CHAPTER 1

# GENERAL

With its natural beauty, rich culture and educational activities, Dakshina Kannada district has occupied a unique place in the Country. The tract between the Western Ghats and the Sea exposes one of the oldest geological features and its different evolutionary stages. It is no exaggeration that the Western Ghats are the home for many rare species and treasury of a variety of minerals. The sea bordering the district on the west is known for its bountiful fish resources. The lofty hills, awesome valleys and the enchanting rivers and plains are amongst the conspicuous physical features that one could see between the Western Ghats and the vast stretch of sea on the west. The onset of monsoon is heralded by thunder and lightning, dense black clouds sometime with silver lining riding the crust of the hills and playing hide and seek in the dense forest. As the monsoon advances, the black clouds form themselves into giant wheels in the sky and throw out streams and drop long grey curtain of rains. Nature's awesome splendor has revealed itself in the twinkling of stars in the temporal clear sky followed by a wave of feathery clouds. Surprisingly, the people of the district have successfully retained the regional peculiarities, though were subjected continual rule by Vijayanagar, *Keladi*, Hyder Ali and Tippu and British rulers. As it happened in the other parts of the Country as a sequel to reorganization,

Dakshina Kannada district also responded to the new economic and social change during the struggle for freedom and in the post-independence era.

The requisite for technological progress in the form of raw materials was provided by the soil, rocks, vegetation and frond available in abundance in the district. For quite some time, the people were dependent on the locally available raw materials and their products such as soil, lateritic building materials, grass roofs, cane baskets, log – mat of wild date trees and the dried sheets of frond, bract. furniture from good wood, oil squeezed from copra in wooden oil mills for their daily use as both for food and lighting, pounding paddy using long wooden pestle, pottery, long spoons prepared by dried coconut shell, ropes manufactured from coconut strand, clothes prepared from handlooms, *jaggery* from sugarcane and toddy etc. As the western technology fostered through the Basel Mission and business people, the local industries underwent a thorough change. Locally available soil was just sufficient for the manufacture of the tiles. Modern mills replaced wooden mills and metal utensils took over clay pots. Likewise, processing of coffee seeds and cashew became industries themselves and offered a plenty of employment opportunities. By getting the required leaves, *beedi* industry flourished throughout the district and by employing modern technology, the fisheries got impetus and are progressing at a rapid pace these days. Fertilizer industry, a symbol of modern industrial progress, has made its way in the district. The New Mangalore Port has benefited both the industry and the trade alike.

In the plains and valleys, the cultivation of paddy, sugarcane, coconut, however, occupies an important place right from the beginning. Earlier, large scale cultivation by clearing hills was in vogue and there were instances of people moving away and settling down in the new places, leaving behind them the fertile land. This was largely due to the fear they had about diseases. But, today, such places have been made habitable. Not only these people have started cultivating the new land, but have tried new crops too a commendable escapade indeed. Surprisingly, green leaves, cow dung and burnt soil have proved to be tested traditional manure. But, in order to get good yield now a days the farmers prefer chemical fertilizers. Understandably, the small land holders are put into financial stress. But, cultivation has been made somewhat less strenuous by the usage of pumps, power tillers etc.

There were times, when, both hills and rains had their impact on the health of people and their longevity. Fever and intestinal problems took a heavy toll in the earlier times. Compared to other diseases, elephantiasis and leprosy, which were considered rare elsewhere, were predominant here. When organized medical care was not in order, diseases like cholera and smallpox proliferated throughout the district. The only means of fighting the ill health was to seek shelter under traditional medicine like Ayurveda and Country medicine. Today, the modern medical facilities have ushered in on a large scale. There are plenty of government and private hospitals and clinics which can quickly provide medical help to the needy. It is here, that, the transportation and communication moulding the entire district into one unit has played a significant role.

While only few roads like Kasargod – Pane Mangalore, Sampaje ghat, Charmadi ghat and Nagodi ghat served as nerve centers of transportation, the villages, for their most part, are well connected by a network of roads. Of course, bullock carts and horse driven carts are increasingly scarce, at the same time, plying trucks and buses are increasing in number. Though the role of boats is insignificant in connecting the highways, nevertheless, as a means of water transport and goods carriers, they play an important role. With the substantial reduction in travel by foot, the traveler bungalows which once used to provide rest and food, gradually disappeared and in their place are to be seen the hotels to suit the speed of movement in the modern times. The people of Dakshina Kannada district are successful managers of hotel industry and have moved out of the district to pursue their business. As though opening the gate for the south, the rail roads have offered comfortable transportation to the eastern part of the district. Air travel, no doubt has added a third dimension to the transportation. Gone are the days, when people paid three *annas* and boarded the boats at Bantval and only to get up in Mangalore in the early morning hours. The familiar sights of people carrying their boxes and squeezing in horse driven carts are hard to find these days. Traveling to Bangalore overnight and taking a day or a day and a half to reach America has not come as a surprise.

There is a radical change in the barter system, which people practiced from time immemorial. The weekly annual *sandies* and religious festivals were convenient for people either to buy or sell their goods. Though, transactions are still continued through these means, but, today

they play a lesser role in a changed society. While Subramanya festival is known for the business of the livestock and rugs, Puttur sandy is known for the business of Country products. Fruits and vegetables are being brought to the district every day from the other side of the Ghats and sold in every village. Likewise, the livestock from the other side of the Ghats are transported through trucks as and when they need them.

Rice was exported from Dakshina Kannada in the earlier days. But, today, it cannot meet the local needs and hence need to be brought from outside. This situation has arisen mainly due to the growth of population. People have adapted themselves to *Sorghum* (Jowar) and Wheat from the days when they faced scarcity of rice. The impact of hotels could be felt even in the home front; and modern breakfast has fast replaced their thin gruel of rice. It was a part of tradition to drink *Jaggery* beverage and butter milk to quench the thirst. Today, this habit has dramatically changed and in their place coffee and tea have gained momentum. It is true that the education, industry and transportation have augmented and accelerated such changes. The postal service which was the brain child of the East India Company, today, caters to the village mass and likewise increase in postal telecommunication facilities is the result of their close association with the communication revolution that changed the face of this part of the Country, as it did elsewhere.

Dakshina Kannada was once a seat for Sanskrit education. Today, it is a beehive of modern activities and is conspicuous in the field of higher education, where, the educated youths prefer to go abroad to pursue their education and correspondingly the district attracts youths from foreign countries who strive for modern education. Such programmes are the results of impact of the extension of higher education and are global in their character. Banking industry in this part took its birth and expanded its spheres as a result of initiation taken by few visionaries, who believed in modern banking system. Life Insurance had its role in promoting the concept of savings. It is dazzling that such measures which created employment opportunities to the graduates also gave impetus to the economic sphere of the Country. It is intriguing to note that the district offers a unique opportunity where education, agriculture, industry, transportation and communication are closely interwoven and is manifested in the comprehensive growth of the district.

Though people speak many languages in this part, the native tongue of a large number of people is Tulu of the Dravidian family of languages. It is no wonder it has crossed the borders of the State and the Country,

with the migration of people to the other parts. This language, along with the subsidiary languages has enriched the literature and more particularly the folklore. Although this part has rich and long multilingual culture, for literature, most of the well-known writers preferred Kannada, the regional language of the State. Time has left indelible mark both on the variety and style of literature. The folklore with religious faith was once the chief means of entertainment. However, today it is declining drastically. *Yakshagana*, a form of folk art which was extensive in performance and widely liked by people as a means of recreation is, today a changed art embarking totally a new style in its presentation. With the changed mind set of the people, it is but natural, that, Dakshina Kannada has also shifted to the cinema which proved its popularity.

**Origin of Name**

Opinion differs as to the derivation of the name 'Dakshina Kannada' (South Canara), which is situated on the southern end of the western coast of Karnataka and also as it is situated to the Southern Indian Coast hence the name Dakshina Kannada. Before the two districts namely South and North Canara were separated in 1860, the entire coastal belt was known either as Canara or Kanara. Later, they were called South Canara and North Canara. There is an interesting anecdote as to how the name Canara came into being. It appears that the Portuguese when arrived in this part and came in contact with the local people found that the common linguistic medium of the people to be Kannada and coined the name Canara, 'd' being not much in use in Portuguese. Since then, the name Canara came into being. People who spoke Kannada were called Kanarese. But it was in 1860, that the Canara district was divided geographically into South Canara and North Canara and each got a separate identity. When Karnataka was unified in 1956, both the districts were merged in Karnataka. From the earlier times the coastal part that included Dakshina Kannada was called variously as *Parashurama Kshetra, Shanthi Kshetra, Shurpanka Kshetra, Aparanthaka Desha* with mythological stigma attached to each of these. But, historical connotation was different - where the land was identified with the rulers. It was called *Alvakheda* – 6000, *Alvanadu* of *Saptha Konkana* region, *Tulunadu* in the reign of Alupas. But, with the entry of Portuguese, the region came to be known as Canara. Mythology has it, that, when Parashuram (parashu for axe) threw the axe, the sea got retreated and the land exposed stretching north-south. This was

identified as *Parashurama Kshetra.* It has a scientific version too. During Megalithic period (Iron Age), perhaps man used axe to cut down the forest for his settlement and Parashurama may symbolize this cultural transposition – according to K.V. Ramesh.

Regionally, Dakshina Kannada district is alluded to as *Tulunadu* in *Agananooru*, a Tamil sangam anthology of circa 1500. There is a reference to Tulu *Vishaya* in the *Barakuru* inscription of the period of Bankideva –I of the Aloopa dynasty and Nayasena who lived in 1115 A.D. in his work "*Dharmamrutha*" makes a mention of *Tulunadu.* Inscriptions of the Vijayanagar rules mention the region as Tulu *Rajya* and Tulu *Desha* and parts of it as Mangalore *Rajya* and Barakuru *Rajya.*

Though Kannada has been in general use in this region both as the official language and popularly cultivated link language, since a long time, the native tongue of a large number of people in a major portion of the district is Tulu of the Dravidian family of languages. The word *'Tuluva'* refers to either people who speak this language or to the region. There is no single opinion as to how the word Tulu has derived. Legend has it, that, *Ramabhoja*, an early ruler of this region was known for his gifts like *tuludhana*, *tulapurusha* etc. and his dynasty was called *Tholar* and the region under his control as Tulu. But this version is refuted by scholars like B.A. Salethore as untenable. He argues that the word *`Tuluve'* has its roots in Tulu which means mild and meek which evidently denotes the peaceful demeanor of the people. Yet in another instance, Salethore opines that the word *`Tuluva'* is derived from the Kannada word which literally means `to attack'. It could well reflect the intrepidity of the Tuluvas in the ancient times and hence the name. A totally different version is provided by another scholar K.V.Ramesh who points out that in the Tulu language, as spoken today, when this word qualified certain fruits it signifies the softness of the fruits. He opines that in the ancient days also the region must have been famous for its variety of soft fruits and might have, therefore, came to be called as *Tulunadu.*

M. Govinda Pai, however, argues that there would be some meaning in the derivation of the word from softness, if softness is taken as an attribute not of the people but the soil of the region. Yet another view suggests that the word *'Tulu'* could also mean to travel by boat in the seafaring, which perhaps is indicative of the maritime activities of the

locals. This view is endorsed by Govinda Pai. Dr. Gururaja Bhat traces the roots of the word *Tulu* to cattle and that the *Tuluvas* in ancient times were cattle breeders and in that context probably *Turuvars* were called *Tuluvas*. Sediyapu Krishna Bhat however, derives a different meaning for Tulu. He suggests that the word Tulu denotes water and therefore the name *Tulunadu* has something to do with the region which abounds in water. K.M. Raghava Nambiar believes that, in its true sense, *Tulunadu* refers to the area over flown by water and agrees with the view of Sediyapu Krishna Bhat. Moreover, *Alupas*, the rulers of the region were known by the name *Aluva*, denoting rich natural background. Hence, it is possible that the word *Alupa* might have had roots in *Anupa*, since the word *Anupa* refers to the region with dense vegetation and cascades. With this background the words *Tulunadu* and *Anupadesha* look as though one is the translation of the other denoting the same meaning. Whatever could be argument, the fact remains, that, this part of the Country is in the foothills of the Western Ghats rich in valleys with copious water supply and is appropriate that the region is called *Tulunadu*.

**Location and Boundaries**

The district of Dakshina Kannada is situated on the Western Coast of India, about half way between Bombay and Cape Comorin. From north to south, it is a long narrow strip of territory and from east to west; it is a broken low plateau which spreads from the Western Ghats to the Arabian Sea known in Kannada as *'Pashchima Samudra'* (Western Sea). The major part of its length lies along the seaboard. The area is intersected by many rivers and streams and presents varied and most picturesque scenery. Abundant vegetation, extensive forests, numerous groves of coconut palms along the coast and rice fields in every valley, provides a refreshing greenness to the prospect. It is a most densely inhabited tract. Geographically, the Dakshina Kannada region is separated from the rest of the South Indian peninsula by the towering heights of the Western Ghats; it spreads from the Western Ghats towards the sea to the west. The length of the undivided Dakshina Kannada district's coast-line, which is almost straight, but broken at numerous points by rivers, rivulets, creeks and bays, is 76 nautical miles (140.8 Km). Now its coastal lines have been reduced to 42 kilometres after the formation of Udupi district and are broken at numerous points by rivers,

rivulets, creeks and bays. The district lies between 12° 27' and 13° 58' North Latitude and 74° 47' and 75° 45' East Longitude.

The district is bounded by Udupi and Karkala taluks of Udupi district on the north, Mudigere taluk of Chikkamagalur district on the northeast, Sakaleshpur taluk of Hassan district on the east, Madikeri and Somawarapet taluks of Kodagu district on the southeast and Kannanur district of Kerala State on the south and is surrounded by the Arabian sea on the west.

**Area and Population**

The geographical area of the district, as computed by the Surveyor-General of India and cleared by the Central Statistical Organization of the Government of India, is 4,560 square kilometres. But the reporting area of the district for land utilization purposes, as worked out by the Commissioner for Survey, Settlement and Land Records in Mysore, Bangalore, is 4,771.49 square kilometres. This difference is due to the different methods employed by them in measuring the area. Dakshina Kannada district, according to the Census of 2001, has an area of 4,560 sq km and represents 2.38 per cent of the total geographic area of the State. In terms of area, it has 23rd place among the 27 districts of the State. While, Belthangadi taluk with an area of 1,376 Sq km is the biggest in terms of area, Bantvala taluk with an area 736 Sq km is the smallest taluk in the district. The district has a population of 18,97,730 of which 9,38,434 are males and 9,59,296 are females, of which 11,68,428 are from rural areas. The district represents 3.59 per cent of the total population of the State and has secured Eighth position in terms of population in the State out of 27 districts. The variation in the population growth over a decade from 1991 to 2001 amounts to 14.6 per cent as against the variation of 17.5 per cent in the State.

It is one of the thickly populated districts of the State and the density of the population being (Population per square km) 416 as against the State average of 276, of this Mangalore taluk has the highest density (1,048) and Sulya taluk being the least (170). A special feature of population of the district has been that excepting the Sulya taluk, it has more females than the males. There are, a total of 3,62,216 houses in district which are inhabitable, of which 2,17,388 houses are in rural areas and the rest i.e. 1,44, 828 houses are in urban areas *( For details see Chapter 3).*

**Table 1.1 Talukwise Area and Population (as per the Census of 2001)**

| Dist./Taluk | Region | Area (in sq.km) | Inhabited houses 2001 | Total Population | | |
|---|---|---|---|---|---|---|
| | | | | Total | Males | Females |
| **Mangalore** | Total | 842.72 | 1,73,804 | 8,82,856 | 4,34,702 | 4,48,154 |
| | Rural | | 53.191 | 2,81,777 | 1,35,470 | 1,46,307 |
| | Urban | | 1,20,613 | 6,01,079 | 2,99,232 | 3,01,847 |
| **Bantval Taluk** | Total | 735.60 | 63,510 | 3,61,554 | 1,78,664 | 1,82,890 |
| | Rural | | 54,043 | 3,06,734 | 1,51,394 | 1,55,340 |
| | Urban | | 9,467 | 54,820 | 27,270 | 27,550 |
| **Belthangadi Taluk** | Total | 1,375.52 | 46,407 | 2,46.494 | 1,21,288 | 1,25,206 |
| | Rural | | 54.043 | 3,06,734 | 1,51,394 | 1,55,340 |
| | Urban | | 9,467 | 54,820 | 27.270 | 27,550 |
| **Puttur Taluk** | Total | 995.19 | 50,111 | 2,66,072 | 1,32,786 | 1,33,286 |
| | Rural | | 40,587 | 2,18,002 | 1,08,527 | 1,09,475 |
| | Urban | | 9,524 | 48,070 | 24,259 | 23,811 |
| **Sulya Taluk** | Total | 827.74 | 28,384 | 1,40,754 | 70,994 | 69,760 |
| | Rural | | 24,739 | 1,22,726 | 61,625 | 61,101 |
| | Urban | | 3,645 | 18,028 | 9,369 | 8,659 |
| **Dakshina Kannada District** | Total | 4,560.00 | 3,62,216 | 18,97,730 | 9,38,434 | 9.59,296 |
| | Rural | | 2,17,388 | 11,68,428 | 5,74,657 | 5,93,771 |
| | Urban | | 1,44,828 | 7,29,302 | 3,63,777 | 3,65,525 |
| **Karnataka State** | Total | 1,91,791.00 | 1,38,30,096 | 5,28,50,562 | 2,68,98,918 | 2,59,51,644 |
| | Rural | | 89,98,481 | 3,48,89,033 | 1,76,48,958 | 1,72,40,075 |
| | Urban | | 48,31,615 | 1,79,61,529 | 92,49,960 | 87,11,569 |

Source : Census of India, 2001 C.D. Version

**Note**: The taluk-wise area figures are for the reporting area for land utilization purposes as worked out by State Survey Department. The Geographical area of the district is computed by the Survey of India. So the total figures of the taluk do not tally with the total figures for the district in respect of areas.

## Administrative History

The Alupas ruled the area from the early period of the Christian era to the end of 14th Century A.D. During their rule, the kingdom was

divided into divisions called Nadu and the region around *Byndoor* was known as *Byndoorunadu*, while the region around the Mangalore was known as *Moogoorunadu*. For a short period it was under the Suzerainty of the Hoysalas. From about the middle of the 14th century to the end of 16th century, the district formed a part of the Vijayanagar Empire. It was during this period that the *Barakooru Rajya* with its headquarters at *Barakoor* of Udupi taluk and Mangalore *Rajya* with its headquarters at Mangalore came into being. Both the States had Governors as overseers and sometimes there used to be a single Governor for both the *Rajyas*. The region was further subdivided into smaller administrative units known as *Nadus*. There are references in the Inscriptions of the Kings of Vijayanagar period to *Paduvakonanadu, Byndoorunadu, Udayan galanadu, Thilugadhiyanadu, Kadabanadu, Nalavattanadu, Harunadu, Munginadu, Mandalakeyanadu, Kantaradhanadu, Kabbunadu, Kandenadu, Bandampallinadu* etc.

The administration of the district was transferred to the Keladi rulers by the emperors of Vijayanagar around 1514 A.D. It was under the rule of Keladi Nayaks for about two centuries. With the capture of Bidanur by Hyder Ali in 1763 A.D., the district also was passed on into his hands and subsequently to the possession of Tippu Sultan. It was annexed by Britishers in 1799 after the death of Tippu Sultan. In the early period the present Dakshina Kannada, Udupi and Uttara Kannada areas formed a single district and the unified district was called Kanara. It was in 1860 that the Kanara district was divided into South Canara(Dakshina Kannada) and North Canara(Uttara Kannada). In 1862, Uttara Kannada (excluding the Kundapur taluk which was transferred to Dakshina Kannada) was transferred to Bombay Presidency, while, retaining Dakshina Kannada in the Madras Presidency. With the reorganization of the State in 1956, the district was integrated with the New Mysore State (excluding Kasaragod which was transferred to Kerala State).

In 1895, the area of Dakshina Kannada district was 3,902 sq miles and it included also a small group of islands in the Indian Ocean known as the Amindivi Islands. In 1896, there were only five taluks in Dakshina Kannada district *viz.*, Mangalore, Kundapura, Udupi, Kasargod and Uppinangady. A new taluk, with Mudabidri as the headquarters and called after that place, was formed in 1910. However, for administrative reasons, the Mudabidri taluk was abolished two years later and a new taluk called the Karkala taluk was formed with effect from 1st July, 1912.

In 1927 Uppinangady taluk was renamed as Puttur and its headquarters was also located there. For purposes of revenue administration, the district was divided into three divisions, namely Kundapura, Mangalore and Puttur. The Kundapura division comprised the three northern taluks of Kundapura, Udupi and Karkala and was headed by an Indian Civil Service Officer designated as Head Assistant Collector, while the Puttur taluk comprising the taluks of Puttur and Kasargod was under the charge of a Deputy Collector. The Mangalore taluk which constituted a division by itself was under the charge of a Deputy Collector.

In 1954, another new taluk, namely, Belthangadi, was constituted for administrative convenience. But, on 1st November 1956, the taluk of Kasaragod, which was all along an integral part of the Dakshina Kannada district, was transferred to Kerala State as a result of re-organization of the State. The jurisdiction of the revenue divisions of the district was again revised in 1959 and the old Mangalore division, which had been abolished earlier, and the Bantval taluk, which was at one time an independent taluk and had been merged with Mangalore in 1858, was revived with effect from 1st October, 1959. Again, in April, 1966, another new taluk namely, Sulya, was carved out of Puttur taluk, which had been considered unwieldy for purposes of revenue administration. Thus, the district of Dakshina Kannada which had eight taluks in 1972 was divided into revenue sub-divisions (called *firkas*). Details of talukwise hoblies and total villages are as follows:

**Table 1.2 The Talukwise Details of Hoblies and Villages as on 1973**

| Taluk | Total number of Villages | Name of Firka/Hobli |
|---|---|---|
| **Kundapura** | 101 | 1. Kundapura<br>2. Bynduru<br>3. Vandse |
| **Udupi** | 115 | 1. Udupi<br>2. Kaapu<br>3. Kota<br>4. Brahmavara |
| **Karkala** | 79 | 1. Karkalaaaa<br>2. Mudbidri<br>3. Ajekar |
| **Puttur** | 68 | 1. Puttur<br>2. Uppinangadi<br>3. Kadaba |

| Taluk | Total number of Villages | Name of Firka/Hobli |
|---|---|---|
| **Sulya** | 41 | 1. Sulya<br>2. Panja |
| **Belthangadi** | 81 | 1. Belthangadi<br>2. Venooru<br>3. Kokkada |
| **Mangalore** | 118 | 1. Mangalore - A<br>2. Mangalore - B<br>3. Gurupura<br>4. Suratkal<br>5. Mulki |
| **Bantvala** | 84 | 1. Buntval<br>2. Pane Mangalore<br>3. Vittla |
| **Total** | **687** | **26** |

There have been some changes in the territorial jurisdiction of some of the taluks and hoblies (*firkas*) in the district, in recent years. Apart from the transfer of Kasaragod taluk to the Kerala State in 1956, the Amindivi group of Islands, which formed a part of the district, was also transferred to the newly formed Union Territory of Laccadive, Minicoy and Amindivi Islands. Within the district itself, consequent to the formation of the Belthangadi taluk in 1954, 25 villages each of Belthangadi and Kokkada hoblies and two villages (Barya and Tekkar) of Uppinangady hobli from the then Puttur taluk, and 29 villages of Venoor hobli from Karkala taluk were transferred to form the new taluk. Similarly, when the new taluk of Buntval was formed in 1959, 31 villages of Buntval hobli and 30 villages of Panemangalore hobli of the then Mangalore taluk and 24 villages of Vittla hobli from the Puttur taluk were transferred to form this new taluk. Further, for purposes of administrative convenience, the village Halady was transferred from Udupi taluk to Kundapur taluk, so also the village Hejmady from Mangalore taluk to Udupi taluk and the villages of Inne, Mulladka and Mundkur from Mangalore taluk to the Karkala taluk, during that year.

Again, during 1966, consequent to the formation of the new taluk of Sulya, 19 villages of the Panja hobli and 22 villages of Sulya hobli from the then Puttur taluk were transferred to form the new taluk. Mudabidri hobli of Karkala taluk of Udupi district was transferred to Mangalore taluk of Dakshina Kannada on 25.3.1998. At present, Dakshina Kannada district has two sub divisions namely Mangalore sub-

division and Puttur Sub-division. In the former, are included, the Mangalore and Buntawal taluk, while, in the latter Puttur, Sulya and Belthangadi taluks are clubbed. There are in all 10 *nadakacheries* and 15 *hoblies* at present. Talukwise geographical details of Dakshina Kannada as per the Census of 2001 are as follows

**Table 1.3 Talukwise Particulars of Dakshina Kannada District**

| Sl. No. | Taluk | Area in Sq.km | East Longitude (Degrees and Minutes) | | North Latitude (Degrees and Minutes) | |
|---|---|---|---|---|---|---|
| | | | From | To | From | To |
| 1. | Mangalore | 842.72 | 74-47 | 75-01 | 12-45 | 12-13 |
| 2. | Buntval | 735.60 | 74-55 | 75-40 | 12-40 | 13-01 |
| 3. | Puttur | 995.19 | 75-09 | 75-45 | 12-34 | 12-53 |
| 4. | Sulya | 827.74 | 75-15 | 75-41 | 12-27 | 12-46 |
| 5. | Belthangadi | 1,375.52 | 75-03 | 75-34 | 12-49 | 13-13 |
| | **Dakshina Kannada District** | **4,560.00** | **74-47** | **75-45** | **12-27** | **13-13** |

Source : Census of India, 2001 C.D. Version

**Table 1.3 Talukwise Particulars of Dakshina Kannada District (contd.)**

| Sl. No. | Taluk | Population | Density of population (persons/ sq.km) | No. of villages | City/ Town | Sex ratio (No. of females per 1000 males) |
|---|---|---|---|---|---|---|
| 1. | Mangalore | 8,82,856 | 1,048 | 88 | 14 | 1,031 |
| 2. | Buntval | 3,61,554 | 492 | 79 | 3 | 1,024 |
| 3. | Puttur | 2,66,072 | 179 | 67 | 1 | 1,004 |
| 4. | Sulya | 1,40,754 | 267 | 40 | 1 | 983 |
| 5. | Belthangadi | 2,46,494 | 170 | 80 | 1 | 1,032 |
| | **Dakshina Kannada Dist** | **18,97,730** | **416** | **354** | **20** | **1,022** |

Source : Census of India, 2001 C.D. Version

## GEOLOGY

The west coast forming almost a depression to the west of Western Ghats of India has been variously described in legends as

*Parashuramanadu* or *Parashurama kshetra.* Legend has it, that, Parashurama won the wars on Kshatriyas and wanted to proceed towards Western Ghats. When he saw from the tops, the vast expanse of sea on the west, he got enraged and ordered the king of sea to recede and the order was expeditiously obliged by the king of sea. This belief could only mean that the present coast was once a submerged part of the land and later exposed when the sea started receding.

The scientific studies of the geomorphology of this part have brought out many interesting results. If the hills of *Birkanakatte* of Mangalore city are examined, it is no surprise, that, at the lower part one can find abundant pebbles of quartz over which are deposited sandstone, shale and laterite at the top levels. It is unaltered product of the preexisting rocks. These layers of rocks are sedimentary in origin which later got transported and deposited by the ancient rivers. There are ample evidences to confirm their sedimentary origin – the stratification and current bedding - for instance. Such features could also be clearly seen near the Government building of *Urva*, B.G. School, V.C. *Nayak* hall, Taluk office, *Velencia*, *Jeppu*, *Kankanadu* and other parts. The upper part exposes quartz pebbles at places reaching the size of tennis ball. Quartz pebbles in association with shale are to be found in the wells dug (25 to 30 feet) around *Ashoknagar* and *Surathkal.*

Another interesting finding is the logs of wood recovered while digging the basement for a new bridge across *Gurupur* River near *Koloor.* These logs had almost been reduced to charcoal and are black in colour. One of the samples recovered was examined by the scientists of Tata Institute of Fundamental Research, Mumbai, who concluded that it might be as old as 63,800 years, and is the remnant of vegetation that was preserved underneath.

Such scientific discoveries have been made in the coastal parts of both Dakshina Kannada and Kerala. It stands to reason, that, once upon a time in the geological history, the coastal parts formed part of the oceanic bottom, but, still it is not clear as to how the sea receded. It could be possible when there is an upliftment of land or subsidence of oceanic bottom. Strangely, there appears to be no deformation in the rocks and has remained unchanged for a long time. It is amply clear when Glomar Challenger took up scientific expedition in the Indian Ocean the vessel picked up a prominent fault parallel to the west coast and thus the subsidence of oceanic bottom has been correlated with this

event. This phenomenon might have caused deepening of the sea in this part and the regression can thus be explained.

Dakshina Kannada is bestowed with rich mineral resources and a variety of rocks. The geological investigations carried out in this part have brought to light the details of distribution of rocks and the mineral deposits. There is a great scope for the development of mineral based industries in Dakshina Kannada.

**Laterite:** Laterite forms one of the extensive rock types all along the coastal regions and is popularly called brick stone by local people. It is very hard on the surface but it becomes soft at depths. The great advantage is that it could be cut into desired dimensions and shape and it gets hardened on exposure to the Sun and air for few hours. The thick bricks of laterites are preferred as building stones which will also reduce the usage of cement substantially. It will not undergo weathering even after exposure to the Sun or rains. It has an added advantage, that, no cement is required to polish its surface. Moreover, laterite is highly porous and the water, instead of getting tapped, is filtered out. Laterite is found up to a depth of three to four meters from the surface. Since it can take heavy load, it is no wonder that laterite is used for construction of houses. Wells dug in lateritic soil yield copious amount of water. The origin of laterite has been scientifically explained. The Country rocks – granite, gneiss and basalt - for instance, are subjected to the process of weathering. In due course silica, calcium and alkalies are leached out as solution while alumina, iron and a small amount of titanium are left out in the parent rock giving rise to laterite, a product of alteration. The formation of laterite is believed to be in the Cenozoic era (Pleistocene epoch) as postulated by geologists. The rock, more or less appears to be perforated and such structure is referred as vesicular texture. Laterites have spread over an area of approximately 32 to 45 km. wide area all along the coastal parts of Karnataka. In Dakshina Kannada there are a number of laterite quarries which have gone up to a depth of 10 – 15 m. Quarrying laterite is a business by itself. The stone cut into desired shape and size can readily be transported. Of late, this rock is used specially for major constructions like houses. All weather port Mangalore as well as fertilizer factory have extensively used laterite as building material. It is increasingly being used for smaller constructions like bridges, dig outs and supporting walls also. The role of laterite is conspicuous in the construction of houses for lower income group people, roads for rural areas, tank bunds and in erecting the walls for wells.

Many experiments have been conducted for strengthening the laterite. When load is not expected to be high, laterite can readily be used along with cement concrete for foundation and flooring. This has been confirmed by carrying out many tests on the bearing strength of laterite. It is equally interesting to note that experiments have been conducted, where, instead of using rocks, lateritic soil is sieved to get the fine powder and mixed with cement to produce bricks. This largely avoids making depressions on the surface of the land by quarrying. It is very hard to get laterite with smooth surface with undisturbed edges and of desired strength. Some countries have shown that laterite could be used even in the construction of airports.

**Granite**: Though both granite and gneiss share common mineralogy, they differ in the mode of origin. While, granite represents typical igneous rock, gneiss is a metamorphosed form of granite formed under specific temperature and pressure within the earth's crust. However, they exhibit similar physical features. Both are hard rocks and generally occur below the lateritic cover in Dakshina Kannada district. These rocks are abundant around Puttur, Sulya and Belthangadi taluks and are exposed near the temple of Surathkal, Udyavara, Bandel of Mangalore and other parts. The surface generally appears dark since it is exposed to rains and sun. It is opined, that, the name Karkala is derived from Kariyakal which literally means black stone. However, if chipped, the inner part appears to be white in colour. Since granite is a hard rock and normally free from fractures, it is easy to cut in to bigger slabs of desired size. It is to the credit of Ranjala Gopala Shenoy of Karkala, who sculptured two imposing statues of Bahubali using granite. The statues of Gommateshwara at Venoor and Karkala are carved out of granite. The threshold pillar (*garudagamba*), the thousand pillar *basadi* of Jains at Mudabidri is yet another master piece sculpted in granite. Granite finds its use in a variety of structures which include enclosures of temples, *garudagamba*, buildings, and bridges and even as foundation stone. The Kastur ba Medical College of Manipal is built by granite. The boulders of granite are used in the constructions of break water in New Mangalore port to withstand the onslaught of sea waves. It has multi variant use in structures like flooring, constructions of roads and of course, as concrete material along with cement. Granite and gneisses have attracted as ornamental stones especially in architecture which includes modern houses, temples and churches.

**Dolerite**: It is a variety of igneous rock dark in colour, both internally and externally hard and compact in nature. Its dark colour is

very conspicuous. Intensively weathered rock, on contact with water turns into reddish soil due to chemical reaction (mainly oxidation). When hit with hammer, dolerite gives out metallic sound. It is the most preferred rock as ornamental stone since it can take desired cutting and polishing. Dolerites and granites are used as ornamental stones for the entrance of Karnataka Bank in *Kodiyalabylu* in Mangalore.

**Iron Ore**: Lateritic iron ore generally contains about 45 per cent of iron. If iron exceeds 50 – 55 per cent, then it qualifies to be classified under iron ore. By and large, the gangue in the form of quartz and other impurities reduce the quality of the ore and such ores have little use for the extraction of metal. In some cases, it could form the source of ore, provided, the iron rich part is separated out. Such deposits occur in Dakshina Kannada district in almost all the taluks nearer to the coast.

**Fire Clay:** As name implies, fire clay or black clay is pitch black in colour, but on mixing with water, turns into pale red colour. It is generally sticky in nature and is associated with quartz which occurs as impurity. Deposits of fire clay occur in many wetlands as well as in places where there is stagnation of water. After necessary purification, fire clay is used in the manufacture of tiles, bricks and cottage industries, most particularly in pottery. The pale red coloured fire clay becomes bright brown in colour when burnt in kiln. Fairly good deposits of fire clay are reported from Mangalore and *Gurupura.*

**Kaolin or China Clay:** Kaolin generally occurs at the bottom of deep wells or in places where granite and gneisses have been substantially altered chemically. Kaolin is powdery in nature and is associated with quartz in most of the cases. The purified kaolin is used in the porcelain industry and for the manufacture of insulators in electrical industry. It also finds use in the manufacture of insecticides. Deposits of kaolin have been reported from *Guruvayanakere.*

**White Sand**: Since it is bounded by the sea on the west, Dakshina Kannada district has no dearth of white sand deposits. Heaps of white sand abound the sea shore. Since white sand has plenty of salt content, it is disqualified for use in the cement for construction. White sand, almost resembling sugar grains are reported within a diameter of one kilometre from the shore of *Mukka.* Here, the deposit contains about 96 per cent silica. It is preferred for the manufacture of transparent glass; bottles etc. in glass industry and are highly suited for moulding purposes. White sand occurring in this part of coast is supplied to the glass industries of Bangalore and Mumbai.

**River Sand**: stream emptying into to the Arabian Sea generally carry sand grains of bigger dimensions in their load. Such deposits, as they are free from salt contents are ideal to mix up with cement used for constructions. Quarrying for river sand is quite a common practice in the beds of Netravathi, Gurupura, Mulki and other rivers.

**Shells**: The shells of marine organism get accumulated in the beach after the death of the organisms. Chemically these shells are completely made up of calcium carbonate, which is generally burnt to recover lime. Lime is used for white washing the buildings and for *pan beeda*. It is also used in poultry farm and in the manufacture of insecticides. The foam associated with the shells is used for cleaning and polishing the glass.

**Hot Water Spring**: It was Thomas Oldham, a renowned geologist of Geological Survey of India who while surveying Puttur area reported a rare hot water spring in 1882. Some observations were later made by B.P.Radhakrishna who was the Director of the Department of Mines and Geology. He re-examined the spring in 1971 and recorded some important findings. This rare hot spring is located 10 km from Puttur on the southern bank of the river *Badantadka*. It is locally called '*Bender Thirtha*'. It is in the jurisdiction of the village *Irde* at a distance slightly downwards after the union of two rivers *Balaku* and *Ermathi*. The temperature of the hot water is about 102°F (39°C) and the hot water comes out through some concealed fractures at a rate of 300 gallons per hour. Since sulphur is dissolved in the water, it emits pungent smell. The hot water spring of *Irde* is only of its kind in the State. There is a belief that taking a dip in this spring cures many diseases connected with the skin. However, contrary to the expectations, the temperature is not enough to produce the required amount of steam for the generation of electricity.

**Natural Divisions**

The district can be divided into three natural divisions namely: 1) The area lying between Southeast of *Kumaradhara* and Northeast of *Netravathi*, 2) The area between *Netravathi* and *Gurupur* rivers and 3) The area lying roughly to the south of *Netravathi* and *Kumaradhara*. The area to the east of the district comprises watershed, the source of many important rivers and peaks of mountains forming a part of the Western Ghats. The highest peak of this range attains 1,830 m while the average height from mean sea level varies from 610 m to 915 m. The district is bordered on the west by the coastal plain over a length of 141 km (undivided Dakshina Kannada) and the width varies from 40 to 80 km.

Near the coastal part, the land attains an height varying from 60 to 120 m which at the foothills of Western Ghats is about 180 m in height. The coast-line of Dakshina Kannada is indented by numerous bays and creeks, which have been formed by the river estuaries. The coast-line is low and sandy with broken and rugged rocks cropping up in places, but the area near the seaboard is well planted with coconut trees. The district possesses picturesque beauties of hill and dale, mountain and plain, wood and water, with some of the happiest combinations of all these aspects. On one side, one can see all the charms of a rural landscape while on the other, the view ranges over the unbounded ocean. The district forms a broken low plateau spreading from the foot of the Western Ghats to the Arabian Sea and forms a narrow strip with rapidly flowing rivers. The coastal land forms a densely populated area.

**Physical Features**

The boundary of the district towards east is carved of parallel scrap edges of the mountain ranges and valleys from where innumerable streams take their birth. As one proceeds towards west, there is transition from the mountainous Country to the expanse of sea. From the Western Ghats, hills radiate in all the directions. One of the longest is being the Chibbiri ridge which runs from Ballarayadurga up to Dharmasthala. Kudremukh forms another prominent range which is terminated near Mudabidri. All over the coast, there are detached low hills which become less frequent as the coast is approached. These Western Ghats have range of peaks which are more or less perpendicular to the plane towards the west and because of their heights intercept the clouds of the southwest monsoon, thereby propelling the highest rainfalls.

Kudremukh range has three important peaks on the highest ridge of the Western Ghats facing Belthangadi. They are:1)The Peak known as the *Mukha* head –1,881m. (6,173 ft.) 2) Midpoint –1,883 m. (6,177 ft.) 3)Funk hill – 1,892 m (6,207 ft.). Important among the other peaks are *Ballarayanadurga* – 1,504m(4,934 ft.), *Kattegudda* lying to the south of *Charmadi ghat* – 1,382m (4,534 ft.). *Subramanya* overlooking the *Bisale ghat*, *Sisalkal* over the old *Sisalghat*. Among the isolated hills, *Ammadikal* – 1,239m (4,261 ft.) in Puttur taluk forms an important peak.

The Western Ghats being the eastern boundary of the district, for almost its whole length, the communication with the rest of the State has to be through passes on these mountain ranges. Beginning from the south of the district to the north, it is found that the first *ghat* road from Chennai to Mangalore through Bangalore and Madikeri passes through

*Sampaje* entering the district in the southern corner of Puttur taluk. Secondly, the road from Hassan and *Sakaleshapura* passes through the *Shiradi* Ghat and runs westwards to Mangalore and joined by the Bisale ghat road at *Uppinangadi*. Thirdly, the road from Chikkamagalur passing down the *Charmadi ghat* (*Kodekal* pass) running west connects Mangalore.

**Water Resources**

Since Western Ghats marks the eastern boundary of the district, the rivers originating in the *ghat* region, necessarily flow towards west to join the Arabian Sea. The rainfall of the southwest monsoon is very heavy giving rise to a number of rivers and streams carrying a great volume of water during monsoon. During this period, the current in these rivers is rapid rendering them unfavourable as a means of transport. In the dry weather, the rocky nature of the river bed gets exposed. But the back water on the other hand, is suitable for navigation and serves as a means of communication with the rest of the towns and ports in the coastal area. During the monsoon period, all the rivers and springs are swollen due to heavy rains and some of them overflow their banks, inundating the surrounding areas. But, they do not lost long, for, they retrieve to their normal levels within a short period. All the rivers invariably support fisheries with abundant fish resources. The principal rivers of the district are the*Vedavathi*, the *Kumaradhara*, the *Payaswini* and the *Gurupur* rivers.

**The Netravathi:** The Netravathi river rises in the *ghats* to the east of *Kudremukh* and flows down the *Bangadi* valley past Belthangadi. It passes through Bantval and Mangalore before it joins the Arabian Sea near *Kodiyala*. It takes north south course in Belthangadi and turn towards south and in its downward journey follows south-westerly direction. Again, in central part of Belthangadi taluk, it takes east west course and crosses the southern part of Mangalore taluk and joins Gurupur River and finally discharges into the Arabian Sea. The river, in all is 96 km. long and the flood is at its maximum during monsoon. Netravathi is widest at Mangalore with a number of small islets which are exceedingly fertile and encouraging rice and sugarcane cultivation. Kumaradhara and Gurupur streams are two important tributaries of Netravathi River. Kumaradhara, which rises from the south eastern border of the district in Puttur taluk, before joining the Netravathi River at Uppinangady, flows through the central part of Puttur taluk. *Gaurihole* is another tributary of Kumaradhara River. It rises in the north eastern

part of Puttur taluk at Shiradi ghat and joins Kumaradhara River after flowing for a short distance towards west. Gurupur river, one of the important streams of Dakshina Kannada flows in the eastern border of Mangalore taluk for a short distance, then turns towards northwest and crosses the central part of the taluk and turns again south flowing parallel to the coast, till the southern end of Mangalore, where, it is joined by Netravathi before emptying into the Arabian sea.

The course of the *Mulki* River almost demarcates the northern boundary of Udupi and Karkala taluks and the river *Payaswini* from South east to Northwest direction in the southern part of Sulya taluk and then enters the State of Kerala. The three rivers namely the Tunga, the Bhadra and the Netravathi take their rise practically at the same place in the Western Ghats but, follow different directions. While, the Tunga and the Bhadra flow eastward, the Netravathi follows a westerly course. Legend has it, that, the giant *Hiranyaksha* carried the earth to *Pathala.* The gods became afraid and approached the Lord Vishnu; the latter took the form of boar and killed the giant. When he was sitting on the *Vedha padha parvatha,* the right tusk of the boar broke and there followed the Bhadra; form the left tusk gushed the Tunga river. The water which flowed through the eyes (Netra) became the river Netravathi.

## FLORA

People still recall the days when the entire State of Karnataka was full of greenery. Nobody denied the fact, that, the State blessed with a variety of land which is fertile and congenial climate encouraging vegetation as though meant for the benefit of both man and animals as well as for the overall development of the environment. But, the impression is short lived as there is a thorough change in the form of vegetation in recent years. No doubt, the green belt has survived but only here and there. It is disheartening to note that the mining has caused irreparable damage to the land. It is feared that it may reflect the sorrowful State to which we have stooped. In order not to encounter such eventualities it is necessary to enumerate what type of vegetation flourished earlier and its status today. It is not all that; equally important is the fact that we need to know the type of pressure the vegetation is facing and the method to overcome such onslaughts. It is needless to say that the vegetation cover of any area, to a greater extent, depends on the amount of rainfall the area receives. If we correlate the amount of rainfall with the type of soil and the altitude of the land from the sea level, it is fairly easy to imagine the type of vegetation that the land will be

supporting. It is now very clear that the forest area is mainly limited to the Western Ghats and some hilly areas of the Deccan plateau. This can very well be understood by considering the type of land use or in other words land use pattern that is practiced in Karnataka. Forest area is very scarce in other parts and whatever little exists today is manmade.

It is the scarp edge of the Western Ghats that faces the impact of southwest monsoon. It rains heavily since the moisture laden clouds strike against the ghats. The coastal Mangalore enjoys an average of 3,000 mm of rains annually. On approaching the ghat, the intensity of rains increases and the peaks enjoy the highest rainfall. About 7,000 mm of rainfall is recorded in Kudremukh, while Agumbe, because of peculiar alignment of mountain peaks, receives much higher rains, averaging 7,460 mm annually. As monsoon approaches the ghats and advances towards east, there is a considerable decline in the amount of rainfall. It is obvious that Sakaleshpura which is located just 10 km from the peaks of Western Ghats receives an average of 2,210 mm of rains while Hassan about 32 km east gets about 875 mm of rains. The change of climate of this part of Karnataka and its ecology has already been made known. The wide variation in the vegetation can also be related to the undulating topography of the land which is 1800 m above the sea level. The type of forest in the Western Ghat and the coastal part of Dakshina Kannada is discussed here.

**1. Tropical Evergreen Forest:** The valleys and the slopes of Western Ghats offer the best example of the evergreen vegetation. Such covers are referred to as the Coastal Tropical Forest. Since the area enjoys heavy rainfall due to south west monsoon, there is characteristic climax vegetation due to canopy coverage. There is no dearth of trees growing to a height of 30 m. with wide spread canopy at the top, where they have interwoven with the neighbouring vegetation. These canopy, in fact acts as a barrier to both the windblown during June to December and the drizzle. But during rest of the season, the canopy is exposed to the sunlight and filters only a small part of it for the vegetation at the ground level. The different levels achieved by the vegetation are the result of specific humidity and the availability of desired amount of sunlight. The first one is the level of the vegetation which is dependent on the ground. The second level is defined by the trees which are comparatively at higher level. The last level is the one achieved by the cloud scrapers. Each level of trees, thus have obliged the theory of evolution and carrying successfully the process of photosynthesis as part of their biological

activity in such environment. There is a great diversity even among the canopy trees. The change in the species can well be noted as one proceeds from north to south and this change is brought about by the quality of the soil, relative altitude and slope has also played a significant role.

About 600 m. above the sea level, one can encounter the oiliferous trees such as *Dipterocarpus –Kingiodendron –Vateria* and *Canarium Strictum, Dipterocarpus - Mesuva – Palaquium.* There is a conspicuous change in the species at an altitude between 600m and 1200 m. Trees have lush growth at the lower levels as demonstrated by the species such as *Scleropyrum pentandrum, Syzygium laetum, Harpudlia arborea* etc. Mono carpules trees like *Caryota urens* and multi carpels trees like *Arenga wightii* are commonly encountered in addition to palm group of trees such *Pinanga dicksonil.* Yet, at other levels are to be seen the thorny shrubs; the forest also abounds in a variety of vegetation, creepers with their thick trunks twisting around huge trees and spread over canopy to get the required sunlight. It is a common scene that the epiphytes have successfully survived on the trees without coming in contact with either the groundwater or soil below. Orchids which are essentially epiphytes, have a special arrangement in their morphology to absorb moisture from the atmosphere and retain it for a longer period for their use. The flowers with attractive colours help in dispersal of seeds which are airborne and settle on some trees, where, with the help of fungi are able to get necessary nutrition for their development.

The microorganisms in deciduous forests – where the withered leaves and the dry sticks fall on the ground help in disintegration and decay of these materials, which ultimately, over the years get accumulated and become the best manure available *in situ.* The soil of the Western Ghats, in fact, is not very thick. It appears that even the water seeping through the rock is poor in nutrition and as such manure formed due to the decay of withered leaves and the dry sticks is the main natural source for the growth of the forests. It also helps to retain the rain water. Rapid flow is effectively checked in such an environment and the water slowly gets into the ground which serves as perennial flow in the form of streams throughout the year. It is obvious that the vegetation cover in the Western Ghats has a strong hold on the web of life. The diverse flora here absorb sunlight effectively and successfully carryout photosynthesis – a complex process in which water and nutrients are absorbed through soil and the carbon dioxide through the air, to synthesise carbohydrates. The carbon dioxide which is detrimental to the

animal world is absorbed by the plants, while, at the same time giving away oxygen to the atmosphere - the essence of life for living organisms.

It is true, that, the dense forests with characteristics levels are not free from danger. There will be a severe competition among minor trees to occupy the space, in case the canopy is damaged and in the process, the canopy may completely be covered up by this secondary vegetation. There is another situation too – in case the canopy is wide in area, instead of recovering from damage, the very levels may be disturbed. This evidently leads to other problems namely disappearance of wide variety of plants. When once the canopy gets damaged, the consequences are serious. Firstly, the heavy rain that falls with no obstruction from the canopy may increase the rate of soil erosion which ultimately cut into the layers of soil leading to the formation of gullies. It has effects on rocks also, as they get hardened like the lateritic soil. Such a situation prevents water from seeping into the earth and instead finds entry in to the forest which could ultimately destroy the entire forest. The manure of withered leaves accumulated over years will be easily washed out. Flash floods resulting in abrupt rainfall will also bring enough silt from both the sides of the eroded river banks. It is a common scene in the deforested area, that, there is meagre scope for percolation of water which, obviously depletes the ground water reservoir and hence the disappearance of springs. Streams get dried up during summer. If there is no continuous flow of rivers, it may, even result in the encroachment of salt water into the coastal areas, thus, rendering the fresh water source unsuitable for use.

**2. Moist Deciduous Forest in the upper reaches of Ghats:** As one proceeds towards the plain from Ghats area, the change in the vegetation with tall trees – the moist deciduous forests are encountered. Here, the canopy will be very dense when the trees are full of leaves. But, during winter the trees shed their leaves as a mechanism for conservation of moisture for a brief time. It is strange that they start flowering in the absence of leaves. Before it rains, and particularly during the period between March and April, when the trees sprouts, they start shedding the flowers followed by the appearance of young nut in the process of development. Such deciduous forests could be seen extending from Belgaum up to Kodagu on the south, where species of *Tectona Dillenia-Lagerstroemia-Terminala* are commonly encountered.

In the moisture laden deciduous forests, the sufficiently thick withered leaves form a bed and serves as a protective layer for soil. In

such an environment, there are plenty of plants including epiphytes and their protection is assured during rainy season, while they are exposed to hot sun during summer seasons. They start flowering between April and May, soon after the rainfall. There will be plenty of activities at the ground level of vegetation due to pre monsoon showers. The aromatic medicinal plants which are hidden in the ground start surfacing out with multiple colours and diverse patterns of flowers.

All along the edge of the Western Ghats, the bamboo bushes were once spread over a wide area. Especially, *Bambusa arundinacea* and *Dendrocalamus strictus* were aplenty in the forest. Every cluster of bamboo sends the shoots (the new bamboo culms) when once the rainy season commences and growth is very rapid. Bamboo starts flowering once in 40 to 60 years and flowers wither away *in toto*. The bamboo seeds accumulated in the ground start germinating and the new generation comes to being. Bamboo, earlier could meet the demand of paper manufacturing industry, even after its full scale utility for artefacts by the tribal people. Of late, the industry is facing the acute shortage of bamboo.

**3. Southern Tropical Montane Forest:** The Southern Tropical Montane Forests are essentially made up of scrubby green plants and green patches of short breeds of plants. Characteristically the evergreen tropical forests undergo visible change according to the altitude. The green plains primarily have innumerable minor medicinal plants which quickly complete their life cycles. The medicinal herbs and climbers are burnt every summer, only to sprout again during April and May when it rains. The blades of grass, perennial as they are, will even decorate the burnt out hills with attractive greenery. The slopes full of grass start flowering as soon as the monsoon commences and gives an impression as though a colourful carpet is spread over the land. The floral assembly encompasses a wide variety of plants, including orchid gentian and violet flowers insectivorous like bladderwort and sundew flowers.

More or less, the dense forest with patchy appearance is often called Shola forests. Such Sholas are to be seen in the lower part of the mountains essentially along depressions and follow undulation of the terrain, as a result, there are considerable variations in their heights. Parasites like algae, lichens etc. get attached to these short breeds for their survivals. Shola forests are generally rich in species like *Gordonia-Schefflera-Meliosma*. The rain water infiltrated through the beds of withered leaves gets purified and finds entry into the stream rich with

vegetation on either side of the banks. *Vernonia arboria* of composite family is yet another species abundant in the shola forest of South India. This in brief is the general description of diverse vegetation of the Western Ghats.

There were times, when, forests were considered as means for easy money making and trees are nothing but timbers. It was only in recent time that we have realized that, forest plays a very important role in maintaining the ecological balance of web of life. Now, we know the importance of vegetation in purifying air, water and soil and their abundance. When once this fact was realized, the phrase 'Forest for Commerce' was replaced with the popular myth 'Forest for Conservation'. Slowly, but gradually the role played by the Western Ghats has been made known, especially, in the context of conservation of ecology.

**Coastal Flora:** The flora of coastal area can be grouped under two heads. Those flora occupying the area between the high and low tides are grouped under the first category, while those on the shore constitute the second group. In the latter, the growth is profuse. Mangroves have thrived in the zone, where fresh water meets the salty sea water resulting in marshy undulating ground. The mangroves have served as barriers against land erosion in the estuary. They also protect the wet land and gardens from wind, rain and hot sun. But, it encourages the sea weeds thus helping the sea life for their quick reproduction. In Karnataka, as much as 8,000 hectares of mangroves could be seen all along the coastal margin of which the undivided Dakshina Kannada alone accounts about 5,000 hectares. The mangroves are to be seen on the banks of streams, particularly *Netravathi, Gurupura, Mulki, Pavanje, Udyavara, Pangasha, Swarna-Seetha-Kodi, Chakra-Haladi-Kolur, Byndur and Shirur* streams.

1. The species *Rhyzophora mucronata* grows in the belt parallel to the flow of river, where, a minimum of eight hours tidal inundation generally prevails. It can reach as much as 25 m height with wide spread branches and interwoven roots.
2. Where there is rise in the water level continually, species like *Rhyzophora – Bruguiera* grows abundantly. Each of these trees grows tall and stout with a number of branches and with varied colours. Since *Bruguiera* grows in the shade, Rhyzophora provides this ideal environment. The other associated flora is the ferns like *Acrostichum aureum*, shrubs like *Acanthus ilicifolius* and *Clerodendrum inerme.*

3. The banks with rich soil near the coast have encouraged *Avicennia marina* which are aplenty and serve as fodder for cattle.
4. Both *Avicennia – Sonneratia* grow together in alluvium but the local people clear these trees for firewood. *Avicennia alba* though, can grow into a tree, its saplings are not commonly seen. But species like *Acanthus ilicifolius* and *Acrostichum aureum* are found in groups with luxuriant growth.
5. Both *Kandelia* and *Excoecaria* grow together. As one proceeds towards land from the sea, the salt contents gradually decreases, which results in thick growth of the species. Plants like *Cerbia, Sonnerata, Morinda* are to be seen as upright small trees all along the streams of the coast. *Derris trifoliata* appears to be the only creeper that grows in this zone.
6. *Aegiceras* and *Excoecaria* is yet another pair up trees that grow together in the zone where back water and the land merge with each other. At the same time, *Acanthus ilicifolius* is abundant in low lying islets.
7. *While Acrostichum aureum species* exhibit delayed growth *the species Acanthus ilicifolius* and *Clerodendrum inerme* are commonly found together.

Near the edge of the water along the sea shore the sand dunes have supported a variety of plants and the shore enjoys humid climate which is not without its effect on the life of coastal plant; so also, the effect of undulating shore tides, sprinkling of salt water and the deposition of salt. It is but natural under these circumstances the flora of sea shore is different from the one in the interior. Species like I*pomoeapes-caprae, Canavalia rosea, Spinifex littoreus, Hydrophylax maritima, Launaea sarmentosa, Cyperus peduculatus, Scaevala sericea, Scaevola plumeri, Flagellaria indica,* can successfully withstand the pressure of the shore. Such vegetation is grouped under Namophytes. Though, man has disturbed the ecosystem of certain groups of vegetation, however, some have managed to escape the wrath and have thrived here and there. Among the creepers commonly encountered are *Ipomoea pes-caprae,Ipomoea-Lanvalia, Ipomoea-Launae, Cyperus-Launae, Cyperus Hydrophyla, Crotalaria nana, Euphorbia atotoa, Scaevola sericea* etc. Small trees and herbs are seen as one proceeds towards the land of which the important species are *Colophyllum inophyllum, Clerodendrum inerme, Morinda citrifolia, Pandanus odoratissimus, Premna serratifolia, Scacvola sericea and Thespesia populnia,* That there is no salt rich alluvium in

Karnataka is very conspicuous. This in turn has resulted in the absence of euhaline zone in Karnataka, which normally would have encouraged the growth of plants like *Salicornia atriplex, Archocnemum suaedea.*

Plants which have a life span of three to five years are normally seen in the zone where shore is somewhat resistant and merges with the land. Such zones have encouraged the growth of *Borassus flabellifer, Colophyllum inophyllum, Heretiera littoralis, Hibiscus tiliaceus, Morinda citrifolia, Pandanus odoratissimus, Pongamia glabra, Terminalia catappa, Thespesia populnea.* This is followed by other vegetation, more particularly cashew, coconut and other plantation. It is conspicuous that there is no congenial environment in Karnataka for the growth of coral reefs. The bare rocky outcrops are attached with patches of moss, lichens and algae.

**Important Timber Trees of the District:** In the earlier times excepting timber trees like *Tectona grandis, Dalbergia latifolia, Pterocarpus, marsupium,* the other trees were used as fuel wood. Similarly bamboo was extensively used for the manufacture of paper, and for plantation no other trees were preferred other than *Tectona grandis.* And today, the concept has radically changed. In addition to *Tectona grandis,* there are a number of other trees which are being used in plantation. With the plantation work in waste land and social forestry, there is rejuvenation of rural and district forestry. The earlier practice of clearing the forest, to give way to the social forestry has been dispensed with and instead, gap planting of some useful species is being adopted and has contributed in large measures to the development of forests. Timber trees are to be found in both evergreen and deciduous forests of the district. Of these *Elaeocarpus tuberculatus, Poeciloneuron indicum, Hopea parviflora, Calophylum polyanthum, artocarpus,* grow on the slopes of the Western Ghats. The important timber tree of the district is listed here.

**Table 1.4 : Details of Timber Plants – Dakshina Kannada district**

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 1. | ***Acacia chundra* (Roxb ex Rottler) Willd.** | *Baddejali, Kempujali* | Fabaceae |
| 2. | ***Acacia sinuata* (Lour.)Merr.** | *Seege* | Fabaceae |
| 3. | ***Hadina cordifolia* (Roxb). Ridsd** | *Heddi, Yathyaga Haladhu* Arishinathega | Rubiaceae |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 4. | **Aegle marmelos (L.) Correa** | *Bilwapathre* | Rutaceae |
| 5. | ***Ailanthus tryphysa* (Dennst.) Alston** | *Gagguladhupa* | Simaroubaceae |
| 6. | ***Alangium salvifolium* (L.f.) Wangerin** | *Anasorali, Ankole Nikochaka* | Alangiaceae |
| 7. | ***Albizzia lebbeck* (L.) Benth.** | *Bage, Hombage, Shirish* | Fabaceae |
| 8. | ***Albizzia odoratissima* (L.f. ) Bentgh** | *Bilwara, Bettasujjalu* | Fabaceae |
| 9. | ***Anacardium occidentale L.*** | *Geru poppu, Godambi, Kaju, Jidi* | Anacardiaceae |
| 10. | ***Arenga wightii* Giriffith** | *Dadasal* | Arecaceae |
| 11. | ***Artocarpus hirsutus Lam*** | *Hebbalasu, Kabbalasu, Hessva, Kanduhalasu* | Moraceae |
| 12. | ***Artocarpus heterophyllus Lam*** | *Halasu, Fanasa* | Moraceae |
| 13. | ***Artocarpus gomezia-nus* Wall ex Trecul. Spp *zeylanicus* Jarreth** | *Vantimara, Vatemara* | Moraceae |
| 14. | ***Azadirachta indica* A Juss** | *Bevu, Ollebevu* | Meliaceae |
| 15. | ***Bambusa arundinacea* (Retz.) Roxb** | *Hebbidiru, Dowga, Mallubidiru, Andebidiru* | Poaceae |
| 16. | ***Madhuca longifolia* (L) Maebride var latifolia (Roxb.) chev** | *Mahuva, Madhuka, Kaduhippie, Hippe* | Sapotaceae |
| 17. | ***Bauhinia malabarica* Roxb** | *Basavanapada, Mandara Huliachalu* | Fabaceae |
| 18. | ***Bischofia javanica* Bl.** | *Neeli, Neerulli, Gobbaranerale* | Euphorbiace |
| 19. | ***Bombax ceiba L.* Bombacaceae** | | *Booruga* |
| 20. | ***Bridelia retusa* (L.) Spreng.** | *Gurige, Gowrige, Asana Gowje, Bikumbe* | Euphorbiaceae |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 21. | ***Buchanania lanzan* Spreng** | *Murkali, Maradi, Morave Charoli, Bhanushchata* | Anacardiaceae |
| 22. | ***Butea monosperma* (Lam.) Taub** | *Muthuga or Palasha* | Fabaceae |
| 23. | ***Calophyllum Polyanthum* Wall ex. Choisy. Puna** | *Shrihonne, Holenonne Koove, Bobbi* | Clusiaceae |
| 24. | ***Calophyllum apetalum* Willd** | *Holehonne* | Clusiaceae |
| 25. | ***Caloptropis gigantea* (L.) R.Br.** | *Yekkemara* | Asclepiadaceae |
| 26. | ***Canarium strictum* Roxb** | *Kaayidhoopa, Karidoopa Raladoopa* | Burseraceae |
| 27. | ***Canthium parviflorum* Lam** | *Kare, Gandukakorla* | Rubiaceae |
| 28. | ***Carallia brachiata* (Lour.)Merr** | *Andinar or Andipunar* | Rhizophoraceae |
| 29 | ***Careya arborea* Roxb** | *Daddal, Kaval, Kavalu Gopwjalu mara* | Lecythidaceae |
| 30 | ***Caryota urens* L.** | *Bainemara, Paine, Bagani* | Arecaceae |
| 31 | ***Cassia fistula L.*** | *Kakke, Bava Swarnapushpa* | Fabaceae |
| 32 | ***Casuarina equisetifolia L.*** | *Saruvemara, Casuarina Galimara, Saruve* | Casuarinaceae |
| 33 | ***Toona ciliata* Roemer** | *Gandhagarige, Noge Nandhuri, Nandivruksha Toonmara* | Meliaceae |
| 34 | ***Celtis tetrandra Roxb.*** | *Karki* | Ulmaceae |
| 35 | ***Chloroxylon swietenia* DC.** | *Kaligarige, Dalmara Gavuda, Madhagiribevu* | Rutaceae |
| 36 | ***Chukrasia tabularis* A Juss** | *Kallugarike* | Meliaceae |
| 37 | ***Cinnamomum verum* J.S. Presl.** | *Dalchinni, Lavangapathre* | Lauraceae |
| 38 | ***Cordia myxa* wight** | *Challe, Solle, Bhotte Chadlu, Mannadake Kendal* | Boraginaceae |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 39 | ***Dalbergia latifolia* Roxb.** | *Beete, Karevyadi Ibadi, Thodeghatta* | Fabaceae |
| 40 | ***Delonix regia* (Boj.ex Hook.) Raj** | Kathikayimara, *Goldmohar, Gulmohar* | Fabaceae |
| 41 | **Dendrocalamus strictus (Roxb.) Nees** | *Bandubidru, Kirubidiru Medhari, seebu* | Poaceae |
| 42 | **Dillenia pentagyna Roxb** | *Machuka* | Apocyanaceae |
| 43 | **Dillenia pentagyna Madathega, Karambala** | *Kadu Kanigalu Kolthega* | Dillenaiaceae |
| 44 | ***Diospyros malabarica* (Jusr) Kastel** | *Holethumra, Hrotutta Thinduka* | Ebenaceae |
| 45 | ***Diospyros montana Roxb*** | *Jagalaganti, Bilkunika Kalnandi* | Ebenaceae |
| 46 | ***Dipterocarpus indicus* Bedd** | *Kalpain, Challane Dhooma* | Depterocar paceae |
| 47 | ***Elaeocarpus oblongus* Wight & Arn.** | *Analthari* | Elaeocarpaceae |
| 48 | ***Elaeocarpus tuberculatus* Roxb** | *Sattagadhamara Kungemara Rudrakshimara Dhandlamara* | Tiliaceae |
| 49 | ***Phyllanthus emblica* L.,** | *Nelli, Bettanelli Amla, Analaka* | Euphorbiaceae |
| 50 | ***Erinocarpus nimmonii*** Graham | *Chera, Chowra Bharangi, Adavibendi* | Tiliaceae |
| 51 | ***Erythrina variegata* L** | *Aluvana* | Fabaceae |
| 52 | ***Syzygium cumini* L Speels** | *Nerale Jambunerale* | Myrtaceae |
| 53 | ***Zanthophyllum retusa* (Roxb.) DC** | | Rutaceae |
| 54 | ***Ficus benghalensis* L.** | *Ala, Vada Vatavruksha* | Moracerae |
| 55 | ***Ficus racemosa L*** | *Atti, Gulara, Rumadi, Oudhumbara* | Moraceae |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 56 | ***Ficus virens* Aiton** | *Basari* | Moraceae |
| 57 | ***Ficus religiosa* L** | *Arali, Ashwatha* | Moraceae |
| 58 | ***Garcinia indica* (Thouars) Choisy** | *Mugal, Murugal, Kokammara, Bheerunda* | Clusiaceae |
| 59 | ***Garuga pinnata* Roxb.** | *Goddanamara Holabalige, Bolamate* | Burseraceae |
| 60 | ***Grewia tiliifolia* vahl** | *Thadsal, Dhaman, Kendalasu, Thadasalu* | Tiliaceae |
| *61* | ***Hardwickia binata* Roxb** | *Yennemara, Penai Chowpaini* | Fabaceae |
| 62 | ***Helicteres isora* L. *Kavargi, Murugikayi*** | *Kowri, Yadamuri* | Sterculiaceae |
| 63 | ***Hemidesmus indicus*(L) R. Br.** | *Halberu, Sogadeberu Sugandaberu, Nama-daberu Mannariberu* | Asclepiadaceae |
| 64 | ***Hibiscus cannabinus* L.** | *Pudike* | Malvaceae |
| *65* | ***Halarrhena pubescens* (Buch.Ham. Wall ex GDon** | *Hirekodsa*<br>*Maddarasa* | Apocynaceae |
| *66* | ***Holigarna arnottiana* Hook. F** | *Chara* | Anacardiaceae |
| 67 | ***Holigarna beddomei* Hook. F** | *Bettaholegara, Doddeleholegara* | Anacardiaceae |
| 68 | ***Hopea parviflora* Bedd** | *Kiralbhogi, Karmara Kallane, Kodachaga Kodamuruka* | Dipterocar paceae |
| 69 | ***Hopea ponga* (Dennst.)Mabberly** | *Haiga, Doddekebogi* | Dipterocar paceae |
| 70 | ***Hydnocarpus alpina* Wight** | *Sooratii* | Flacourtiaceae |
| 71 | ***Ixora pavetta* Andr.** | *Goruvi, Kansara, Heddarani, Kansuragi Gorije* | Rubiaceae |
| 72 | ***Jasminum arborescens* Roxb** | Mallige | Oleaceae |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 73 | ***Garcinia xanthochymus* Hook, gex T And** | *Jarigemara* | |
| 74 | ***Kydia calycina* Roxb** | *Bende, Bellaka, Belagu* | Malvaceae |
| 75 | ***Lagerstroemia speciosa* (L.) Pers** | *Holenandi* | Lythraceae |
| 76 | ***Litsea wightiana* (Nus) Hook.J.** | *Massi or Mashe* | Lauraceae |
| 77 | ***Lagerstroemia microcarpa* Wight** | Nandi, Beimatti *Bolandaru, Nans* | Lythraceae |
| 78 | ***Lophopetalum wightianum* Arn.** | *Balipale* | Celastraceae |
| 79 | ***Macaranga peltata* (Roxb.) Muell.-Arg** | *Uppalige, Kanchupranthi Chandrakala, Batla-chandrike* | Euphorbiaceae |
| 80 | ***Persea macrantha (Nees)*** | *Gulumavu, Chittundi* Chandrahittu, Katerm | Lauraceae |
| 81 | ***Mallotus philippinensis* (Lam.) Muell-Arg** | *Kumkumadamara, Kapilarangu Hulibendu Urabatti* | Euphorbiaceae |
| 82 | ***Mangifera indica* L** | *Mavu* | Anacardiaceae |
| 83 | ***Melia dubia* Cav** | *Kadubevu, Bettadabevu Hebbevu* | Meliacea |
| 84 | ***Memecylon edule* Roxb.** | *Nemar* | Meliaceae |
| 85 | ***Mesua ferrea* L.** | *Nagasampige Nagakesari* | Clusiaceae |
| 86 | ***Mimusops elengi* L** | *Ranja, Pagademara Kesara, Malasuri, Yalangi* | Sapotaceae |
| 87 | ***Knema attenuata*** | *Ramapathri* Hook.J & Thoms) Warb | Myristicaceae |
| 88 | ***Myristica fatua* Houtt** | *Ramapathre* | Myristicaceae |
| 89 | ***Myristica malabarica*** | *Ramapathre* | Myristicaceae |
| 90 | ***Dimocarpus longana Lour*** | *Chakote* | |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 91 | ***Ochlandra travancorica* Benth. Ex. Gamble** | *Vate* | Gramineae |
| 92 | ***Lannea coromandelica* (Houth)** | *Godda*, Udimara. Oodimara, *Simtimara, Gogal Hemmugodda* | Anacardiaceae |
| 93 | ***Olea dioica*** | *Madle, Hekkarakalu* | Oleaceae |
| 94 | ***Palaquium ellipticum* (Dalz) Baill** | *Pali, Hadasale, Panchotimara, Hadasaale ,Halusalle* | Sapotaceae |
| 95 | ***Pongamia Pinnata* (L.) Pierre** | *Honge, Karanja, Huligili* | Fabaceae |
| 96 | ***Pterocarpus marsupium* Roxb.** | *Honne, Hane Bijasal* | Fabaceae |
| 97 | ***Rauwolfia serpentina* (L.) Benth/ ex Kurz** | *Chandrike, Nanjaregida Sarpakshi, Sarpagandha* | Apocynaceae |
| 98 | ***Rhizophora mucronata* Poir** | *Kandla Kandala* | Rhizophoraceae |
| 99 | ***Bombax ceiba* L** | *Bhuruga Kempuburuga* | Bombacaceae |
| 100 | ***Santalum album* L** | *Shrighandha* | Santalaceae |
| 101 | **Sapindus emarginatus vahl** | *Antwala, Norekayi Kugatemara* | Sapindaceae |
| 102 | ***Schleichera oleosa* (Lour)** | *Kendala, Kusum Sagade, Kusambi* | Sapindaceae |
| 103 | ***Soymida febrifuga* (Roxb) A Juss** | *Somemara, Swamimara Kemmara, Navilumettu Rohini* | Meliaceae |
| 104 | ***Spondias pinnata* (L.f) Kurr** | *Amate, Pundi* | Anacardiaceae |
| 105 | ***Mitragyna paraviflora* (Roxb.) Korth** | *Kadivala, Kadagadha Kapari, Kongu* | Rubiaceae |
| 106 | ***Sterculia guttata* Roxb** | *Hulitharadu* | Sterculiaceae |

| Sl. No. | Scientific name of the plant | Local name | Family |
|---|---|---|---|
| 107 | ***Stereospermum suaveolens* (Roxb). DC** | *Billmara, Belipadri Uppalave, Billa* | Bignoniaceae |
| 108 | ***Strychnos nux-vomica* L** | *Kasaraka, Nanjinakoradu Katharike* | Loganniaceae |
| 109 | **Swietenia *mahagoni* (L.) Jack** | *Mahagani* | Meliaceae |
| *110* | ***Symplocos laurina* (Retz.)Wall** | *Changa, Chunga Lodhra* | Symplocaceae |
| 111 | ***Syzygium cumini* (L.) Speels** | *Kadunerale* | Myrtaceae |
| 112 | ***Syzegium gardneri* ThW** | *Bilichiravu* | Myrtaceae |
| 113 | ***Tectona grandis* L.f.** | *Saguvani, Tega* | Verbenaceae |
| 114 | ***Terminalia arjuna* (Roxb.ex.DC) Wight & Aru** | *Holemathi, Belimatti* *Thorematti* | Combertaceae |
| 115 | ***Terminalia bellirica* (Gaertn) Roxb** | *Shanthimara Gotingadamara* Thare | Combertaceae |
| *116* | ***Terminalia alata* Heyne ex Roth** | *Matti* | Combertaceae |
| 117 | ***Tetrameles nudiflora* R Br** | *Cheeni* | Datiscaceae |
| 118 | ***Thespesia populnea* (L.) Sol. ex Corr** | *Bugarimara Hoovarasi Johiherale, Kandarola* | Malvaceae |
| 119 | ***Vepris bilocularis* (Wight & Aru) Engl.** | *Doddatoppe* | Rutaceae |
| 120 | ***Trewia nudiflora* L.** | *Kadugunbala Katakamba, Hilaga* | Euphorbiaceae |
| 121 | ***Vitex altissima* L.f** | *Myrole or Thornukki* | Verbemaceae |
| 122 | ***Vitex negundo* L.** | *Nekki, Lakkigida, Lakkili* | Verbenaceae |
| 123 | ***Xylia xylocarpa* (Roxb.) Taub** | *Jambe* | Fabaceae |
| 124 | ***Ziziphus oenoplia* (L.) Mill** | *Soorimullu* | Rhamnaceae |

## 4. Medicinal Plants

Medicinal plants are plenty in the district. Out of 500 species, 320 species are found in Dakshina Kannada district, important ones are found :

**Table 1.5 Details of Medicinal Plants in Dakshina Kannada**

| Botanical Name | Local Name |
|---|---|
| *Abelmoschus esculentus (L.) Moench* | *Bende* |
| A. moschatus Medicus | Kasturi Bende |
| Abrus precatorius L. | Gurugangi |
| Acacia sinuata (Lour) Merr. | Shigekai |
| A. catechu (Roxb.) Willd | Kachu |
| *Acalypha indica L.* | *Kuppigida* |
| Achyranthes aspera L. | Uttarani |
| Acorus calamus L. | Baje |
| Adenanthera pavonia L. | Manjetti |
| *Aegle marmelos (L.)* Corr. | *Bilwapatre* |
| *Aerva lanta (L.)* Juss.ex.Shult | *Bilihindegida* |
| *Ageratum conyzoides* L. | *Nayi Tulasi* |
| *Alangium salvifolium* (L.f) Wang. | *Ankole* |
| *Albizia lebbeck* (L). Benth | *Bagemara* |
| *A. odoratissima*(L.f) Benth | *Kalbagi* |
| *Aloe vera* (L.) Burn | *Lolisara* |
| *Alpinia galanga (L.)* Sw. | *Rasmi,sugandhavasigida* |
| *Alstonia scholaris* (L.)R.Br. | *Meddale, halemara* |
| *Alternanthera sessilis* (L) R.Br.ex. Dc | *Honagonesoppu* |
| *Amaranthus spinosus* L. | *Mulluharive* |
| Amorphophallus paeoniifolius var camlanulatus (Decnc.) Sivad | *Suvarnagadde* |
| *Anacardium occidentale* L. | *Gerumara* |
| *Anamirta cocculus* (L.) Wight & Arn. | *Kakamari* |
| *Ananas comosus* (L.) Merr | *Ananus* |
| *Andrographis paniculata* (Burm.f.) Wall ex. Ness | *Nelabebu, kirthakatti* |
| *Annona squamosa* L. | *Seethaphala* |
| *Aphanamixis polystachya* (Wall.)R. Parker | *Mullu muntara* |
| *Arachis hypogea* L. | *Nelagadale* |
| *Areca catechu* L. | *Adike* |
| *Argyreia nervosa* (Bum.f.,)Boj | *Samudraphala* |
| *Aristolochia indica* L. | *Eshwariberu* |
| *Artocarpus communis* J.R. & G. Forst | *Devi halasu* |
| *A. heterphyllus* Lam | *Halasu* |
| *A. hirsutus* Lam | *Hebbalasu* |
| *Asparagus racemosus* Wild | *Shathavari* |

| Botanical Name | Local Name |
|---|---|
| *Averrhoa carambola* L. | *Dharehuli* |
| *Azadirachta indica* A. Juss | *Bevinamara* |
| *Bambusa arundinacea* (Retz.)Roxb | *Bidhiru* |
| *Becopa monnieri* (L.) Pennell | *Jalabfrahmi* |
| *Barringtonia acutangala* (L). Gaertn | *Holekauva* |
| *Basella alba* L. | *Kempubasale* |
| *Benincasa hispida* (Thunb.) Cogn | *Boodugumbala* |
| *Bixa orellana* L. | *Rangumale* |
| *Blumea lacera* (Brum.f.)DC | *Gandharigida* |
| *Boerhavia diffusa* L. | *Punarnaava* |
| *Bombax ceiba* L. | *Boorugadhamara* |
| *Borassus flabellifer* L. | *Thalemara* |
| *Brassica juncea* (L.) Czem | *Sasive* |
| *Buchanania lanzan* Spreng | *Noorakal* |
| *Butea monosperma* (Lam.) Taub. | *Muttuga, palasha* |
| *Caesalpinia bonduc* (L.) Roxb | *Gajaga* |
| *Cajanus cajan* (L.)Millsp | *Thogari* |
| *Colphyllum inophyllum* L. | *Honne* |
| *Colotropsis gigantea* (L.) R.Rr | *Ekkadagida* |
| *Calycopteris floribunda* Lam. | *Kumusaalu, Engeeru* |
| *Canavalia gladiata* (Jacq.)DC | *Sambe, Thamate balli* |
| Canscora decussata (Roxb.)Schult | *Shankapusti* |
| *Canthium parviflorum* Lam. | *Karayi* |
| *Capsicum annum* L. | *Menasina gida* |
| *Cardispermum halicacabum* L. | *Agniballi – Erooballi* |
| *Carea arborea* Roxb. | *Dhaddala* |
| *Carica papya* L. | *papaya, parangi* |
| *Carissa congesta* Wight | *Karekayi, Karandhe* |
| *Caryota urens* L. | *Bynemara* |
| *Cassia fistula* L. | *Kakkemara* |
| *C. occidentalis* L. | *Doddathagasi* |
| *C. tora* L. | *Thagasi, Thageethe* |
| *Catharanthus roseus* (L.)G.Don | *Sadhapushpa* |
| *Catunaregam spinosa* (Thumb). Tirvengadum | *Kaare* |
| Cayratia trifolia (L.) Domin | *Heggoli* |
| *Ceiba pentandra* (L). Gaertn | *Biligoodhuga* |
| *Centella asiatica* (L.) Urban | Brahmi, Ondelaga |
| *Ceratophyllum demersum* L. | *Shivala* |
| *Cerbera odollam* Gaertn | *Kandi* |
| *Chonemorpha fragrans* (Mooon ) Alston | *Moorva* |
| *Cinnamomum verus* Presl. | *Dalchinni* |
| *Citrus aurantifolia* (Christm & Panz.) Swingle | *Limbe* |

| Botanical Name | Local Name |
|---|---|
| *C. limon* (L.) Burm.f. | *Gajalimbe* |
| *C. medica* L.. | *Madhala* |
| *Cleome viscosa* L. | *Kadu sasive, nayi sasive* |
| *Clerodendrum serratum* (L.) Moon | *Gantubarangi* |
| C.viscosa Vent | *Thaggi* |
| *Clitoria ternatea* L. | *Shankapushpa* |
| *Coccinia grandis* (L.) Voigt | *Thonde* |
| *Cocos mucifera* L. | *Thenga* |
| *Coffea arabica* L. | *Khafi* |
| *Coix lacryma-jobi* L. | *Kotttibeeja* |
| *Colocasia esculenta* (L.) Schott | *Kesu, Kesavu* |
| *Cordia myxa* Wight | *Challemara* |
| *Coriandrum sativum* L. | *Dhaniya* |
| *Coscinium fenestratum*(Gaertn) Colebr. | *marada arishina* |
| *Costus speciosus* (Koenig ex Retz.)J.E, Smith | *Nari kabbu* |
| *Crataeva magna* (Lour)DC | *Nirvala* |
| *Cressa cretica* L. | *Rudanthi* |
| *Crinum asiaticum* L. | *Vishamangali* |
| *Crotalaria retusa* L. | *Gajjegida* |
| *Cucumis melo* L. | *Sowthe* |
| C. sativus L. | *Mullu Sowthe* |
| *Curculigo archoides* Gaertn | *Nelathale* |
| *Curcuma amada* Roxb. | *Shunti, Mavinakayi* |
| *C.longa* L. | *Arishina* |
| *Cyathula prostrata* (L.) Blume | *Rakthamarga* |
| *Cycas circinalis* L. | *Mandikalu* |
| *Cyclea peltata* (La,)Hook.f. & Thoms | *Hadeballi* |
| *Cymbopogon citratus* (DC.) Stapf | *Majipige hullu* |
| *Cynodon dactylon* (L.)Pers | *Garike* |
| *Cyperus rotundus* L. | *mastaka, koranarigadde* |
| *Dalbergia sissoo* Roxb. | *Agaru, biradi* |
| *Datura metel* L. | *Ummatti gida, Dattoorigida* |
| *Dendrophthoe falcate* (L.f) Etting | *Bandanage* |
| *Desmodium gangeticum* (L.)DC | *Saalaparni* |
| *D. triflorum* (L.)DC | *Kaadupulluporsi* |
| *Dichrostachys cinerea* (L.) Wight & Arn | *Vadhuvaradha mara, edathari* |
| *Dioscorea alata* L. | *Madhigenasu* |
| *Diospyros malabarica* (Desr.)Kostel | *Bandada mara* |
| *Diplocyclos palmatus* (L.) Jeffrey | *Shivalinga* |
| *Drynaria quercifolia* (L.)J. Smith | *Ashwashakthi* |
| *Drypetes roxburghii* (Wall.) Huresawa | *Putramjeeva* |

| Botanical Name | Local Name |
|---|---|
| *Eclipta prostrata* (L.)L. | *Garga* |
| *Elephantopus scaber* L. | *Nelamucchala* |
| *Elettaria cardamomum* Maton | *Elakkigida* |
| *Eleusine coracana*(L.) Gaertn | *Raagi* |
| *Emilia sonchifolia*(L.)DC | *Ilikivi* |
| *Erythrina variegataL.* | *Hungaraka, Harivana* |
| *Euphorbia ligularia* Roxb. | *Ellikayi* |
| *E. thymifolia* L. | *Kempunene hakki* |
| *Evolvulus alsinoides* (L.)L. | *Vishnukranthi* |
| *Ficus arnottiana* (Miq.)Miq. | *Kallaswatha* |
| *F. benghalensis* L. | *Ala, Goli mara* |
| *F. hispida* L.f. | *Kaaduhatti* |
| *F. microcarpa* L.f. | *Itthi* |
| *F. religiosa* L. | *Ashwatta, Arali* |
| *F. racemosa* L. | *Atthi* |
| *Flacourtia indica* (Burm.f.)Merr. | *Nekkeharagu, Jeda* |
| *Garcinia gummi-gutta* (L.) Robs | *Upagi mara* |
| *G.morella* (Gaern.)Desr. | *Jeerige huli* |
| *Garuga pinnata* Roxb. | *Halabalage* |
| *Glorisosa superba* L. | *Koli kuttuma* |
| *Glycosmis pentaphylloa* (Retz.) DC | *gurodhagida* |
| *Grewia tilifolia* Vahal | *Dhadasalu* |
| *Gymnema sylvestre* (Retz.) R.Br | *Madhunashini* |
| *Gmelina arborea* Roxb. | *Shivani, Kashmeeri* |
| *Haldina cordifolia* (Roxb.)Ridsdale | *Anavu* |
| *Hedyotis corymbosa* (L.) Lam | *Parpata hullu* |
| *H. herbacea* L. | *Urakigida* |
| *Helicteres isora* L. | *Kempu kaveri* |
| *Heliotropium indicum* L. | *Chelubaladha gida* |
| *Hemidesmus indicus* (L) R. Br. | *Naamadha balli* |
| *Hibiscus hispidissimus* Griffith | *Huligowri, gumachi* |
| *H. rasa-sinesis* L. | *Dasavala* |
| *Hiptage benghalensis* (L.)Kurz | *Madhavilathe* |
| *Holarrhena pubescens* (Buch.-Ham) Wall, ex Dom | *Kodasige, Kodagasana* |
| (Roxb.) Planch | *Holoptelea integrifolia* *Thapasimara, Raahubeeja* |
| *Homonia riparia* Lour. | *Sanna pasanachida* |
| *Hugonia mystax* L. | *Modirkanna, Mrema* |
| *Hydnocarpus laurifolia* (Dennst.) Sleumer | *GarudaPhala* |
| *Hygrophila schulli* (Buch. – Ham.) MR. & S.N Almeida | *Kolavalike* |
| *Hygroryza aristata* (Retz.) Nees ex Wight & Am. | *Jyarahumedhe* |

| Botanical Name | Local Name |
|---|---|
| *Ichnocarps frutescens* (L.) R.Br. | *Kappunamadha beru* |
| *Indigofera tinctoria* L. | *Neligida* |
| *Ipomoea batatas* (L.) Lam. | *Sihigenasu* |
| *I. mauritiana* Jacq. | *Nelagumbala* |
| *I. nil* (L.) Roth | *Gowribeeja* |
| *I. pes-caprae* (L.) R Br. | *Adambu bali* |
| *I. sepiaria* Roxb. | *Lakshmana* |
| *Ixora coccinea* L. | *Kiskara, Kephala* |
| *Jasminum gradiflorum* L. | *Jaji mallige* |
| *J. multiflorum* (Burm.f.) Andr. | *Magi mallige* |
| *J. sambac* (L.) Ait. | *Mallige, dundu mallige* |
| *Jatreopha curacas* L. | *Hadlu haralu, Bili Owdala* |
| *Justicia adhatoda* L. | *Adusoge* |
| *J. gendarussa Burm.f.* | *Karnekki* |
| *Kaempferia galangal* L. | *Kachora* |
| *K. rorunda* L. | *Nela sampige* |
| *Kalanchoe pinnata* (Lam.) Pers | *Kadu basale* |
| *Kyllinga nemoralis* (Forster) Dandy ex. Hutch | *Shwetha nirvisa* |
| *Lablab purpureus* L. | *Avare* |
| *Lagenaria siceraria* (Mol.) Standley | *Sore* |
| *Lannea coromandelica* (Houtt.) Merr | *Oodhmara* |
| *Lantana camara* L. | *Kadugulabi* |
| *Lawsonia inermis* L. | *Madhurangi* |
| *Leea indica* (Burm.f.)Merr | *Andhilu, gandhapatri* |
| *Leucas indica* (L.) R.Br.ex. Vatke | *Tumbe* |
| *Limnophila aromatica* (L.) Merr. | *Mangannari* |
| *Luffa acutangula* (L.) Roxb. | *Hirekayi* |
| *Lycopersicon esculentum* Mill | *Tomato* |
| *L cylindrica* (L.) M. Roem | *Tuppaheere* |
| *Macrotyloma uniflorum* (Lam.) Verde | *Hurali* |
| *Mallotus philippensis* (Lam.) Muell. – Arg | *Kampillaka* |
| *Mangifera indica* L. | *Mavu* |
| *Manihot esculenta* Crantz | *Maragenasu* |
| *Manilkara hexandra* (Roxb. ) Dubard | *Halehannu kirni* |
| *Maranta arundinacea* L. | *kuvegida* |
| *Marsilea minuta* L. | *Chiqiginasoppu* |
| *Melia azedarach* L. | *Thurakabevu* |
| *Mentha arvensis* L. | *Pudhina* |
| *Merremia tridenta* (l.) Hall.f. | *Orasarani* |
| *Mesua ferrea* L. | *Nagasampige* |
| *Michelia champaca* L. | *Sampige* |
| *Mimosa pudica* L. | *Naachigegida* |

| Botanical Name | Local Name |
|---|---|
| *Mimusops elengi* L. | *Renje, Ukula* |
| *Momordica charantia* L. | *Hagala* |
| *Monochoria vaginalis* (Burm.f.) K.B. Presl | *Indhivaraa* |
| *Moringa oleifera* Lam. | *Nugge* |
| *Mucuna pruriens* (L.) DC | *Nayihonamguballi* |
| *Mukia maderaspatana* (L.) Roem. | *Kadu pappateballi* |
| *Murraya koenigii* (L.) Spreng. | *Karibevu* |
| *Musa paradisiaca* L. | *Baali* |
| *Mussaenda frondosa* L. | *Bellota* |
| *Myristica fragrans* Houtt. | *Jayikayi* |
| *M. malabarica* Lam. | *Ramapatre* |
| *Naravelia zeylanica* (L.) DC. | *Nendamalli* |
| *Naregamia alata* Wight & Arn. | *Nelakandhigida* |
| *Neolamarekia cadamba* (Roxb.) Bosser | *Kadambamara* |
| *Nerium oleander* L. | *Kanagila* |
| *Nervilia aragona* Gaud | *Padmacharani* |
| *Nicotiana tabacum* L. | *Hogesoppu* |
| *Nilgirianthus ciliatus* (Nees) Bremek. | *Sahachaara* |
| *Nyctanthes arbor-tristis* L. | *Parijatha* |
| *Nymphaea nouchali* Burm.f. | *Bili Nydhile* |
| *Ocimum canum* Sims. | *Nayi tulasi* |
| *O. basilicum* L. | *Kama kasturi* |
| *O. sanctum* L. | *Tulasi, Krishnatulasi* |
| *Oroxylum indicum* (L.) Benth ex. Kurz | *Anemungu* |
| *Oryza sativa* L. | *Batta* |
| *Oxalis corniculata* L. | *Pullampurachi* |
| *Pandanus odaratissimus* L.F. | *Kedage* |
| *Paspalum scrobiculatum* L. | *Haraka* |
| Padalium murex L. | *Aneneggilu* |
| *Phyla nodiflora* L. | *Nela hippala* |
| *Phyllanthus amarus* Schum. & Thonn | *Nelanelli* |
| *P. emblica* L. | *Nelli* |
| *P. reticulates* Poir | *Pulaveri* |
| *Physalis minima* L. | *Guddehannu* |
| *Piper betle* L. | *Veelayadele* |
| *P. longum* L. | *Hipli* |
| *P. nigrum* L. | *Olle menasu* |
| *Plectranthus amboinicus* (Lour.) Spreng | *Doddapatre* |
| *Plumbago indica* L. | *Kempuchitra moola* |
| *Plumeria rubra* L. | *Kadu sampige, Devaganigalu* |
| *Polyalthia longifolia* (Sonn.) Thw | *Kambada mara, hessare* |

| Botanical Name | Local Name |
|---|---|
| *Pongamia pinnata* (L.) Pierre | *Hongemara* |
| *Portulaca oleracea* L. | *Doddagunisoppu* |
| *Premna coriacea* C.B. Clarke | *Thakkila, annamantha* |
| *Pseudarthria viscida* (L.) Wight & Arn. | *Salaparni* |
| *Psidium gujava* L. | *Perale* |
| *Pterocarpus marsupium* Roxb. | *Benga, honnemara* |
| *Puncia granatum* L. | *Dalimbe* |
| *Rauvolfia serpentina* (L.) Benth ex Kurz | *Pakalagaruda* |
| *Rhaphidophora pertusa* (Roxb.) Schott | *Kandhodiballi* |
| *Rhinacanthus nasutus* (L.) Kurz. | *Nagamalli* |
| *Ricinus communis* L. | *Haralu, Owdhala* |
| *Rotula aquatica* Lour. | *Phasanabeda* |
| *Rubia cardifolia* L. | *Manjisthu* |
| *Saccharum arundinaceum* Retz. | *Kadukabbu* |
| *S. officinarum* L. | *Kabbu* |
| *S. spontaneum* L. | *Hucchukabbu* |
| *Salvadora persica* L. | *Gonimara* |
| *Samadera indica* Gaertn | *Nafa, samadhera* |
| *Santalum album* L. | *Shrigandhada mara* |
| *Sapindus laurifolius* Vahl | *Antavala* |
| *Saraca asoca* (Roxb)de. Wilde | *Ashoikadhamara* |
| Sarcostigma *kleinii* Wight & Arn. | *Puvanne* |
| *Schleichera oleosa* (Lour.)Oken | *Chakkotha, Kendhala* |
| *Securinega leucopyrus* (Willd.) Muell.-Arg | *Kariyahuli, GudaPha* |
| *Sesamum indicum* L. | *Ellu* |
| *Sesbania grandiflora* (L.) Poir | *Agasi* |
| *Sida eordata* (Burm.f.) Borss. | *Hettotti, Chittuharalu* |
| *S. rhombifolia* L. | *Kallangadale* |
| *Solanum melogena* L. | *Badhanekayi* |
| *S. nigrum* L | *Kakamachi* |
| *S. surattense* Burm.f. | *Nelagulla* |
| *Solena amplexicaulis* (Lam.) Gandhi | *Bimpuli* |
| *Spermacoce hispida* L. | *Madhanabeedu* |
| *Sphaeranthus indicus* L. | *Gaddekarandhe* |
| *Spondias pinnata* (L.f.) Kurtz., | *Ambademara* |
| *Stereospermum colais* (Buch.-Ham.ex. Dillw) | *Pathala Mabberly* |
| *Streblus asper* Lour. | *Mitlimara, Punji* |
| *Strychnos mux-vomica* L. | *Kasara kanamara* |
| *Syzygium aromaticum* (L.) Merrill & Perry | *Lavanga* |
| *S. cumini* (L.) Skeels | *Nerala* |
| *S. jambos* (L.) Alston Tabrnaemontana | *Ponnerala* |
| *divaricata* (L.) R. Br. Ex. Roem. & Schult | *Nandhibattalu* |

| Botanical Name | Local Name |
|---|---|
| *Tamarindus indica* L. | *Huli* |
| *Tactona grandis* L.f. | *Tega, Saguvani* |
| *Tephrosia purpurea* (L.) Pers. | *Phanike* |
| *Terminalia arjuna* (Roxb. Ex.DC) Wight & Arn. | *Bilimatti* |
| *T bellirica* (Gaertn) Roxb. | *Shanthimara* |
| *T.chebula* Retz., | *Analekayi* |
| *T. alata* Heyne ex Roth | *Banapu, matti* |
| *T. paniculata* Roth | *Marva* |
| *Thespesia populnea* (L.) Soland ex Correa | *Huvarasi* |
| *Tinospora cordifolia* (Willd.) Miers ex. Hook. F. & Thoms. | *Amruthaballi* |
| *Toddalia asiatica* (L.) Lam. | *Mullumasige, Musimullu* |
| *Toona ciliata* Roem. | *Biligandhagiri* |
| *Tragia involucrata* L. | *Thurabeballi* |
| *Trichosanthes cucumerina* L. | *Kahi padavala* |
| *T. tricuspidata* Lour. | *Kakkemandali* |
| *Tylophora indica* (Burm. F.) Merr | *Kirumanjiballi* |
| *Uvaria narum* (Dunal) Wall. Ex Wight | *Unayina gida* |
| | *Vateria indica* L. |
| | *Dhoopada mara* |
| *Ventilago maderaspatana* Gaettn | *Pappali* |
| *Vernonia anthelmintica* (L.) Willd. | Kadu Jeerige |
| *Vernonia cinerea* (L.) Less | *Sahadevi* |
| *Vetiveria zizanioides* (L.) Nash | *Lavancha, Mudhivala* |
| *Vigna mungo* (L.) Hepper | *Uddu* |
| *V. radiata* (L.) Wilezek | *Hesaru* |
| *V. radiata Var. sublobata* (Roxb.) Verdc | *Kaduuddu* |
| *V. unguiculata* (L.) Walp ssp. Cylindria (L.) Eselt | *Alasandhi* |
| *Vitex negunda* L. | *Naragundi* |
| *V. trifolia* L. | *Nerlakki* |
| *Wedelia chinensis* (Osbeck) Merr. | *Kalasarji, Gargagi* |
| *Woodfordia fruticosa* (L.) Kurz | *Dhataki* |
| *Wrightia tinctoria* (Roxb.) R.Br. | Kirikodasige |
| *Zanonia India* L. | *Kunthali* |
| *Zanthoxylum rhetsa* (Roxb.)DC. | *Gamatemara* |
| *Zea mays* L. | *Mekkejola* |
| *Zingiber offocinnale* Rosc. | *Shunti* |
| *Ziziphuy mauritiana* Lam | *Bore, bogari* |
| *Z. oenoplia* (L.) Mill | *Kanerigida, surimullu* |

## FAUNA

The wild life of Dakshina Kannada district is both abundant and varied. It is the home of a variety of fauna which are both small and big, including vertebrates. It is apparent that the fauna and more particularly the percentage of larger mammals essentially reflect the abundance of flora in the area. It is no strange that animals depend on vegetation as food chain and where there is great diversity of flora; one can expect the diversity of animals too. Tree dwelling animals like monkeys generally abound in ever green forests, if the availability of food is taken as one of the criteria. Similarly, the deciduous forests have proved more functional for herbivorous giant mammals like bisons, elephants and deers etc.

Out of six forests groups which have supported wild life in Karnataka, two are to be found in the coastal part and mountain ranges bordering the district. The evergreen forests are no doubt very dense except at some places where some indent has been made due to the persistent human activity. Such areas generally are covered by withered leaves and as could be expected, the growth of grass is very limited in such cases. This ecological set up has encouraged the tree dwelling monkeys and minor mammals like squirrels, instead of grazing ungulates and elephants. Animals like black bear, wild boar, which show duality in their food habits could be seen in the area. These animals can survive with limited food. Since vegetation likes bamboo and plants with leaf at the lower reach are generally scarce, these forests are not suited for herbivorous animals. On the other hand, there is abundant moisture and ecological support system that has encouraged insects, amphibians, and reptiles to thrive well in these areas. Rarely does it happen when forests with profuse canopy trees are invaded by alien plant that turn out to be a good grazing ground for animals. The deciduous forests and their environment are highly suited for mammals. Though, the evergreen forests and deciduous forests suffer heavily, but, nevertheless, they encourage grass and bushes which in turn support large sized wild animals. The unlimited disintegration of forests has encouraged the rapid growth of weeds like lantana and *eupatorium* which have suppressed the growth of the local species. It may look beneficial, apparently that some animals live on wild fruits and flower (berries). But, in the long run, it turns out to be futile due to other harmful effect the destruction brings.

The lush forests in the coastal parts were once the home for a variety of wild life. Sadly, today they no longer have the same

environment to support these creatures. Heavy cutting of trees and disintegration of forests have proved detrimental to the wild life. The sea dwelling animals of coastal area include whales, sea turtles and sea snakes, balaeloptera, a-genus of whales lives in the sea and sea cows; dugong are found in Bays and lagoons in the coastal areas.

Endangered and would be extinct animals of the district is listed below:

**Table 1.6 : Details of Endangered Animal Species in Dakshina Kannada District**

| Species | Zone |
|---|---|
| *Avicennia officinalis* | Mangrove, Coastal Saline |
| *Gracilaia verrucosa A. marina* | Alga, Mangrove, Coastal Saline |
| *Kandelia kandel* | Mangrove, Coastal saline |
| *Rhizophora mucronata* | Mangrove, Coastal saline |
| *Sonneratia alba* | Mangrove, Coastal saline |
| *Aegiceras corniculatum* | Mangrove, dune, upstream |
| *Excoecaria agallocha* | Mangrove, Upstream |
| *Cheatomaorpha lineum* | Alga, Backwaters |
| *Ipomoea perscaprae* | Shrub, Coastal dune |
| *Asparagus dumosus* | Shrub, Coastal dune |
| *Spenifex littoreus* | Shrub, Coastal dune |
| *Cyperus aristatus* | Shrub, Coastal dune |
| *Sporoborus tremulus* | Shrub, Coastal dune |
| *Leucas aspera* | Shrub, Coastal dune |
| *Thespsia populnea* | Tree, Coastal dune |
| *Rhizophora conjugata* | Mangrove, Upstream |
| *Rhizophora conjugata* | Mangrove, Upstream |
| *Sonneratia caseolaris* | Mangrove, Upstream |
| *Salvadora persica* | Shrub, Upstream |
| *Ierodendrum inerme* | Shrub, Upstream |
| *Acanthus ilicifolius* | Shrub, Upstream |
| *Entreeromorpha intestinalis* | Tree, Backwaters |
| *Chetomaorpha lineum* | Alga, Backwaters, dune |
| *Casuarina equisetifolia* | Tree, Coastal dune |
| *Vitex negundo* | Tree, Back shore |
| *Pandanus Sp.* | Shrub, backshore |
| *Durana repens* | Shrub, |
| *Anacardium occidentale* | Tree, Back shore |
| *Cocos nucifera* | Tree, Back shore |

**Table 1.7 Rare and Endangered Fauna and Flora of Coastal part**

| Species | Type | Zone | Status |
|---|---|---|---|
| *Periophthalmus* Sp. | Mud Shipper | Intertidal | uncommon |
| Fishing Cat | Mammal | Lagoon | Rare* |
| Otter | Mammal | Lagoon | Rare* |
| Osprey | Bird | Lagoon | Endangered |
| Green Turtle | Reptile | Sea | Rare* |
| Olive Ridley | Reptile | Sea | Rare* |
| Water Monitor *Varanus Salvator* | Reptile | Lagoon | Threatened* |
| Common monitor *V. benghalesnsis* | Reptile | Lagoon | Threatened* |
| Estuarine Crocodile *Crocodilus Porosus* | Reptile | Lagoon | V.rare* |
| *Cryptocoryne congnatoides* | Marsh Plant | Coast | rare** |
| *Hubbarda heptaneuron* | Grass | River | Extinct(?)** |
| *Nelumbo mucifera* | Plant | Ponds | Heavily used |
| *Hydrobryopsis sessilis* | Plant | Stream | rare |
| *Aponogeton appendiculatus* | Plant | Coast | Threatened |

**Birds:** There are no bird sanctuaries worth naming in Dakshina Kannada; but, there is no dearth of diversity of birds. Different habitats – right from evergreen forest to islands near the shore, have proved to be congenial habitat for the birds. A total of 320 species of birds have been identified in the district. It includes wild birds, aquatic birds, sea birds and those living the coast. While, the evergreen forests of the Western Ghats are home for wild birds, the water birds are comfortable with back water, reservoirs and rivers. The coastal part of the sea is a special habitat and aptly has encouraged rare birds in these zones.

Hornbills, nicknamed as rain nightingales are the endemic species of the Western Ghats pied hornbills are becoming rare and the impact of deforestation is visible to a larger extent. Bellied sea gull is yet another bird listed as endangered species in the district. This rare bird is protected under the wild life (conservation) Act. The other important birds of interest are Ceylon frog mouth, black kestrel, imperial green pigeon, nightjar, laughing thrush, emerald dove. The waders and water dwelling birds are aplenty. Among the abundant water birds, mention may be made of heron, grey heron, purple heron, darter, little grebe(dabchick), water hens and a wide variety of ducks, heron (Krouncha), coot,

kingfishers. In addition, the other scavengers like shikra, kestrel black kite and crows flourish in large numbers. Birds from the northern hemisphere migrate too many parts of the coastal areas from March to April, every year. A total of 35 varieties of migratory birds have been listed as on now. Their details are to be found in the next table:

**Table 1.8 Migratory Birds in Dakshina Kannada district during winter season**

| Name of the Birds | Scientific Name | Migratory places |
|---|---|---|
| **Common Teal** | *Anas crecca* | Europe – Siberia |
| **Garganey** | *A querquedula* | Europe – Siberia |
| **Northern pintail** | *A. acuta* | North Europe |
| **Blue-tailed Bee-eater** | *Merops Philippinus* | Himayala, Pakistan |
| **Short-eared Owl** | *Asio flammeus* | North Kashmir, Himalaya |
| **Common Snipe** | *Gallingago gallingo* | North Europe |
| **Jack Snipe** | *Lymnocryptes minimus* | North Europe, Siberia |
| **Black-bailed Godwit** | *Limosa limosa* | Central Europe |
| **Whimbrel** | *Numenius Phaeopus* | Central Europe |
| **Eurasian Curlew** | *N. arquata* | North Central Europe |
| **Common Redshank** | *Tringa totanus* | Central Europe, Tibet |
| **Common Greenshank** | *T. nebularia* | Central Europe, North Asia |
| **Marsh Sandpiper** | T. stagnatilis | Central Europe |
| **Wood Sandpiper** | T. glareola | Central Europe, Siberia |
| **Common Sandpiper** | *Actitis hypoleucos* | Himalaya |
| **Terek Sandpiper** | *Xenus cinereus* | North Europe, Siberia |
| **Little Stint** | *Caladris minuta* | Siberia |
| **Temminck's Stint** | *Calidris temminckii* | North Europe |
| **Dunlin** | *Caladris. alpina* | North Europe<br>North Asia |
| **Pacific Golden plover** | *Pluvialis fulva* | North Europe<br>North Asia |
| **Grey Plover** | *Pluvialis squatarola* | Siberia |
| **Lesser Sand Plover** | Charadrius mangolus | Europe |
| **Kentish Plover** | *Charadrius alexandrinus* | Europe |
| **Slender-billed Gull** | *Larus genei* | |
| **Brown-headed Gull** | *Larus brunnicephalus* | Ladakh, Tibet |

| Name of the Birds | Scientific Name | Migratory places |
|---|---|---|
| **Gull-billed Tern** | *Gelochelidon nilotica* | |
| **Lesser crested tern** | *Sterna bengalensis* | Pakistan |
| **Whiskered Tern** | *Chlidonias hybrida* | North India (Kashmir) |
| **Osprey** | *Pandion haliaetus* | Europe (Himalaya) |
| **Western Marsh-Harrier** | *Circus aeruginosus* | West Himalaya |
| **Pallid harrier** | *Circus macrourus* | |
| **Barn swallow** | *Hirunda rustica* | |
| **White Wagtail** | *Motacilla alba* | Pakistan, Kashmir |
| **Yellow Wagtail** | *Motacilla flava* | Himalaya |
| **Grey Wagtail** | *Motacilla cinerea* | Himalaya |
| **Rosy Starling** | *Sturnus roseus* | Pakistan |

Birds migrating from a long distance generally fly in groups and belong to two or three different species. The coast, nearby islands, paddy fields, back water areas, soil mounds, amidst river are the favourite places of the migratory birds. It is only after the close examination; one could notice their wide varieties which are not generally revealed at the first instance.

Depending on the local conditions, many birds change their habitat accordingly. When the tanks and minor water bodies get dried up in summer, the aquatic birds are quick to leave the place in search of suitable habitat. The birds which are scattered in the winter season go in search of tanks and ponds in the coastal regions concurrently. It is also observed that the local migratory birds do not prefer to migrate to the same place every year. On their flight, if they come across suitable place, the birds prefer to stay there for a brief stint. Cormorant, darter, ibis, purple heron and grey heron are among the birds which change their local habitat.

Some sea birds when faced with bellowing rainy season and roaring wind prefer to take shelter in the coastal areas; it is not their destination, however. But, they would have missed their way during migration. In some cases, during their long journey, the birds would have faced fatigue and would rest wherever they could. Of late, some of the strange birds are noticed migrating to the Dakshina Kannada district and are listed here

**Table 1.9 : Details of Migratory birds**

| Common Name | Scientific Name | Possible places of Migration |
|---|---|---|
| **Masked Booby** | *Sula dactylatra* | Laccadive's Islands |
| **Roseate Tern** | *Sterna dougalli* | Islands of Arabian Sea (Laccadive) |
| **Bridled Tern** | *Sterna anaethetus* | Islands of Arabian Sea (Laccadive) |
| **Great Frigatebird** | *Fregata minor* | Pacific Ocean |
| **Magnificent Frigate** | *Frigata. magnificens** | Pacific Ocean |
| **Whiskered Tern** | *Chlidonias hybridus* | North India |
| **Red billed Tropicbird** | *Phaethon aethereus* | Islands of Arabian Sea (Laccadive) |
| **South Polar Skua** | *Catheracta maccormicki* | South Pole (Antarctica) |
| **Spot-billed Pelican** | *Pelecanus phillippensis* | Local Migratary bird |

*Note: Of the birds listed above, magnificent Frigate is not listed in the standard text as migrataory bird to the Indian subcontinent. Acknowledgement: The technical help received from K.S.Naveen in translating 'Chapter on Birds' is acknowledged.

The birds of Dakshina Kannada too face serious environmental problems. King Vultures were reported from coastal part, about 40 years ago and today, it is reported to be absent in the district. Way back in 1990, a national level scientific studies were conducted about the status of King Vulture. It is disheartening to note that there is not a single bird of this genus or its nest is reported from the Survey in the district. Vultures, which are on the tip of pyramid of food chain, are subjected to a variety of pressure and the problems are multi-dimensional. The pesticides have definitely made an impact on their reproduction. Clearing bigger trees have adversely affected on the building of nests. The non-availability of dead animals is yet another serious problem, and the overall result is the decline of predatory birds. King Vultures have completely vanished in the coastal part and the situation is not different with white –backed Vultures also.

Coastal erosion is a serious problem in this region. Erecting wall to check the invasion of water is considered to be a workable solution. But, such erections have direct bearing on the birds which live in the coast. Particularly, species like Dunlin, Sanderling and ringed Plover etc. practically suffer from the loss of habitat.

## FORESTS

In the revised survey of forest by H.G. Champion and S.K. Sethi, details of different types of forests in Mangalore Forest Division are available and are given in the subsequent paragraphs. However, no area represents a particular type of forest and transition from one forest to the other is very much conspicuous. It can be generalized that, out of total area of forest, evergreen forests constitute 0.5per cent, semi evergreen forest 54per cent, and humid deciduous forest 42per cent and the other types make 3.5per cent. But, between them it is not possible to demarcate the boundaries.

**Lateritic Scrub** Lateretic scrub is found in dry areas of the coastal district, where the lateritic soil is developed at a much shallower part. This type is confined to the reserves towards the coast where the soil is dry, shallow and lateritic due to denudation and exposure. Though the environment is highly favourable for the growth of evergreen or semi evergreen forest, the land is more or less denuded and is exposed to the natural agents of weathering like rains, wind and heat from the sun. Only scrubs are successful in such environment. The stunted growths of trees – mainly deciduous, belong to the open type scrub forest. The vegetation is almost scarce and only few species of evergreen forest which have adapted to tropical conditions seem to survive in such conditions. The undergrowth is thin including xerophytic evergreens. *The important Plant species are :Terminalia chebula, Careya arborea, Strychnos nux-vomica, Anacardium accidentale; Randia species, lxora* etc.,

**Southern Secondary Moist mixed Deciduous Forest:** This type of forests are to be seen in the western part of Mangalore Forest Division, where the environment, though suited for the development of tropical or semi tropical forest, the soil is more favorable for moist mixed deciduous forests. Kumri cultivation, over exploitation of forests products, grazing of cattle, fire, and have all contributed in their own way for degeneration of forests. Inevitably, only forests of this type thrive in such environment. The forest is similar to the climax moist deciduous type but usually with few fine big trees and more of soft quick growth species.Like the luxuriant moist mixed evergreen forest, here also the trees are tall, soft and grow in a short time. Whatever the trees left out in the primary forest are tobe seen mainly in wet land and moisture laden areas. No doubt, the control of wild fire and simultaneously the growth of evergreen forest have come in the way of the development of moisture mixed deciduous forests. The ground is covered by shrubs and trees with withering leaves

and grass, wherever wild fire occurs frequently. In addition, the thickness of soil is very limited and mostly made up of rocky debris and as such is prone to erosion. But, the development of lateritic soil is characteristic of such environment. *The important plant species are : Terminalia paniculata, Bombax ceiba, Mangifera indica, Dalbergia latifolia, Adina cordifolia, Dillenia pentagyna, Schleichera oleosa, Alstonia scholaris, Xylia xylocarpa, Lagerstroemia lanceolata, Olea dioca, Careya arborea, Emblica officinalis, strychnos nuxvomica, Clerodendron infortunatum, Helecteris isora.* In damp areas evergreen under growth includes *Actinodaphne, Psychotria, Webera, Ixora and Strobilanthes.* No bamboos but canes are confined to wet pockets. Climers of the species of *Calycopteris floribunda, Acacia species are common.*

**Lateritic Semi Evergreen Forest:** The forest of this category is to be seen in the areas where there is abundant lateritic soil and plants like *Xylia xylocarpa* are characteristic of this type of forests. The environment, though, resembles that of semi evergreen forests, and the soil is lateritic in nature, is shallow and dry for its most part. *The important Plant species are Xylia xylocarpa, Pterocarpus marsupium, Grewia tiliaefolia, Terminalia species, Careya arborea, Bridelia retusa, Calycopteris floribunda, Strychnos nux-vomica, Lea indica.* Generally sparse *Adhatoda vasica, Holarrhena antidysenterica.*

**West Coast Secondary Evergreen Dipterocarpus Forest:** The plains below the Western Ghats have encouraged this type of forests. The characteristic features of these forests are the uniformity and luxuriant growth and without a definite middle storey but with undergrowth of evergreen shrubs. The species *Hopea parviflora* is aplenty in Evergreen Dipterocarpus Forest. The climate is hot and equable and the soil is red, often lateritic in eroded depressions. *The important Plant species are; Hopea parviflora, Hopea wightiana, Vateria indica, Diospyros microphylla, Eugenia gardneri, Aporasa lindleyana, Olea dioica, Syzygium Species, Ixora* and *Calycopteris floribunda bushes.* No Bamboo.

**West Coast Semi Evergreen Forest:** This forms the intermediate type between the evergreen forest and the moist mixed deciduous forest. It forms a closed high forest containing intimate mixture of tree species of both evergreen and deciduous though extensive consociations notably of *xyhis xylocarpa* are met with. The number of species is high than in the true evergreen. Tall trees with luxuriant growth are a plenty in this type of forest. Another interesting feature is the abundance of evergreen vegetation at lower level and climbers tend to be very heavy. The ground

level is made up of bushy shrubs. The bamboo vegetation is represented by *Bambusa bambos* and *Terminalia paniculata* is a common species in West Coast Semi Evergreen Forest. Epiphytes and Ferns are abundant. Mostly found on hill slopes from 50 t0 1050m but also on plains. *The important Plant species are: Terminalia paniculata, Diospyros spp, Lagerstroema lanceolata, Lophopetalum wightianum, Machilus macarantha, Cinnamomum spp, Hopea parviflora, Mangifera indica, Artocarpus hirsuta, Holigarna arnotiana, Elaeocarpus serratus, Mallotus philippensis, Diospyros spp, Lxora spp, Strobilanthus, Lxora.* Climbers and canes are numerous.

**West Coast Tropical Evergreen Forest**: This forms a part of dense evergreen forests of Mangalore Forest Division. Generally, these are abound in the areas where there is rainfall of more 3,000 mm. and are located on the slopes of Western Ghats - 120 to 250 m. above the sea level. The moisture and nature of soil are highly favourable for the development of tropical evergreen forest. These are characterized by the presence of a large number of species, which grow to lofty heights. The canopy is unbroken, extremely dense and almost entirely evergreen. Long cylindrical boles with thin bark are typical but buttresses are also frequently seen. Cauliflory and coloured juvenile foliage are striking and attractive features of the evergreen forests. Besides, innumerable leeches are present in these forests. *The important Plant species are Dipterocarpus indicus, Hopea wightiana, Vaheria indica, Calophyllum wightianum, Hardwickia pinnata, Artocarpus hirsue, Machilus macarania, Matgnifera indica, Lophopetalum wightianum, Olea dioca etc., Aporosa lindleyana, Myristica spp, Garcinia spp, Caryota urens, Elaeocarpus serratus, Strobilanthus spp, Psychotria spp, Lea sambucina. Climbers* are seen often and are mainly of *Entada scandens, Dioscorea spp.* Regeneration of inferior spp is more abundant than that of merchantable ones. Epiphytes are numerous, mosses and ferns occur almost everywhere.

**Southern Wet Bamboo Brakes** : Wet Bamboo are usually found along streams or on badly drained hollows in the evergreen tract more or less displacing the trees and are often very dense. The bamboos tend to be of smaller types than the big clumped species. Species of *Ochlandra*(reeds)frequently occur in damp sites and are extended in areas where the canapy is broken.

**Cane Brakes**: Cane Brakes are commonly found in evergreen and semi evergreen forests where there is less desiccation of water. Many

species of *Calamas* have been reported from such areas. Here the soils are permanently wet and usually fine clay with very rich in humus.

Mangalore forest division happens to be the only forest division in the district and encompass forest areas belonging to five taluks of Dakshina Kannada. The forest areas of Mudabidri and Venur zones are clubbed under Kundapur and Karkala of Udupi district. This division extends between the East longitude 74° 45' - 75° 33' and 12° 30'-13° 04' North latitude. It has a geographical area 4,391 sq km of which the reserved forests constitute 1,228 sq km The reserved forest has been leased out to an extent of 104 sq km both for government and private agencies to raise rubber, cashewnut, coco and arecanut plantation. This extends up to Puttur, Sulya, Mangalore, Buntval and Belthangadi taluks. All the forest areas are in the Western Ghats excluding the sub-division belonging to Buntval and Mangalore taluks. This division, in fact, forms a part of catchment area of Netravathi and Payaswini rivers, where a number of tributaries like Gundya, Kumaradhara, Gurupura and Neria take their birth. In all, there are eight regional forests zones (sub divisions) in Mangalore forest division, namely, Mangalore, Buntval, Uppinangady, Belthangadi, Puttur, Panja, Sulya and Subramanya. The district boasts five social forest divisions namely Sulya, Puttur, Belthangadi, Bantval and Mangalore.

The Mangalore forest division is known for its diversity of both the fauna and flora and comprises of about 1,12,816 hectares of forest land. Further, about 400 species of medical plants and 180 species of edible plants and many varieties of archids are reported from this division. Since the district is located on the edge of the Western Ghats, it enjoys heavy rains during the monsoon period and hence supports dense forest.

**General Condition of the Forest**: The general condition of the forest is poor and does not indicate the original luxuriant growth mainly due to the past practice of *kumri* and over exploitation in the recent years in the accessible areas. The exploitation in the past was mainly for earning more revenue. All the economic species, which are valuable as timber, plywood and railway sleepers, were felled without bestowing any care towards their regeneration. Besides, the practice of collection of green manure by destruction of saplings, recurring fires and grazing are the contributory factors which noticeably destabilized the micro-climate, rainfall and groundwater regime. Evergreen forests are replaced either by the deciduous species or by a type of evergreen inferior to the original. The richest forests of the ghats and foothills suffered the most. Exposed

southerly or westerly slopes are the ones severely modified. The northern slopes have often reverted to the evergreen or mixed types, containing both deciduous and softwood species but of much value.

There has been a serious depletion of the growing stock and heavy opening of the canopy resulting in weed growth, hindering regeneration of principal species and thereby degradation of the forest.

The coastal forests are displace to the scrub types or the secondary moist deciduous type, due to the incessant cutting by local people for firewood, small timber and lopping of the trees for the purpose of green manure for their fields. The collection of leaf litter exposes the ground, causing severe soil erosion and deterioration of the site. Abnormal disturbance to the original crop has in many places resulted in the occupation of the site by dominant or exclusive growth of *Eupatorium* which a menace is being difficult to eradicate. The growth of woody climbers is so prolific in many areas that they hinder the development of good top canopy. Continuous tall evergreen patches are scarce, due to lack of tending and severe competition of woody climbers and rank growth. Many of the higher ridges of the ghats are devoid of tree growth and comprise of grassy banks.

The zone wise forests area (hectares) of Mangalore Regional Forest Division is shown in the following table.

**Table 1.10 : Details of Forest Land**

| Name of the Zone | Forest land as per Sec. 16 | Forest land as per Sec 17 | Forest land Sec. 4 | Total For-est land (Hectare) | Other govt/land | Total area (ha) |
|---|---|---|---|---|---|---|
| **Buntval** | 0 | 1,88.68 | 315.53 | 2204.31 | 245.40 | 2,449.71 |
| **Belthangadi** | 0 | 10,667.30 | 1,317.79 | 11,985.09 | 3,054.01 | 15,039.10 |
| **Mangalore** | 0 | 0 | 0 | 0 | 334.35 | 334.35 |
| **Panja** | 0 | 11,908.52 | 546.60 | 12,455.12 | 455.93 | 12,911.05 |
| **Puttur** | 8,874.46 | 3,033.36 | 970.89 | 12,878.71 | 1,379.33 | 14,258.04 |
| **Subramanya** | 570.24 | 30,386.05 | 0 | 30,906.79 | 232.11 | 31,138.90 |
| **Sulya** | 1,907.48 | 14,263.13 | 78.00 | 16,248.62 | 1,134.62 | 17.383.23 |
| **Uppinangadi** | 24,750.52 | 384.83 | 1,001.83 | 26,137.38 | 1,244.41 | 27,481.79 |
| **Total of all the zones** | 48,409.05 | 60,176.22 | 4,230.64 | 12,816.01 | 8,180.16 | 1,20,996.17 |

The details of areas of forest leased out and given for other purposes is shown in the next table.

**Table 1.11 : Details of Forest Land**

| Name of the Zone | Total notified forest area (ha) | Area leased out of KFDC (ha) | Area leased out KSDC (ha) | Area leased out for research (ha) | Area leased out for Others (ha) | Non forest area (ha) | Total Forest area available (ha) |
|---|---|---|---|---|---|---|---|
| Buntwal | 2,204.31 | 0 | 602.89 | 0 | 0 | 0 | 1,601.00 |
| Belthangadi | 11,985.09 | 0 | 363.24 | 0 | 87.55 | 0 | 11,354.28 |
| Panja | 12,455.12 | 56.76 | 484.77 | 0 | 9.71 | 1.32 | 11,902.56 |
| Puttur | 12,878,71 | 2,212.49 | 1,989.02 | 80.94 | 8.50 | 0.96 | 8,596.80 |
| Subramanya | 30,906.79 | 1,551.58 | 80.94 | 121.45 | 51.40 | 0 | 29,101.42 |
| Sulya | 16,248.61 | 529.85 | 364.09 | 0 | 82.44 | 0 | 15,271.33 |
| Uppinangadi | 26,137.38 | 92.64 | 1,512.07 | 0 | 105.21 | 0 | 24,427.46 |
| Total | 1,12,816 | 4,443 | 5,388 | 202 | 345 | 2.3 | 1,02,435 |

The important non timber trees of the district are listed below. These trees are being used for the preparation of medicinal, manure and cosmetic products.

**List of Forest Products:** *1) Acacia sinuate (Seegekai) 2) Artocarpus gomezianus (Vatekayi) 3) Cinnamomum verum (Dalchinni), 4) Garcinia gummigutta (Upagimara) 5) Garcinia indica (Punarpuli) 6) Garcinia xanthchymus (Jarige), 7) Myristica malabarica (Ramapatre) 8) Emblica officinali (Nellikayi) 9) Sapindus laurifolia (Norekayi), 10) Strychnos muxvomica (Kasarka) 11) Tamarindus indica (Hunise) 12) Terminalia bellirica (Shanthi), (13) Terminalia chebula (Alalekayi), 14) Zanthoxylum rhetsa (Gamatamara) 15) Garcinia cambogia (Murugan Huli) 16) Artocarpus integrifolia (Halasu) 17) Mangifera indica (Mango) 18) Syzygium cumini (Nerale) 19) Semicarpus anacardium (Kadugeru) 20) Zizyphus species (Bore) 21) Anacardium accidentale (cashew) 22) Garcinia tinctoria (Jerkan Huli) 23) Vateria indica (Sal dhupa) 24) Cinnamomum zezylanicum (Dalchini) 25) Canarium strictum (kai dhupa) 26) Ailanthur malabaricum (Acacia catechu) 27)Terminalia bellirica (Tare) 28) Terminalia chebula (Alalekayi) 29) Zanthoxylum hetsa (Gamatamara)*

**Medicinal Plants Conservation Area** : Subramanya and Dharmastala Mundaje (Medicinal Plants Conservation Area (MPCA):

About 600 plant species have been identified and listed as medicinal plants by Aryavaidyashala during 1993-96. It is learnt that about 320 plants species are reported from this district. In collaboration with the Foundation for the Revitalization of Local Health Tradition (FRLHT), Conservation of Medicinal Plant area is being carried out at Subramanya temple and Dharamastala, Mundaje. The MPCC area at Subramanya temple is spread over an area of 200 hectares, while, it is about 250 hectares at Belthangadi, Dharmastala Mundaje areas.

There are eight nurseries in Mangalore Forest Division, viz., Padila of Mangalaore zone, Shambura of Bantvala zone, Mundaje of Belthangadi zone, Udhane of Uppinangady zone, Kanakamajalu of Puttur zone, Enekallu of Panja zone, Medinadka of Sulya zone and Kallaje of Subramanya zone. There is forest check post located near Kotekar on the National Highway, Mangalore zone, Jalsoor on the highway of Puttur zone, again Ukkada on the district highway of Puttur zone, Gundiya located on the National Highway of Uppinangady zone and Charmadi located on the State Highway of Belthangadi zone.

## CLIMATE

The climate of the State is determined by parameters such as the distance from the sea, monsoon winds and physical features. The Western Ghats act as though the weather divide between the West coast mountainous area having highest rainfall and eastern part with little rainfall and draught prone areas. Western Ghats play a significant role as an important physical feature in determining the climate of the State. It also serves as catchment area giving birth to the rivers and streams which flow both towards east and west. The ghats extend in north south direction and are responsible for the heavy down pour all along the coast and Malnad area. They act as barrier to the north western monsoon winds. Since the catchment area is the main source of water, this could amply be termed as the backbone of the State.

The district is known for highest annual rainfall, humidity and dynamic weather patterns. The year can be divided into four parts from the point of view of climate. It is summer between March and April months; south western monsoon extend from June to September The pre monsoon period commences from October and ends in November. Similarly, the period from December to February marks the regime of north-eastern monsoon. It rains in December, generally, due to north-eastern monsoon and the other two months are free from rains.

Of the total four important climatic zones, Dakshina Kannada district encompasses two zones. 1)*Coastal part*: This part lies between the Arabian Sea and Western Ghats and includes Dakshina Kannada district, Udupi district and south-west part of Uttara Kannada district. It enjoys more than 3000 mm. of annual rainfall and 2)*Western Ghats and Malnad areas* : This forms part of mountain and forest areas lying to the east of western margin of Western Ghats.

Some characteristic features of rainfall distribution are described here under.

**South-West Monsoon (June to September):** There is a distinct change in the isohyetal pattern, with isohyets running north to south parallel to the coast and Western Ghats, and a sparse and irregular pattern in the maidan area. The south west monsoon is primarily due to the wind circulation caused by the difference of pressure in summer, between the heated south Asian continent and the cooler sea area surrounding it to the south. The high pressure region over Southern Asia in winter is replaced in summer(April-May) by a fairly deep low pressure area extending from Sudan in East Africa to Rajasthan and then to West Bengal in India. By the end of May, the South-East trade winds from South of equator extend northwards into the Arabian Sea and Bay of Bengal as a moist south-westerly stream which is the southwest monsoon. These south westerly winds gather much moisture up to considerable height which passing over the sea before striking the coastal areas. The heavy rains caused on the west coast and the ghats and adjoining areas is due to the moist monsoon current striking against the ghats, thus getting a forced ascent with pronounced dynamic cooling which results in the formation of thick rising clouds and subsequent condensation of moisture resulting in heavy rains. The south-west monsoon is not a period of continuous rain even in the heavy rainfall areas. The rainy periods are pulsatory in character with burst of general rain for a period followed by breaks of a few days to about a week or sometimes two weeks. These breaks generally occur in June or August or September, but rarely in July. There is heavy rainfall in the coastal region and the Western Ghats, increasing from about 3,200 mm along the coast to about 7,000 mm Agumbe and about 5000 mm at Bhagamandala. The season's rainfall is about 80 to 90 per cent of the annual in the coastal and ghats region. The number of rainy days (a rainy day being one with 2.5 mm or more rain in 24 hours) in the season varies from 95 to 105 in the heavy rainfall western ghats and coastal

areas. In the district, rainfall increases from the coast eastwards towards the ghats. Rainfall increases north to south along the coast from Mangalore being a maximum of 4,137 mm at Baindur, but decreases as one go further north along the coast.

**North-east Monsoon (October to December):** There is a distinct change in the isohyetal pattern as compared to south west monsoon season. The north east monsoon commences in October when the south west monsoon begins retreating. In October, there is a change in the pressure system over South Asia including India with higher pressure in the north and lower pressure in the south. A low pressure area establishes itself in the southern Bay of Bengal. This introduces a different wind circulation with north easterly winds blowing across India and adjoining regions. These winds, being of land origin, are mainly dry, but with their travel over the Bay of Bengal, they pick up moisture. Striking against the east coast of southern India, they give the north-east monsoon rain. Rainfall is 200 to 300 mm in coastal region. Over the coastal area and ghats, the rainfall is less than 10 per cent of annual rainfall. More than half of season's rainfall occurs in October when 150 to 200 mm occurs in Dakshina Kannada district. Rainfall in November is much less than in October and in December it is very lesser still.

**Winter (January to February):** Generally winter is almost a dry season in the State. The summer (March to May) for its most part is characterized by dry weather with scanty rainfall. But greater changes are to be seen in the month of April. It rains nearly 150 mm. at the tips of Dakshina Kannada district. Half the amount of rainfall of this season is received in the month of May itself.

**Depression and Cyclones:** The cyclone seasons in the south Bay of Bengal and South Arabian Sea are April-May and October-November and to some extent December also in the South Bay of Bengal. Cyclones are much more frequent in the Bay of Bengal than in the Arabian Sea. On an average about two cyclones per year hit or come near the east coast. Hardly one cyclone hits or comes near the west coast in ten years on an average. A cyclone is a vast moving whirl or vertex of low pressure of large dimensions with a calm centre surrounded by a ring of hurricane winds, which moves and causes considerable destructions when it hits coastal areas. In many cases, a cyclone starts as a depression and later intensifies into a cyclone. After crossing the coast, a cyclone generally weakens into a depression. A few prominent occasions in the past when cyclones from the Bay of Bengal weakened after crossing the coasts, and

moved across the State causing rainy and stormy weather were on 2nd May 1872, 4th May 1874, end of November 1880, 16th November 1885, 3rd May 1909, 16th October and 23rd November 1916. Sometimes, but very rarely, a cyclone which forms in the South east Arabian Sea of the Kerala coast in the latter half of May before the onset of the monsoon and moves northwards may cause heavy rains and strong winds over the west coast of the State.

**Rainfall**

The climate of this district is marked by heavy rainfall, high Climate humidities and oppressive weather in the hot season. The year may be divided into four seasons. The hot season from March to May is followed by the soulh-west monsoon season from June to September. October and November constitute the retreating monsoon or post-monsoon season. December to February may be called the north-east monsoon season although the rains associated with the north-east monsoon cease after December and the rest of the season is generally dry.

The district has a good network of raingauge stations, records Rainfall of which extend to periods ranging from 60 to 90 years. A statement of the rainfall at these stations and for the district as a whole are given in Tables 1.12. The main rainy season is from June to September. The average annual rainfall in the district is 3,930 mm. The rainfall increases from the coast towards the Western Ghats on the eastern border of the district, In the coastal strip in the northernmost part of the district in the Bhatkal-Baindoor region, the rainfall is heavier than in the southern coastal strip. About 87 per cent of the annual rainfall is received during the south-west monsoon season, July being the month with the heaviest rainfall. Some rainfall is received in May and the post-monsoon months. The variation in the rainfall from year to year is not large. Considering the district as a whole, during the fifty-year period from 1901 to 1950, the highest annual rainfall amounting to 1.27 per cent of the normal occurred in 1946. In the same fifty-year period, 1941 was the year in which the lowest annual rainfail amounting to 73 per cent of the normal was received. This was also the only year when the rainfall was less than 80 per cent of the normal. It will be seen from Table 2 that in 34 years out of 50, annual rainfall in the district was between 3,400 and 4,400 mm.

On an average, on 129 days in a year the district gets rainfall of 2.5 mm or more. As in the case of the amount of rainfall, the number of rainy days in a year increases from the coast towards the Western

## Table 1.12 Rainfall in Dakshina Kannada District

| Station | No. of years of Data | Jan | Feb. | Mar. | April | May | June | July | Aug. | Sep. | Oct. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mangalore** | 50 a | 4.8 | 2.5 | 8.9 | 35.3 | 177.5 | 966.7 | 1019.6 | 607.1 | 272.0 | 208.0 |
| | b | 0.3 | 0.2 | 0.5 | 2.1 | 7.2 | 24.7 | 27.6 | 25.1 | 16.0 | 10.2 |
| **Belthangadi** | 50 a | 5.6 | 2.3 | 8.6 | 51.1 | 151.9 | 967.4 | 1572.0 | 975.6 | 392.2 | 304.3 |
| | b | 0.4 | 0.1 | 0.7 | 3.3 | 7.4 | 24.7 | 29.1 | 27.1 | 18.1 | 13.5 |
| **Puttur** | 50 a | 5.3 | 2.5 | 13.5 | 38.9 | 160.3 | 928.4 | 1237.7 | 772.4 | 297.9 | 277.1 |
| | b | 0.5 | 0.2 | 0.7 | 2.7 | 6.9 | 24.3 | 28.7 | 26.4 | 16.8 | 12.9 |
| **Udupi** | 50 a | 3.6 | 3.3 | 3.3 | 29.7 | 141.5 | 995.9 | 1197.6 | 721.6 | 351.5 | 187.2 |
| | b | 0.3 | 0.1 | 0.2 | 2.0 | 5.8 | 25.1 | 28.2 | 26.0 | 17.4 | 9.0 |
| **Bantval** | 50 a | 6.1 | 1.3 | 6.3 | 33.8 | 143.5 | 1003.8 | 1225.3 | 732.8 | 290.3 | 223.0 |
| | b | 0.3 | 0.1 | 0.4 | 2.3 | 6.4 | 24.7 | 28.9 | 26.4 | 16.3 | 11.8 |
| **Baindur** | 50 a | 1.3 | 0.8 | 2.3 | 23.9 | 121.4 | 1123.9 | 1361.7 | 823.2 | 395.2 | 201.2 |
| | b | 0.1 | 0.1 | 0.2 | 1.2 | 4.8 | 24.8 | 29.2 | 27.1 | 18.0 | 9.6 |
| **Mulki** | 50 a | 5.1 | 1.8 | 3.3 | 35.8 | 162.3 | 984.5 | 1074.2 | 668.8 | 297.7 | 194.3 |
| | b | 0.3 | 0.1 | 0.3 | 1.7 | 6.7 | 24.7 | 28.2 | 25.6 | 16.4 | 9.9 |
| **Karkal** | 50 a | 7.6 | 1.8 | 12.2 | 48.5 | 160.5 | 1108.5 | 1532.1 | 976.4 | 412.2 | 298.7 |
| | b | 0.4 | 0.1 | 0.8 | 3.5 | 6.9 | 25.5 | 29.5 | 27.6 | 18.8 | 13.8 |
| **Kundapur** | 50 a | 1.5 | 2.5 | 3.8 | 25.7 | 126.5 | 1037.8 | 1211.3 | 698.3 | 349.8 | 156.2 |
| | b | 0.1 | 0.1 | 0.1 | 1.3 | 5.1 | 24.5 | 28.2 | 25.8 | 16.8 | 7.9 |
| **D.K. District** | 50 a | 4.5 | 2.1 | 6.9 | 35.9 | 149.5 | 1014.0 | 1270.2 | 775.1 | 339.9 | 227.8 |
| | b | 0.3 | 0.1 | 0.4 | 2.2 | 6.4 | 24.8 | 28.6 | 26.3 | 17.2 | 11.0 |

**Note:** (a) Normal rainfall in mm, (b) Average number of rainy days(days with rain of 2.5 mm or more), * Based on all available data upto 1957, ** Figures given in brackets are years.

**Table 1.12 Rainfall in Dakshina Kannada District (Contd.)**

| Station | No. of years of Data | Nov. | Dec. | Annual | Highest annual rainfall as % of normal and year** | Lowest annual rainfall as % of normal and year** | Highest rainfall in 24 hrs.+ Amount in mm | Highest rainfall in 24 hrs.+ Date |
|---|---|---|---|---|---|---|---|---|
| **Mangalore** | 50 a | 79.8 | 15.7 | 3397.0 | 138(1946) | 72(1941) | 360.9 | 1909-5-8 |
| | b | 4.8 | 0.9 | 119.6 | | | | |
| **Belthangadi** | 50 a | 122.4 | 20.3 | 4582.7 | 130(1923) | 72(1915) | 359.9 | 1941-6-11 |
| | b | 5.9 | 1.2 | 131.5 | | | | |
| **Puttur** | 50 a | 111.5 | 16.8 | 3862.3 | 127(1946) | 75(1944) | 336.0 | 1887-10-9 |
| | b | 5.9 | 1.1 | 127.1 | | | | |
| **Udupi** | 50 a | 68.8 | 14.7 | 3718.7 | 128(1902) | 59(1941) | 276.1 | 1902-7-30 |
| | b | 3.8 | 1.0 | 118.9 | | | | |
| **Bantval** | 50 a | 85.3 | 21.0 | 3772.8 | 130(1946) | 77(1913) | 290.8 | 1946-8-7 |
| | b | 5.2 | 1.2 | 124.0 | | | | |
| **Baindur** | 50 a | 73.4 | 9.1 | 4137.4 | 146(1948) | 68(1911) | 346.5 | 1955-5-21 |
| | b | 3.9 | 0.8 | 119.8 | | | | |
| **Mulki** | 50 a | 66.3 | 16.8 | 3510.9 | 135(1929) | 65(1941) | 303.5 | 1909-5-8 |
| | b | 4.0 | 1.0 | 118.9 | | | | |
| **Karkal** | 50 a | 111.8 | 24.1 | 4604.4 | 127(1946) | 65(1941) | 302.0 | 1923-6-24 |
| | b | 6.2 | 1.5 | 134.6 | | | | |
| **Kundapur** | 50 a | 66.0 | 13.5 | 3692.9 | 135(1946) | 66(1941) | 373.9 | 1902-7-30 |
| | b | 3.3 | 0.8 | 114.0 | | | | |
| **D.K.District** | 50 a | 87.3 | 16.9 | 3930.1 | 127(1946) | 73(1941) | | |
| | b | 4.8 | 1.1 | 123.2 | | | | |

**Note:** (a) Normal rainfall in mm, (b) Average number of rainy days (days with rain of 2.5 mm or more), *Based on all available data upto 1957, **Figures given in brackets are years.

Ghats. The heaviest rainfall in 94 hours which occurred at any station in the district was 373.9 mm at Kundapur on 2nd July 1930.

**Frequency of Annual Rainfall in Dakshina Kannada District (Data 1901-1950)**

| Range in mm | No. of years | Range in mm | No. of years |
|---|---|---|---|
| 2,801-3,000 | .. 1 | 4,001-4,200 | . . 10 |
| 3,001-3,200 | .. 3 | 4,201-4,400 | . . 6 |
| 3,201-3,400 | .. 3 | 4,401-4,600 | . . 7 |
| 3,401-3,600 | .. 7 | 4,601-4,800 | . . I |
| 3,601-3,800 | .. 6 | 4,801-5,000 | . . 0 |
| 3,801-4,000 | .. 5 | 5,001-5,200 | . . 1 |

**Table : 1.13 Details of season wise Rainfall (mm)**

| Details | | Normal | 1999-2000 | 2000-01 |
|---|---|---|---|---|
| **South-west Monsoon Season** | June-September | 3,361.50 | 3,230.00 | 2,869.00 |
| **North-east Monsoon Season** | October-December | 353.40 | 537.00 | 307.00 |
| **Winter season** | January-February | 5.20 | 49.00 | 1.00 |
| **Summer season** | March–May | 233.20 | 281.00 | 328.00 |
| **Annual** | | 3,953.20 | 4,097.00 | 3,532.00 |

Source: Directorate of Economics and Statistics, Bangalore.

**Pressure and Wind:** The general surface-wind flow over the State is from west of south-west (north-west in the interior) in the south west monsoon season and from north-east or east in the north-east monsoon season. In winter, the atmospheric pressure is high over north India and low over South India. Over the State, the pressure gradient is weak in winter, and the winds are from north-east or east are variable. Pressure begins to decrease in March and by April there is reversal of pressure gradient with lower pressure over north India and higher pressure over South India. In March and April, pressure gradient over the State is still weak, and winds are light or variable with a westerly tendency in the afternoon in coastal areas. With the advance of the summer, the seasonal low pressure over north-west India becomes more marked. The pressure

gradient over the State becomes steep by July, the isobars (lines of equal pressure) running north-west to south-east across the State.

Winds are generally stronger in June and July than in May, and from west to south-west with more westerly components in the afternoon in coastal regions. The wind and pressure regime remains more or less similar in August and September. In October there is a reversal of pressure gradient with higher pressure again over north India and lower pressure over South India. The pressure gradient and winds are light variable in October, but later in the northeast monsoon season, winds become north-east to east with the pressure gradient becoming slightly steeper.

**Temperature**

Temperature is lowest in the beginning of January and increases thereafter generally at first and rapidly after the middle of February or beginning of March. In coastal areas, the highest temperatures occur in May. In January, the mean daily maximum temperature is 31 to 32 degree Celsius in coastal areas over the ghat areas; it is 24 to 27 degree Celsius. In April, the mean daily maximum temperature is about 32 in the coastal region and it varies from 33 to 36 over the ghats. The highest maximum temperature in May, which is the warmest month over major part of the State, is 35 to 36 over the coastal areas. Over the Western Ghats it is $32^0$ to $34^0$ C. Temperatures decrease after May and by July, the daily maximum temperature decreases appreciably. It is about $28^0$ c in coastal areas in July and ghats, it is about $20^0$ to $24^0$ Celsius. It is of interest to note that the coastal area and ghats, the maximum temperature in July is lower than the maximum temperature in January. This is because of the continuous clouding and frequent rain over the area in July, while in January the skies are clear with bright sunshine during the daytime. In October the maximum temperature increases over the coast. After October, temperatures gradually decrease throughout the State reaching the lowest in the beginning of January.

The mean daily minimum temperature in January is about $20^0$ C in the coastal region decreasing to $13^0$ to $14^0$ degree Celsius in the ghats and malnad areas. The lowest minimum temperature ever recorded is $16^0$ to $18^0$ Celsius in the coastal area, $10^0$ to $12^0$ Celsius in the ghats and maidan areas. It is noteworthy that the mean annual range of temperature (i.e. the difference between highest mean daily maximum temperature and lowest mean daily minimum temperature) is smallest in the coastal region. The annual mean temperature (i.e. the average of the

12 monthly means of daily maximum and minimum temperature) is about 18° to 20° Celsius in the ghats and malnad areas and is about 27° Celsius in the coastal area.

The only Meteorological Observatory in the district is at Mangalore and records for this station are available for about seventy years. Temperature and other meteorological conditions in the district can be taken to be represented by the data for Mangalore, Being a coastal district, the seasonal variations in the temperature are small. The south-west monsoon season is the coolest part of the year with the mean daily maximum temperature below 29° C. Although April and May may be considered to be the hottest months of the year as both day and night temperatures are higher than in the rest, of the year, day temperatures remain high even during the period from December to February. The oppressive heat is often relieved by the comparatively cool sea breezes which blow in the afternoons. The highest maximum temperature ever recorded at Mangalore was 37.8°C on February 28, 1920 and the lowest minimum was 16.7°C ( recorded on January 13, 1911, February 8, 1911 and December 10, 1950.

**Table 1.14 : Maximum and minimum temperatures recorded**

| Month | Average | Daily | Max. | Recorded Temp. | Min | Recorded temp | Relative humidity | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 8.30 am | 5.30 pm |
| January | 31.6 | 21.5 | 36.1 | 21.01.1957 | 16.7 | 13.01.2011 | 69 | 63 |
| February | 31.2 | 22.6 | 37.8 | 28-02-1920 | 16.7 | 08-02-1911 | 74 | 67 |
| March | 32.0 | 24.4 | 37.3 | 07-03-1958 | 18.3 | 04-03-1911 | 75 | 68 |
| April | 32.8 | 25.9 | 35.6 | 28-04-1921 | 20.0 | 23-04-1954 | 72 | 69 |
| May | 32.6 | 26.1 | 36.7 | 02-05-1921 | 18.9 | 06-05-1911 | 75 | 72 |
| June | 29.2 | 23.8 | 34.4 | 05-06-1923 | 20.0 | 16-06-1920 | 88 | 57 |
| July | 28.6 | 23.5 | 31.7 | 25-07-1954 | 20.6 | 25-07-1931 | 90 | 89 |
| August | 28.7 | 23.5 | 32.2 | 26-08-1932 | 20.6 | 12-08-1911 | 91 | 88 |
| September | 28.9 | 23.5 | 31.7 | 23-09-1955 | 21.1 | 09-09-1950 | 88 | 85 |
| October | 30.0 | 23.7 | 34.4 | 31-10-1941 | 20.0 | 23-10-1933 | 84 | 79 |
| November | 31.1 | 23.2 | 35.6 | 03-11-1941 | 18.3 | 30-11-1950 | 76 | 72 |
| December | 31.7 | 21.8 | 35.0 | 01-12-1953 | 16.7 | 10-12-1950 | 68 | 63 |
| Annual | 30.7 | 23.6 | | | | | 79 | 75 |

**Relative Humidity:** The relative humidity in the State is highest during the months of July and August and is very low during the months of March to April. Humidity depends not only on water vapour but also the temperature. During the months of March to April, compared to

plains, generally the coast and ghats are more humid. 30–40 per cent of humidity is recorded in the coast and Malnad parts. Likewise during the months of July and August more than 90per cent relative humidity prevails in this part. This marks the highest humidity and thereafter there is a gradual decrease till November and further decrease is noted in the subsequent months. In the district, the air is highly humid all through the year and particularly so in the south-west monsoon months.

**Winds:** Winds are strong and are mainly westerly or south-westerly in the south-west monsoon months. In the rest of the year, winds are mainly from directions between north and east in the fore-noons and westerly or north-westerly in the afternoons.

**Cloudiness:** Cloudiness is measured in units called Octa (okta). One octa refers to 1/8 part of the sky covered by clouds. If the whole sky is overcast it is referred to as 8 octa of the sky is covered and if it is half of this the coverage is 4 octa. The south-west monsoon witnesses' heavy cloudiness of the sky and it gets reduced in the month of March when the sky is almost clears. But, here and there one can see the floating of bigger or medium sized clouds in the sky. Sky is overcast in the coast and ghats during the months of July to August, when the clouds are at a lower level. It rains more than 20 days in a month during this period and the sun is covered for days together. In the district, Skies are heavily clouded or overcast on most days in the south-west monsoon season. The number of such heavily clouded days is fewer in the post-monsoon months of October and November. In the rest of the year, skies are generally lightly clouded or clear.

**Special Weather Phenomena :** Phenomena such as thunderstorm, storm, hail storm, rains, typhoons, cyclones and mist are included among the phenomen associated with climate. Storms associated with thunderbolt are common features in the summer season (April to May) and also during the months of September to October, but, are very rare during the months of November to March. Sometimes it is not uncommon during the months of June and August. But, this happens very rarely. Likewise, rain associated with hailstorm is also a rare phenomenon. But during the months of April to May, sometimes during September and October, there could be hailstorm associated with thunderbolt followed by heavy rains. The Western Ghats and maidan areas may experience hailstorm associated with thunderbolt or cyclones. When cyclone attains a speed of more than 50 km per every hour in a span of 3 to 5 minutes and operates for about 10 minutes, then it is called squall. In the

district, Thunderstorms occur on three to six days in a month during the period from April to June and on five to seven days in a month in the post-monsoon months of October and November. Squalls are possible in the latter part of the hot season and the early part of the south-west monsoon season. In association with storms in the Arabian sea in the months of April, May and June and to a greater extent in the post-monsoon months of October and November, the district gets heavy rainfall and high squally winds all along the coastal regions. Tables 1.15 and 1.16 give the details of phenomena associated with the climate.

**Table 1.15: Month-wise Average Wind speed in Mangalore (km/hour)**

| | | | | | |
|---|---|---|---|---|---|
| January | 7.9 | May | 9.0 | September | 6.4 |
| February | 8.2 | June | 8.7 | October | 6.6 |
| March | 7.9 | July | 9.0 | November | 6.6 |
| April | 8.2 | August | 7.4 | December | 7.0 |
| | | Annual | 7.8 | | |

**Table 1.16 Special Weather Phenomena* - Mangalore**

| Prevailing Days | Jan | Feb | Mar | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ann. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lightning | 0.0 | 0.3 | 0.5 | 4.1 | 5.8 | 3.7 | 1.0 | 0.4 | 0.9 | 6.9 | 5.3 | 1.2 | 30.1 |
| storms | | | | | | | | | | | | | |
| Hail stone | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Typhoon | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.4 |
| Cyclone | 0.2 | 0.0 | 0.0 | 0.5 | 0.9 | 2.9 | 1.9 | 0.3 | 0.1 | 0.3 | 0.4 | 0.1 | 7.6 |
| Mist | 0.5 | 0.1 | 0.7 | 0.2 | 0.0 | 0.0 | 0.2 | 0.1 | 0.5 | 0.5 | 0.2 | 0.2 | 3.6 |

*If it exceeds more than two days, it is rounded off to the nearest number
Source : Indian Meteorological Department, Government of India, 1984

## The State of Environment in the District

The survival of life on the earth depends on the availability of natural resources. The exploitation of natural resources undoubtedly has a greater impact on the environment. For instance, when we use water we also pollute it. By over exploitation of the resources such as coal, oil and mineral wealth, they get depleted. The soil becomes either saline or alkaline, when there is no sufficient scope for infiltration of water and especially in the areas where large scale cultivation is practiced. Burning

more wood also brings about increase in the emission of carbon dioxide which ultimately leads to global warming. Both exploration and depletion of the natural resources have adverse effect on the environment.

The loss of vegetation on a large scale in the plains is due to the agricultural activities extending into these areas. In fact, the shrubby forests which formed unique vegetation in the plains are almost destroyed. Excepting few places, even the wild life has been driven out. Similarly, degeneration of natural vegetation in the Western Ghats has reached a dangerous level and has badly affected the rate of destruction of flora. The wild life in many parts of the State has already been wiped out. The loss of habitat, continual separation and unlawful killing are some of the prime causes that have dwindled the population of wild life. At the same time, the forest areas of Western Ghats are converted into cardamom, coco, coffee and tea plantations. Similarly, the lush tropical forests are fast replacing the timber and woody forests. No doubt, the plantations are commercially viable but it is at the cost of wild life, bio-diversity and the habitat of both *fauna* and *flora*. East flowing rivers of the Western Ghats are tamed for the generation of electricity and it has led to the submergence of vast areas of forest. This has another ugly face too; such developmental activities demand rehabitation of refugees which leads to further reduction in the forest area. Exploitation of both renewable and non-renewable resources undoubtedly affects the environment. The impact of mining activities depends on the place, the type of mining and the amount of work carried out. Even the area around mining will be under great pressure due to the mining activities as well as the miners activities. In order to extend the long life to the resources and the conservation of environment, it is imperative that both the extention of mining and methods followed need to be standardized.

When the foreign objects (undesired) mix up with the resources and reduce their utility, then the resources are said to be polluted. When the waste water is mixed up with the natural water or fresh water, the water gets polluted. Both the industries and the human activity can pollute water. Especially, the industrial effluents containing organic, chemical and hazardous waste can lead to pollution. In order to control this type of pollution, evaluation has been made with respect to each industrial source. The Parliament has passed the Water Act (Prevention and Control) on 23rd March, 1974. The urban agglomeration is responsible for higher rate of water pollution. Before the sewage water is discharged, it is the duty of the agency responsible for processing to see that the job is carried out.

**Air Pollution**

The smoke issued by the industries carries both the suspended particles and poisonous gases. It is possible to control the smoke issued by the chimneys of the factories. By adopting means such as cyclone, scrubbers, electrostatic precipitators and other instruments, the level of pollution can be ascertained. The residual part which is mostly in the form of particles (particulates) can cause the sewage mud which needs to be dealt with. The Mangalore Super thermal unit is believed to generate about 20,000 tons of ash every day. In order to prevent the air pollution and to conserve the environment, the Centre has passed the Air Pollution Act (Prevention and Control) in 1999 and it is in force.

The noise pollution is classified under three categories. 1) Industrial noise 2) Traffic congestion 3) cultural activities. This is also covered under the Air Pollution Act (Pollution and Control) 1981.

Similar to water pollution, the noise pollution is also increasing at a rapid pace. That, our ears get used to higher level noise is a misconcept. But, it is not true. As person gets aged, the ears gradually but silently slow down their functions. In order to achieve the conservation of environment and promote development, the Centre has framed Environmental (Conservation) Act, which is in force since 23rd May, 1986.

The Department of Ecology and Environment was established by the State Government in March, 1981 in order to protect and conserve the environment, forest and other natural resources, keeping in view the overall development in these fields. The Act concerning the Environment (Conservation) came into being in November, 1986. Under this Act, public can question the officers engaged in pollution control, in the court. It is also the responsibility of the Department of Ecology and Environment to manage the hazardous chemicals and oil pollution in the sea. In addition, much attention has also been paid for the management of ports in the coastal areas (shore). The Karnataka State Pollution Control Board came into being in 1974. This Board is responsible for the implementation of some Acts connected with Water, Air and Environment. The Regional office of Karnataka State Pollution Control Board was established in Dakshina Kannada in 1991.

The Water (Prevention and Control of Pollution) Act, 1974, amended 1988

The Water (Prevention and Control of Pollution) Cess Act, 1977, amended 2003

The Air (Prevention and Control of Pollution) Act, 1981 amended 1987

The Environment (Protection) Act,. 1986, amended 1991

The Hazardous Wastes (Management and Handling) Rules, 1989, amended 2000, 2003

The Bio-Medical Waste (Management and Handling) Rules, 1998, amended 2003

The Municipal Solid Wastes (Management and Handling) Rules, 2000

The Batteries (Management and Handling) Rules, 2001

The Recycled Plastics Manufacture and Usage Rules, 1999 amended 2003

* * * * *