formations. Extensive laterisation is the principal geological process in the coastal zone as this part is located in the tropical moist climate (Ranganath, 2010).

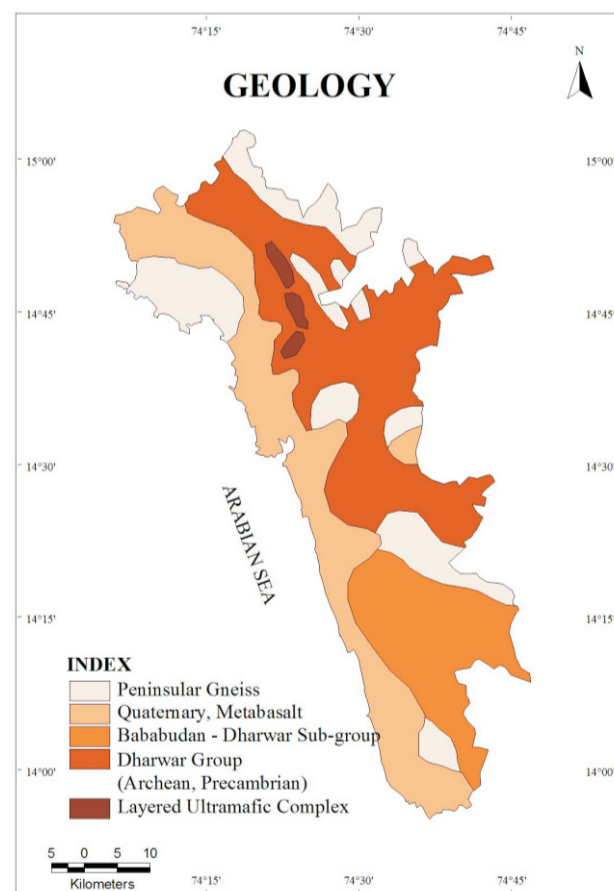


Figure 2.4

**THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST**

Towards interior from the coast the thickness of laterite goes thinner and thinner. The older formation was covered by recent, sub-recent sediments i.e. alluvium and dunes along the river valley and the coast. The coastal tract is steep like terraces due to oscillations in the sea levels during the geological past. These aspects represent the evidences for both an emergent and submergent coast, suggesting a compound nature of coast (Wagle, 1982). Zariwada as the name suggests is a low-lying valley region characterized by seepage of ground water.

Geomorphologically, the valley area can be recognized as an old stream (paleo-river) channel that formerly drained into the Kali River that flows in the north of Zariwada. The paleo-river channel is still connected to the Kali River and the groundwater seepage into the channel increases or decreases rhythmically according to high and low tides in the River.

**4.3 GEOMORPHIC FEATURES**

Landform is an area which is the resultant of the interaction between lithology of rocks and the structure, through the operating process in the region. The prominent landforms in the coastal region are the laterite capped table-lands with a gentle seaward slope and there is usually an abrupt fall along the coast presenting a cliffed coastline (Wagle, 1982). The coastline of North Kanara is characterised by beaches, separated by rocky headland, cliffs, river mouths and broad estuaries. Geomorphological features of the coastal North Kanara may be divided into three broad categories (Figure 2.5).

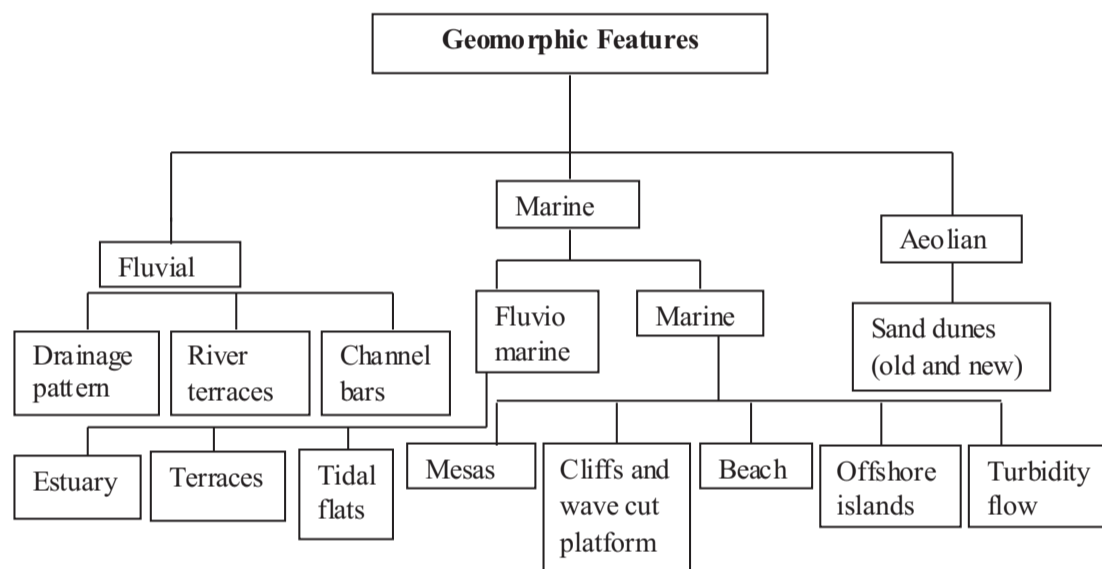


Figure 2.5

The linear features forming the hill ridges (intrusions such as granite or granitic gneiss, amphibolites, dolerite, etc.) are quite conspicuous and extend to the western margin that sometimes run along the headlands peaks. The linear trends along the headlands which run shorter distance can be basic dykes or amphibolites which are quite significant and conspicuous all along the central west coast. A lineament passes right across the summit of the hill along the Saiba Pad and another through base of the hill, along south, in east-west direction. A lineament is also found starting close to landslide area 1, passes across the railway track in somewhat SW-NE direction.

Geomorphologically, the valley area was a paleo-river channel that formerly drained into the Kali River that flows in the north of Zariwada and Kadwad. The shift of the river course might have led to the formation of hills/mounds. Composition of this mound which is mainly of laterite clay further confirms the existence of paleo stream in this region. The paleo-river channel is still connected to the Kali River and the groundwater seepage into the channel increases or decreases rhythmically according to high and low tides in the River. The Konkan Railway track passes through this Zariwada paleo-river valley connecting Karwar town with Goa and other places.



#### 4.3.1 FLUVIAL LANDFORMS

**Drainage and Drainage Pattern:** The drainage pattern in North Kanara is of dendritic and is dense. Due to closely spread network of fractures running Western direction pattern is found except Varda and Dharma are the two important east-flowing rivers in the south-eastern sector of the district, cutting the Western Ghats into deep Valleys. The rivers are generally straight with sharp bends and meandering is a rare phenomenon (Ranganath, 2010). The direction is mainly NW or NSW and EW. The NW or NSW direction is due to westward decreasing of slope of Western Ghats, while EW direction is result of faults fractures and joints. River Kali is the only which is exception having flow from North West to south and turns into western direction.

**River Terraces:** These are example of polycyclic landforms. These are the evidences of the variation in the base level and stream energy. This is the outcome of the tectonic and climatic variability. Horizontal or nearly horizontal alluvial terraces on either side of the rivers are about 2-5 meters above the present high water level and are covered by alluvial deposits (Ranganath, 2010). The whole Karwar beach is covered with sand dunes. Near the Kali River mouth behind P.G. Centre the beach becomes comparatively wider and more amounts of sand dunes are grown there. Two major sewage drains are open in the sea one is near the London Bridge and another one is near the mini train area. This beach is totally sandy that's why no rocks are found there except in monsoon small stones are scattered on the whole Karwar beach.

**Channel Bars:** These are the deposits of the sand and gravels along the river channel. These morphological forms found along Kali, Bedti, Aghanashini and Venkatpur rivers. The general orientation of the Karwar beach is in North-Southern direction. The sediment found on the beach is fine in nature. The total length of the beach is 3200 m and the width varies from 70-170 meters. This beach is open type and the nature of the beach is moderate (Nayak.1986).

#### 4.3.2 MARINE LANDFORMS

**Estuaries:** In North Kanara, only Kali, Sharavati, and Gangavali develop large estuaries.

**Mesas:** The mesas are 40-100 meters high laterite formation. The upper surface of these mesas is covered with huge lateritic layers of 20 to 40 meters thickness. The coastal plateaus are generally separated by sandy alluvial deposits.

**Cliffs:** Cliffs are one of the most important features formed by erosion. This is the result of the undercutting and subsequent fall of large rock mesas. This process later on gives rise to the development of caves. Its height ranges between 5 to 40 meters. Such cliffs are found along the Bhatkal, Shiralli, Belure, Manki, Haldipur, Basavarajdurga, Kumta, Ankola and many places along the coastal areas of North Kanara.

**Wave Cut Platform and Terraces:** Marine abrasion platforms are found at the base of cliffs and headlands, whereas, there may be another lower level platform submerged under the water (Wagle, 1982). In the northern part, it is made of quartzites and laterites while in the southern part, it is made up of basaltic gneissic. Granite formation has created base for the development of the sea cut platforms. In southern areas wave cut terraces are also found. Some terraces are in the inter-tidal zone while many are above the present water level.

**Off Shore Islands:** Several islands are located in a 10 kilometer north to south stretch, within 17 meters depth off the North Kanara coast. They are Kangigudda, Kurmagadagudda, Shimisgudda, Devgad, Basavrayandurga, Nitrani or Pigion with a maximum elevation of 32-61 meters, North Kanara coast, Karkalgudda, Mandalgud, Keerkund, Hog, Murudeshwar, and Hadimadi, with an elevation of 20-41 meters off mid coast, and Mogeragudd, Anjadeep island with an elevation of 13-46 meters in the southern part of north kanara coast. These are basically detached part of the headlands due to wave action, rise in sea level, or due to tectonic movement.

**Tidal Flats:** During the high tides the sea water submerges the low laying area adjacent to the rivers, resulting into tidal flats. This is common phenomena in almost all the rivers in the North Kanara. The old tidal flats are 2 to 3 meters high from the sea level. These flats are generally filled by the aeolian, fluvial or marine materials, brought by the tides. These flats are found along the Kali, Aghanashini, Gangavali and Venkatapura rivers. These tidal flats are generally used for the agricultural and growing the vegetable purposes.

#### THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

**Beaches:** It ranges from a few meters to 100 meters along the coast. Most part of the beaches is intertidal zone. Most of the beaches are backed by the narrow littoral terraces, which are in turn backed by abandoned cliffs. Unprotected areas facing seas are marked by long stretches of straight sandy beaches of very low gradient. Old beach ridges are parallel to the present shoreline are 1 to 3 meters are high. These ridges are the evidences of the sea level regression or lowering of the sae levels and these are different from the sand dunes.

**Turbidity Flow:** Turbidity flow is found in the Arabian Sea from the Kali, Sharavati, and Gangavali estuaries. The turbidity flow at the mouth of these rivers shows a deflation towards the south indicating a week southerly current (Ranganath, 2010).

#### 4.3.3 AEOLIAN LANDFORMS

**The Coastal Dunes:** These are found parallel to the coast. They are almost stable and vary in their size. Generally, recent dunes are found close to the beaches. These are around 10 to 15 meters high. These are generally devoid of vegetation. On the other hand the old dunes are parallel to the coast separated by swampy depression. They are covered with thick vegetation. They are found as the richest, parallel to the coast.

#### 5. DRAINAGE

Rivers are the most important freshwater resource for human social, economic and political development has, in the past, been largely related to the availability and distribution of freshwater reverine systems. North Kanara is the land of five major rivers viz., Kalinadi, Gangavali, Aghanashini, Sharavati and Venkatapura with their sources in the Sahyadris of Western Ghats (Chapman, 1996).

Rivers created some of the magnificent physical features like waterfalls, caves and steep riverine valleys, in the region such as the Jog falls, the Lushington (Unchalli) falls and Magod falls are associated with the rivers Sharavati, Aghanashini and Gangavali respectively. Also, where these rivers meet the sea, there are some of the finest estuaries of the west coast, as the drainage system of north Kanara shown in (Figure 2.6).

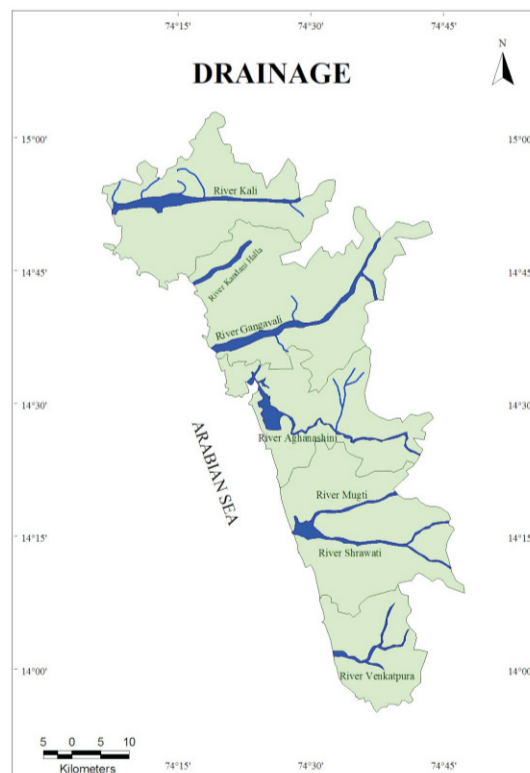


Figure 2.6

#### THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

North Kanara receives heavy rainfall during monsoon period, the depth of flow of these rivers ranges from 9 to 10 meters and the riverbank height is about 12 to 15 meters. The point where the rivers meet the sea, some of the finest estuaries are present (Table.2.2).

**Table.2.2 Major River System of North Kanara**

Taluks	River Basin	Length Within The State (Km)	Basin Area (Sq. Kms)
Karwar, and Joida Taluk	Kali river	184	844
Ankola Taluk	Gangavali/Bedti river	161	925
Kumta, Siddapur, Sirsi Taluk	Aghanashini river	121	547
Honnavar Taluk	Sharavati river	128	755
Bhatkal Taluk	Venkatapur river	45	335
Sirsi Taluk	Varada river	96	244
<b>Total</b>		<b>735</b>	<b>3605</b>

Source: North Karnataka Development Report 2005.

Kali River is a major west flowing river takes origin near Bidi village of Western Ghats in Joida Taluk of North Kanara district. With catchment area of 844 sq kilometers, and total length is 184 kilometers, as the river flows through black rocks, the river appears black and the name of Kali (black) is derived. The major tributaries of this river are, the Pandri, the Kanari Nagi, the Veki and Digi hole, which flows into each other near Supa. The two streams flow in the eastward direction. The river thus formed continues to flow in the south direction for a distance of about 50 kilometers and then takes a sudden westward turn. At this place, called the Lalguli Falls, the west flowing Thattihalla stream also joins the Kali. Several gigantic hydroelectric projects have been constructed across and The Kaiga Atomic Nuclear Power Plant located on the bank of river Kali, the river flows west till it falls into the Arabian Sea near Karwar.

Bedthi /Gangavali also consist of two main streams, Shalmali, which originates in the south of Dharwad, and Bedthi, which originates near Hubli. These two streams flow west and southwest for a total distance of 96 kilometers. On its meandering way into the Arabian Sea, the river dashes down the western face of the Sahyadri to form the Magod Falls.

Aganashini / Tadri, also known as Tadri, flows into the Arabian Sea about 10 kilometers south of Bedthi. This river is also composed of two major streams besides Benneholla (Benehalla). Two of these streams originate in Sirsi taluk and flows southward. The other stream flows across the entire breadth of Siddapur taluk in a westerly direction. A short distance to the west from here, the river leaps down a precipitous rock to form the Unchalli Falls. From Mirjan, near Kumta the river forms a lagoon, which runs parallel to the coast for about 13 kilometers.

Sharavathi, also known as Banaganga, originates in the Shimoga district. It flows in the north westerly direction. Near the border of the district after covering a distance of 64 kilometers, the river bends to the west and for about 13 kilometres forms the natural boundary between North Kanara and Shimoga. Near Kodkani, the place where the river touches the district boundary, the river leaps over a precipice, about 260 meters in height, to form four distinct cascades known as Raja, Roarer, Rani and Rocket. These falls have acquired world fame as the Jog Falls.

Venkatpura River is located in the southern part of North Kanra. It originates in Western Ghats and confluences into Arabian Sea, after a course of 45 kilometres near Venkatpura in Bhatkal taluk. It has catchment area of 335 square kilometres (Kamat, 1985). Forest and agriculture are the major land use in the catchment area. The river basin has been divided into six sub basins namely Venkatapura tributay, Chitihalla, Katagarnala, Basti Halla, Kine hole and Venkatpura river.

#### 6. CLIMATE

The North Kanara district experiences tropical monsoon climate. Generally the weather is hot and

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humid on the coastal areas throughout the year. The district falls under the hilly agro climatic zone except for western parts of Karwar, Ankola, Kumta, Honnavar and Bhatkal taluks which fall under coastal agro climatic zone. The temperatures start rising from January to peak in May, around 300C is common. The highest day time temperatures rise some time up to 380C. Thereafter they will decline during the monsoons. As can be expected, the humidity is lowest during the dry season and highest during the monsoons. The winds are predominantly south westerly during the summer monsoon and north easterly during the winter monsoon. The year may broadly be classified into four seasons. The dry season is from January to February with clear and bright weather. It is followed by hot weather from March to May. During this season thunderstorms are common in the month of May (Table 2.3).

**Table 2.3: Mean Monthly Relative Humidity, Wind Speed and Wind direction, in North Kanara 1991-10**

Months	Monthly Relative Humidity (%) 2010			Monthly Mean Average Wind Speed (Km/ Hr)			Wind Direction		
	1991	2001	2010	1991	2001	2010	1991	2001	2010
January	80.0	76.0	74.0	6.5	7.3	6.3	NW-SE	NW-SE	NW-SE
February	79.0	75.0	73.0	8.0	8.4	6.1	NNW-SSE	NNW-SSE	NW-SE
March	81.0	79.0	82.0	7.7	8.7	8.2	NNW-SSE	NNW-SSE	NNW-SSE
April	71.0	74.0	76.0	10.2	11.2	11.7	NW-SE	NW-SE	SW-NE
May	72.0	73.0	84.0	13.4	12.1	9.6	NNW-SSE	SW-NE	SW-NE
Jun	83.0	88.0	87.0	12.9	13.7	11.1	NW-SE	SW-NE	SSW-NNE
July	89.0	89.0	89.0	16.1	15.5	14.5	NW-SE	SW-NE	SSW-NNE
August	90.0	91.0	87.0	14.6	8.2	11.2	NNW-SSE	SW-NE	SW-NE
September	87.0	92.0	89.0	7.3	7.2	6.6	NE-SW	SSW-NNE	SW-NE
October	82.0	87.0	87.0	6.2	8.1	6.2	SE-NW	NE-SW	NE-SW
November	79.0	77.0	73.0	5.2	5.4	3.0	SE-NW	NNE-SSW	NNE-SSW
December	83.0	69.0	66.0	6.5	5.9	6.5	SSE-NNW	NE-SW	NNE-SSW

Source: North Kanara Weather Observatory Station Karwar.

North Kanara has a tropical climate located along Arabian Sea. Therefore it has a warm and humid climate most of the year. The climate of the different parts of the region varies greatly. It is generally humid, hot along the coast, cool in the Ghats region, and warm and equable in the eastern up Ghat region. Humidity is relatively high near the coast, which rises further during the Monsoon season. It enjoys a mild and typically maritime and monsoon type of climate. The climate of the entire coast may be described as healthy

**6.1 TEMPERATURE**

The temperature of the coast varies between 150C in winter to 340C in summer. The year may divide in to Four Seasons i) summer from March to May has raising temperature with the maximum temperature of the year occurring in April or May. Humidity begins increasing from May onwards. ii) The South West monsoon from June to September lasts for four months from the beginning of June is characterized by overcast skies and heavy rain falls in the coastal region and Malnad area. iii) October and November constitute the retreating monsoon or coast monsoon region. iv) The period from December to February is generally dry with clear bright sky, low humidity and agreeably low temp. There is very little rain fall in this season (Table 2.4).

Table 2.4: Mean Monthly Temperature in North Kanara (1991-2010)

Months	Mean Monthly Temperature in (C)					
	1991		2001		2010	
	Min	Max	Min	Max	Min	Max
January	19.2	32.3	20.7	32.9	18.2	32.3
February	17.6	31.0	19.9	32.9	20.3	33.6
March	23.1	33.5	22.3	32.5	23.5	32.7
April	23.9	33.3	26.1	34.4	25.9	32.7
May	26.7	33.6	28.1	35.0	25.1	31.3
Jun	25.0	31.6	25.5	31.2	24.5	30.0
July	24.8	29.9	25.1	29.8	24.3	29.0
August	24.4	29.5	25.1	30.1	24.6	29.8
September	24.4	31.5	24.4	29.8	24.1	30.2
October	24.7	33.5	24.1	30.1	24.4	31.9
November	24.2	33.3	22.3	32.0	22.1	37.2
December	22.4	32.4	20.3	33.0	19.8	34.4

Source: North Kanara Weather Observatory Station, Karwar.

**6.2 RAINFALL**

The monsoon season is from June to September. This season yields around 75 per cent in Halyal taluk to 90 per cent in Karwar taluk of the annual rainfall. The period from October to December may be termed as the post monsoon season. On an average the coast receives annually around 2750 mm rainfall occurs in nearly 103 rainy days. The rainfall decreases from over 3230 mm in west to less than 1207 mm in east. The coefficient of variability of pre monsoon season rainfall is high indicating erratic rainfall. The same is the case during the post monsoon season. The variability is 30 to 40 per cent during the monsoon season, which is normal. The same is the case on an annual basis it being around 30 per cent. July is the wettest month with normal monthly rainfall in all stations is recorded in excess of 300mm (Figure 2.7).

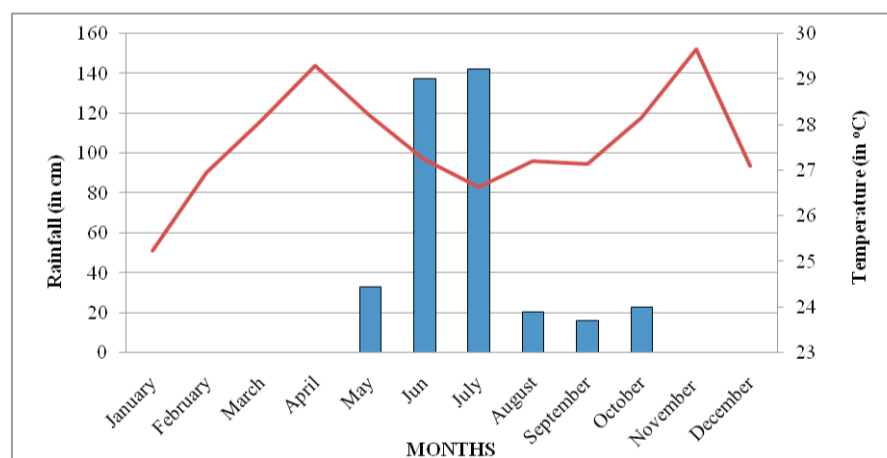


Figure 2.7

Annual rainfall in the region varies from 1176.8 mm in Mundgod taluka, and around 4145.6 mm in Bhatkal. Rainfall distribution during the last five years is varied. For the period between 2001 to 2005, at Ankola normal rainfall is recorded, except during the year 2003 when excess rainfall was recorded. During the year 2001 in all the stations deficient rainfall was recorded except at Ankola, Bhatkal, Honavar, Karwar,

THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

and Kumta (Table 2.5). During 2002 also there was deficient rainfall in all stations except at Ankola, Honavar,

Table 2.5: Mean Monthly Rainfall in North Kanara (1991-2010)

Months	Rainfall ( mm )		
	1991	2001	2010
January	0.8	0.0	0.0
February	0.0	0.0	0.0
March	1.3	0.0	0.0
April	0.0	0.1	1.5
May	2.9	38.7	328.2
June	802.8	1372.4	1373.7
July	1258.1	728.7	1421.0
August	853.7	510.3	201.7
September	128.0	641.3	159.8
October	47.5	307.4	227.3
November	56.1	83.7	0.5
December	106.0	31.8	0.0

Source: North Kanara Weather Observatory Station, Karwar.

Karwar and Kumta. During 2003 Ankola has received excess rainfall and all other stations have normal rainfall except at Haliyal, Mundgod, Siddapura and Yellapur. During 2004 Bhatkal rain gauge station recorded excess rainfall and other stations recorded normal rainfall except Haliyal, Sirsi and Yellapur. During 2005 all stations have recorded normal rainfall except supra.

Table 2.6: Talukwise Normal Rainfall in mm (1941-90)

Talukwise Stations	Rainfall Normal rainfall in mm (1941-90)	Rainy Days	
		Normal (1941-90)	Actual (2009)
Ankola	3543	107	111
Bhatkal	4173	116	115
Honavar	3678	112	114
Karwar	3228	105	103
Kumta	3602	112	110
<b>Total</b>	<b>Average 3644.8</b>	<b>110.4</b>	<b>110.6</b>

Source: North Kanara District Statistical Abstract, Karwar

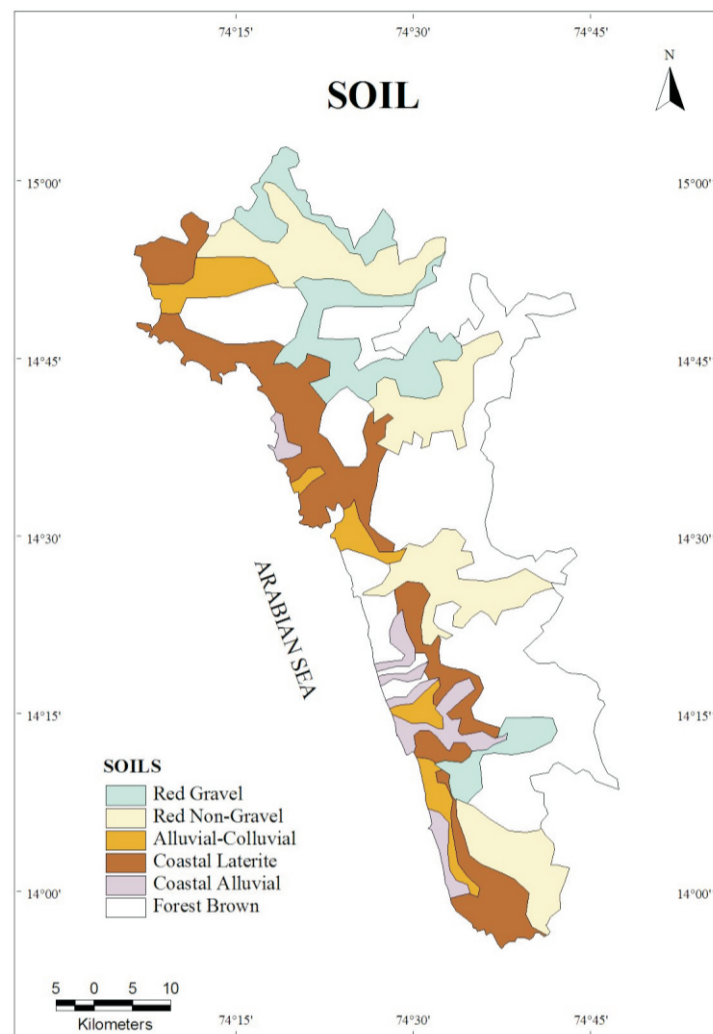
## 7. SOIL

The soils of the region are basically derivatives of the Dharwad system- the most ancient metamorphic rocks in India- which are rich in iron and manganese (Pascal, 1988). Most of the coastal hills are covered with exposed laterite rocks. These are very unproductive rocks, most of the top-soil already washed off. Peninsular gneiss containing granite occurs towards south of the region. Yana in Kumta taluk, clad in evergreen forests, is unique in having magnificent limestone formations which rise like cathedrals. Such rocks, not found elsewhere in the Western Ghats, are commoner in the rain forests of Southeast Asia



## THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

(Daniels, 1989) (Figure 2.8).



**Figure 2.8**

The soil of this region is mostly derived from lateritic and traps formations. In the Ghat regions, lateritic soil at the base is covered by shades and mixed with humus of the forest and has formed a soft type of soil known as Kagadai soil which is rich in mineral contents and plant nutrients. In the coastal plain along with sea coast, the soil is sandy and in number of places mixed with the river alluvia. The low lying marshy lands of the coastal plains are popularly known as Gajanis or Khar lands. Contain clay mixed humus and support salt resistant paddy. If the lateritic soil predominates in the Taluks of Honnavar, Kumta, Bhatkal, Siddapur and Part of Sirsi, in Karwar and Ankola lateritic soil mixed with gravelly soil derived from granites and sandy soil. Red loam derived from laterite and traps are noticed in Mundgod, Haliyal and Sirsi Talukas. Patches of alluvial soil are also found in these talukas. The Organic content of the soil is high in uplands. The soil in general is found to be acidic, rich in nitrogen, deficient in phosphorous with low medium potassium content.

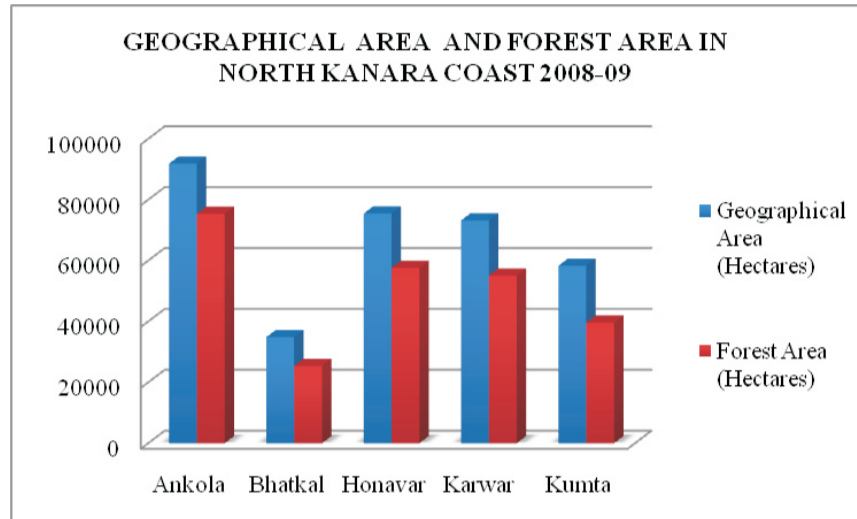
### 8. VEGETATION

As per the district census, the forest cover is approximately 7397.283 square kilometres, making North Kanara as one of the most forested districts in peninsular India. Of the district's forest cover, 6866.058 square kilometres, are under the jurisdiction of the forest department and 531.225 are sq. km under the revenue department. The coastal taluk wise distribution of forest area varies each other, the

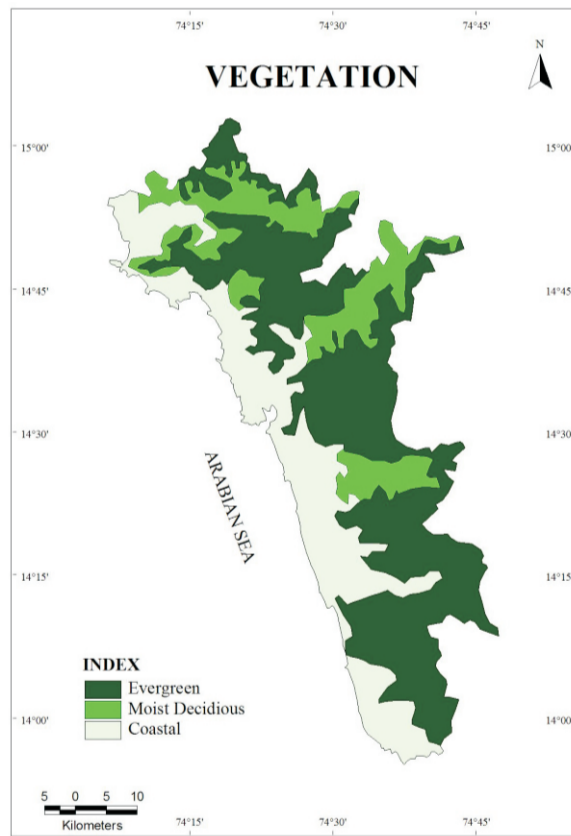
**THE GEOGRAPHICAL DIMENTIONS OF NORTH KANARA COAST**

highest of forested land area 75374 hecters in Ankola and lowest is 25433 hecters in Bhatkal. Out of total 333785 hecters geographic area of five talukas, 253184 hecters of land is forested (Figure 2.9 and Figure 2.10).

**Figure 2.9: Taluk Wise Geographical Area and Forest Land**



Source: Source: North Kanara District Statistical Abstract, Karwar, 2009-10



**Figure 2.10**

**THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST**

The forests facing the western side as of the tropical wet evergreen type and included the eastern part in the tropical moist deciduous type (Puri, 1960). Champion and Seth (1968) have classified the forests on the western slope as of tropical evergreen type and have included the forests of the eastern zone in the category of moist deciduous type. According to Arora (1961) the following forest types are encountered in the region, evergreen forests, deciduous forests and scrub forests. The details regarding the administrative categories of the forests are given in (Table 2.7).

**Table 2.7: The Forest Cover Area in North Kanara**

Department	Type of Forest	Area in Sq.km
Forest	1. Reserved	6840.948
	2. Protected Forest	25.090
	4. Un-classified	0.020
	Total	6866.058
Revenue	1. Reserved Forest	505.075
	2. Protected Forest	26.150
	4. Unclassified	
	Total	531.225
	<b>Grand Total</b>	<b>7397.283</b>

Source: Annual Administrative Report of Forest Department North Kanara 2000-01

Within North Kanaras vast forest ecosystems, there is a great mosaic of various major habitats and sub-habitats that support tremendous biological diversity. While the coast is extremely rich in wild and domesticated biological diversity, there is limited comprehensive documentation of the coast's colourful array of flora and fauna. Most charismatic species, including flowering plants, mammals and birds are documented while lower plants, microorganisms, reptiles, moths, beetles, other insects and various other invertebrates have yet to be uncovered and documented in any notable manner (Table 2.8).

**Table 2.8: Area Under Various Forest Plantations In North Kanara**

Species	Plantations 1865-66 To 1999-2000 ( Ha)	During 2000-01 (In Ha)	Total (In Ha)
Teak & other hard wood	91330.18	1105.00	92435.18
Matchwood & softwood	17854.93	90.00	17944.93
Bamboo & canes	10675.14	72.80	10747.94
Cashew/fuel-wood/others	66406.58	3334.25	69740.83
Others	67224.01	50.50	67274.51
<b>Total</b>	<b>253490.84</b>	<b>4652.55</b>	<b>258143.39</b>

Source: Annual Administrative Report of the Karnataka Forest Department, 2000-01.

Furthermore, several endemic plant and animal species, Non Timber Forest Products (NTFP) and medicinal plants are found in this region. More than 400 NTFP species such as Cinnamomum spp, Vateria indica, and Garcinia gummigatta are collected in the district, of which 45 are collected for commercial purposes. The remaining species are collected for medicinal, edible, non-agricultural and other purposes. The collection, consumption and selling of NTFP accounts for 33 per cent of the total income to rural households in the district, making these practices important to local livelihoods KBIS (Karnataka Biodiversity Information System, 2002).

These forests of the Western Ghats perform several critical ecological functions that support agro-forestry, agriculture and other forest-based livelihoods in the district. The forests are also the catchments of important rivers such as the Aghnashini, Sharavathi, Kali and Gangavalli.

**THE GEOGRAPHICAL DIMENTIONS OF NORTH KANARA COAST**



Plate 2.1 a



Plate 2.1 b

The Coastal Vegetation in Karwar Beach

**9. SOCIO CULTURAL PROFILE**

Though the District is located in coastal area, it is not so famous for its marine products. But activities connected with fisheries are carried out on large scales with the help of State Government as well as Central Government. The major population lives in rural area undertaking agriculture as their main occupation. The main traditional occupations are agriculture, fisheries, animal husbandry, sericulture, horticulture, beekeeping and leather works etc.

**9.1 PEOPLE**

Every decade the total population of the North Kanara has been changing rapidly with changing in coastal development. As per 2001 census, the male population is 6, 86,876 and female population is 6, 66,768 aggregating to 13, 53,644. Out of this coastal zone has a total of 7, 04,934 persons, which comprises above 60 per cent population of the region. The average density of population is 132 persons per square kilometers, but the population density in the coastal zone is quite higher to the other parts as of 240 persons. Thus it can be said that coastal zone is highly populated. It is due to multiple economic opportunities available in the coast. However there is significant amount of unevenness in the population distribution, even in the coastal areas. Karwar, Bhatkal, Ankola, Kumta, Gokarna, Honavar and Murudeshwar. While Supa, Yallapur, siddapur, Mundgod, Haliyal having less dense population as compare to the others.

North Kanara is closely linked to the existing culture that has evolved in different ecological zones. Nearly 75 per cent of the population of North Kanara coast lives in villages and remaining 25 per cent in small towns. It is estimated that about a fourth of the population lives below poverty line. In terms of gender related health indicators the situation in North Kanara region is significantly better. The life expectancy at birth of females in North Kanara region is 70 (Census of India, 2001) (Table 2.9).

**Table 2.9: Socio-Economic Profile of North Kanara**

Geographic area	10,201 sq. km	Adult literacy rate	62.41%
Total Population	6 lakh	Life expectancy at birth (both sexes together)	67 Years
Proportion of female Population	47%	Life expectancy at birth of Females	70 years
GDP per capita income	9742	Total infant mortality	49/1000
Population below poverty line	25%	Mean age at marriage of Females	20.89
Percentage of households with out civic amenities (Drinking water, electricity and toilets)	33.5%	Sex Ratio	970/1000

## THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

Source: Human Development in Karnataka, 2005.

Gender wise composition of the population in North Kanara has better condition than the national average. In north Kanara, the sex ratio is 971 which is quite higher than the state 960 and national average 933 in 2001. the coastal zone talukas like Bhatkal, Honavar, Kumta Karwar and Ankola have relatively higher proportion of females than the males. The lesser sex ratio is over talukas of Yallapur and Sirsi (Figure 2.11).

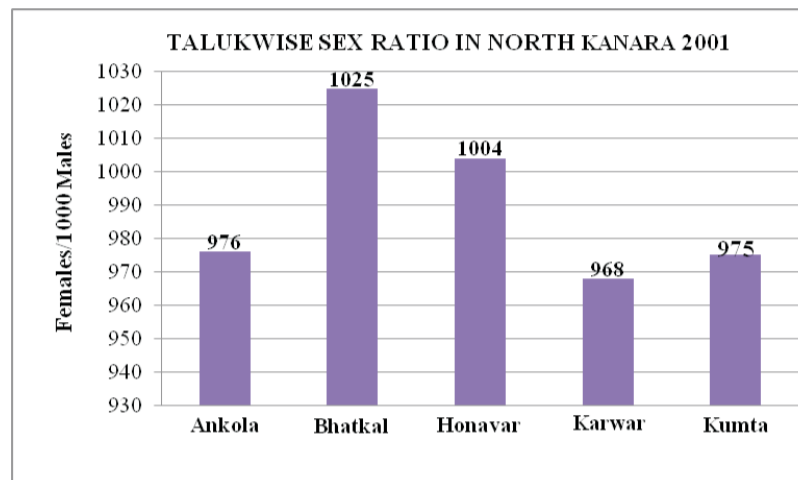


Figure 2.11

## 9.2 ECONOMY

The economy of North Kanara was by and large self reliant in the matter of necessities being governed by rules and regulations of village commune system (Gomes, 2002). It was mainly based on Fishing and traditional agriculture. But economic order of the coastal zone has been changed with passage of time. After 1970s tourism has emerged one of the important one of the important aspect of the economy of North Kanara.

The major population lives in rural area undertaking agriculture as their main occupation. Though the District is located in coastal area, it is not so famous for its marine products. But activities connected with fisheries are carried out on large scales with the help of State Government as well as Central Government. The main traditional occupations are agriculture, fisheries, animal husbandry, sericulture, horticulture, beekeeping and leather works etc. Paddy and [sugarcane](#) are the main crops of the irrigated region. Ragi and Horse-gram are the major crops of dry land agriculture.

Now a day, the traditional fishing and agriculture is steadily losing its importance and service industry is expanding. However, the fishing has still significant place in the economy but not in its traditional form. Now the mechanization of fishing has completely changed the scenario. The fishing corporation have come in the field with better efficiency and expertise.

Apart from forest based industries already referred to other industries were established in the district, having ecological and socio-economic consequences. The Ballarpur Industries Ltd, Binaga at Karwar was established in 1975. Nearly 1200 hectares of estuarine areas of Aghanashini River in Kumta taluk were allotted to the factory for producing salt to prepare caustic soda. This caused displacement of several families of estuarine farmers. Subsequently the factory found the lands not very suitable for salt making, and returned the lands to the Government. Since the farmers evacuated from these estuarine lands were already paid compensation by the Government, the latter refused to restore the lands to the farmers. It is alleged that the industry is discharging treated effluents of sodium tri-poly-phosphate and mercury into the Arabian Sea through a pipeline, causing marine pollution (Hegde, 1999).

The North Kanara district is rich in minerals such as iron, lime-stone, quartz, manganese, bauxite, molluscan shells, silica etc. These minerals were exported since pre-independence days or used within the country itself. In 1955 the Dandeli Ferro Allies Private Limited was established. The factory uses manganese ore extracted from the forest belt for production of ferro alloys. By 1981, as many as 98 mining leases were given in the catchment area of Kali River itself, covering an area of 125.6 km<sup>2</sup>. Total mining area within the region, mostly situated in the forests of Joida, Yellapur and Karwar taluks are reported to be



## THE GEOGRAPHICAL DIMENSIONS OF NORTH KANARA COAST

14894 ha. The mining operations cause various disturbances to the ecosystems. Erosion by runoff causes damage to forests, agriculture and rivers. The increased silt load in the river Kali was considered as detrimental to many aquatic organisms.

Project Seabird and Konkan Railway: The construction of Project Seabird Naval Base involved eviction of thousands of families of fishermen and farmers from the coastline of Karwar and Ankola taluks. Environmental modifications of great magnitude, such as building of breakwaters, dredging of the sea, filling up of coastal swamps, intensified construction activities and other landscape changes are being executed in the Project Seabird area. The rehabilitation of the evacuees brought greater pressure in other coastal villages as well as in the forest areas of hinterland. The construction of the Konkan Railway through the west coast, while revolutionising coastal transportation had also its own inevitable environmental impact in the form of landscape changes, diversion of agricultural and forest lands etc.

### 9.3 SOCIETY AND CULTURE

The languages of the district are [Kannada](#), [Konkani](#) and [Marathi](#). Kannada is the predominant language spoken in the district followed by Konkani which are also widely spoken. The population North Kanara predominantly [Hindu](#) comprising of majority communities Namadhari, [Havyaka](#), Halakki [Vokkaligas](#), Goud Saraswat and minority communities are Bhandari, Mogaveera, Komarapant, Ager, Chamagara, Gramavokkaliga, [Konkan Maratha](#), Nadavara, Chitrapur Saraswat, [Daivajna](#), Shervegar ([Ramakshatriya](#)), Devadasi, Harikant, Gabeet, Kharvee, Gudigara and Vani. Christians of Catholic and Protestant faiths and Islams of Shia and Sunni sects are thinly spread out in North Kanara. The communities of Islam living in Bhatkal are known as [Nawayaths](#). The people of North Kanara are non-vegetarians except for Havyaka community. Fish and coconut are common in their diet. [Kannada](#) is spoken by 50 per cent, [Konkani](#) by 40 per cent, [Marathi](#) by 5 per cent and other languages are spoken by 5 per cent of the population

The main tribes of the district are Sidhi, Kunabi, Halakki Vokkaliga, Gonda and Gouli. Sidhis are said to have been brought by the Portuguese from Africa as slaves some four hundred years ago. Their populations are around ten thousand and are generally found in Haliyal, Yellapur and Ankola taluks. Now their cultures are completely Indian and have adopted mainly Hindu religion. Small populations of them are Muslims and Christians. They are extremely poor and backward and work mainly as agriculture labourers in the fields of Havyak Brahmins (Plate: 2.1)

Halakki Vokkaligas, living in the foot of Western Ghats are known as the "Aboriginals of North Kanara". Their distinctiveness and backwardness are too obvious. They have administrative system of their own and the headman is called "Gouda". Their way of living is still ancient and need amalgamation with the main stream. The men are practically naked at home and the women decorated with beads and necklaces, heavy nose rings have distinct attire. Goulis are nomadic tribes migrated from Maharashtra (Plate: 2.2).

They are mainly cows and goat rearers, they stay on the fringes of forest. Some have taken up agriculture. Kunabis are said to be the most backward of the tribals of North Kanara District. They live in small groups deep inside forests in bamboo huts built in a row sharing common walls. Not having access to the medical facilities due to seclusion, mortality rate among them is very high. Gonds live mainly in the forests of Bhatkal taluk. They live off forest products and they have rich folk culture of tribal dance.

### 10. CONCLUSION

However, it can be inferred that the coastal region of North Kanara has an advantageous location in terms of its natural resources. It is one of the leading regions in the state in terms of its progress and overall development. The region has been under the colonial influents and has immensely affected the economy, culture and lifestyle of the people. The economy and the lifestyle are also highly influenced by the geographical features, therefore, the root of the problems and the existing potentials are deeply associated with the geographical attributes. In this context, the geographical analysis of the coastal zone of the North Kanara may be instrumental in Integrated Coastal Zone Management of North Kanara.

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