# Uttara Kannada District

## CHAPTER I

## GENERAL

The Uttara Kannada district (called North Kanara till recently) is one of the 19 districts in Karnataka. It is one of the two coastal districts of the State and stretches itself along the coastline of the Arabian Sea. The Western Ghats divide the district into two parts, and five of its taluks are in the coastal plain and six taluks are above the ghats, with parts of their territory stretching itself on the fringe of the Deccan Plateau. Uttara Kannada with its long silver white beaches, fertile green paddy fields, cool palm groves, picturesque river valleys and rich hilly forest tracts, is one of the most beautiful regions in India, endowed with the most captivating landscapes. Its waterfalls have attracted men from far and near. It is the richest forest districts of Karnataka, endowed with a bountiful variety of fauna and flora. Its coastline is dotted with some ports of inter-continental celebrity, humming with life by the movements of the hardy fisher folk and industrious traders.

### Origin of name

The district is known as Uttara Kannada, and there is also another district in the State, known as Dakshina Kannada, another strip of territory to the South of this district, along the sea coast. The Portuguese called this territory as Canara, derived from Karnataka. Portuguese historian Faria Y Souza called this region 'Charnataka' (Karnataka) "or Canara which is corrupted form made to shorten the name". The Portuguese and the English continued to use the same name. Earlier, Dutch visitor, Von Linschoten (1583) also calls the

people here as the 'Canarins'. The British named their new district as Canara when they acquired it from Tipu in 1799, and they divided it into two in 1800, and called northern part as North Kanara. In Kannada language, the districts were called Uttara (north) Kannada and Dakshina (south) Kannada. Of late, the State Government discontinued the English nomenclature and named the district as Uttara Kannada from 31.1.1977.

Traditionally, southern tip of the district, area till Bhatkal, was called Tuluva, and from there, the region till the Gangavali river, was called Haive or Haiga as testified by Buchanan and other earlier records, and the territory to the north of the Gangavali was part of Konkan. Regions around Gersoppa and Bhatkal were called Tuluva, being treated as parts of Tulunadu or Dakshina Kannada. Inscriptions of rulers of Haduvalli and Gersoppa repeatedly speak of their rule over "Haive, Tulu and Konkana". But in modern times, the name Uttara Kannada (or North Kanara) struck. In popular parlance the district is even referred to as 'Karwar' district.

**Location**

The district is located in the mid-western part of the State. It lies between 74° 9′ to 75° 10′ east longitude and 13° 55′ to 15° 31′ north latitude and extends over an area of 10,327 sq km which is 5.37 per cent of the total area of the State and ranks 10th in the State. It extends to about 328 km north south and about 160 km east west. Most of the district is hilly and thickly wooded. The coast stretches in a long nearly straight line to the south south east except the shallow Karwar and Belekeri bays. The district can be approached by land through all-weather roads and also sea during navigable period of the year. Though the coast is unbroken by deep or wide mouthed estuaries, it is varied and picturesque, with rocky islands and capes, stretches of plam-fringed sand beaches, low narrow mouths and rough bluffs and headlands. The deep winding valleys, waving wooded hills and wild background of high peaks stretch behind the coastline boundaries.

The district which is a long and narrow strip of territory is surrounded by Belgaum district and Goa territory in the north, Dharwad district in the east, Dakshina Kannada and Shimoga districts in the south and the Arabian sea in the west. There is an extent of only 10 km of plain land in the south and it is here that the southern boundary of this district and the nothern boundary of the Dakshina Kannada district meet.

## Area and population

The area of the district was 10,291 sq km and the population was 10,72,034 in 1981 as per census report. An area of about 36 sq km was added to this in 1983. The Supa taluk is the biggest taluk with an area of 1,890.3 sq km and the Bhatkal taluk is the smallest taluk in the district with an area of 348.9 sq km in 1981. For administrative purposes the district has been divided into 11 taluks. There are 13 towns and 1,283 inhabited villages and 55 uninhabited villages in the district. The following table gives the area, population, number of villages and towns in each taluk as per 1981 census.

| *Taluk* | *Area sq km* | *Percentage to the district's area* | *Population 1981* | *Percentage* | *No. of towns* | *No. of inhabited villages* | *No. of uninhabited villages* |
|---|---|---|---|---|---|---|---|
| Ankola | 918.7 | 8.8 | 81,057 | 7.56 | 1 | 84 | 2 |
| Bhatkal | 348.9 | 2.5 | 96,896 | 9.04 | 1 | 63 | 1 |
| Haliyal | 847.4 | 8.2 | 1,32,552 | 12.36 | 3 | 112 | 21 |
| Honavar | 754.8 | 7.2 | 1,27,988 | 11.94 | 1 | 95 | 2 |
| Karwar | 732.1 | 7.1 | 1,25,635 | 11.72 | 1 | 54 | 4 |
| Kumta | 582.0 | 5.9 | 1,17,325 | 10.94 | 1 | 112 | 7 |
| Mundgod | 668.1 | 6.3 | 58,745 | 5.50 | 1 | 79 | 12 |
| Siddapur | 859.3 | 8.3 | 84,525 | 7.88 | 1 | 194 | 2 |
| Sirsi | 1,320.1 | 12.7 | 1,35,107 | 12.60 | 1 | 226 | 1 |
| Supa | 1,890.3* | 18.4 | 52,215 | 4.87 | 1 | 137 | 3 |
| Yellapur | 1,301.1 | 12.6 | 59,989 | 5.59 | 1 | 127 | — |
| Total | **10,291.0 | 100.0 | 10,72,034 | 100.00 | 13 | 1,283 | 55 |

* Plus about 36 sq km transferred from Belgaum district in 1983. This has to be added to the total and the total area is 10,327.

** The total area of the district given here does not tally with the taluk-wise figures as the latter was supplied by State Survey Department and the former by the Survey of India, and they use separate methods for measurement.

## History of the District as an Administrative Unit

Uttara Kannada was subjected to the rule of the Shatavahanas from the beginning of the Christian era. Later, the feudatories of the Shatavahanas, the Chutus started ruling from Banavasi (Sirsi tq). For some time, the area appears to have been subjected to the Pallavas of Kanchi and the northern parts of the district were subjected to the rule of the Bhojas of Chandore in Goa. By the middle of the 4th century A.D., the Kadambas of Banavasi started ruling over the whole district. The feudatories of the Kadambas, the Kekayas

administered some regions in the district from Haigunda (Honavar tq). The Chalukyas of Badami took the whole district from Kadambas from the sixth century and a branch of the Pallavas ruled over parts of Uttara Kannada as feudatories of the Chalukyas. Southern tracts were under the Alupas. Later, the district came under the control of the Rasthrakutas of Malkhed who were successors of Chalukyas of Badami as the imperial power of Karnataka, and a major part of the district was under the province Banavasi–12,000 of the Rashtrakutas. In the days of the Chalukyas of Kalyana, parts of the district were in the province Banavasi–12,000. In addition, Haive–500, Konkana–700, Halasi–12,000 and Hanagal–500 were some administrative units into which parts of the district were included. The Kadambas of Hanagal and the Kadambas of Goa administered parts of the district (being contemporaries), under the Chalukyas. There was also a minor feudatory family of the Kadambas of Chandavar, earlier ruling from Honavar and later from Chandavar, administering parts of the modern Honavar and Kumta taluk regions. From the close of the 13th century, the Saluvas of Gersoppa started their rule over the southern coastal taluks, and during the fifteenth century, there was a split in the family and the Saluvas of Haduvalli (Bhatkal tq) started ruling over the coastal regions to the south of the Venktapur river. By then, Vijayanagara had secured control over the district after a short period of Hoysala domination over parts of the district. The Alupas from Dakshina Kannada also had their sway over the southern coastal patch for sometime prior to Vijayanagara rule. The district also saw some wars between the Hoysalas and the Seunas (Yadavas). Vijayanagara posted a governor at Honavar. In addition to the Saluvas of Gersoppa and Haduvalli, there were other feudatories of Vijayanagar, the rulers of Bilgi and Sonda, and of these the prince of Sonda had considerable territory under him, to the north of the Gangavali and in the up-ghat region. The Sonda ruler had to later acknowledge the supremacy of the Adilshahis of Bijapur and the Marathas in succession. During the later half of the 16th century, the Keladi rulers were entrusted with responsibility of administering the district by the Vijayanagara empire. By the middle of the sixteenth century, Gersoppa was merged with Haduvalli, and this territory came to be occupied by Keladi in 1606. When Haider took over Keladi in 1763, he not only occupied the areas uuder Keladi in the district, but also subdued the rulers of Bilgi and Sonda. The ruler of Sonda took shelter in the Portuguese territory of Goa.

Thus the whole of the territory in the modern district came under Haider in 1764. After the fall of Tipu in 1799, the British formed the Canara district with regions in the former Kasargod taluk (now in Kerala), the present Dakshina Kannada (except the regions under Kodagu in those days) and the present Uttara Kannada. This was subjected to a single Collectorate, Sir Thomas Munro being appointed as the first Collector in 1799. Later, in November 1800, the district was divided into two divisions, and there were two separate Collectors for the northern and southren divisions. Honavar was the headquarters of the northern division. The present Uttara Kannada with the Kundapur taluk of Dakshina Kannada was in the northern division. In 1817, the district again came to have a common Collector. But in 1862, the district was once more divided, and Uttara Kannada with its present territories was transferred to the Bombay Presidency (15th April).

There were seven taluks in North Kanara between 1800 and 1817, namely, Kundapur, Honavar (with Haldipur as hq.) and Ankola below the ghats and Bilgi, Banavasi, Sonda (with Sirsi as hq.) and Supa (with Yellapur as hq.). Banavasi was later merged with Sonda, perhaps in 1817 (the date is not definite). Supa taluk was divided into two in 1857, Yellapur and Supa, and latter had Haliyal as its headquarters. Sadashivgad was created as a sub-taluk in 1853, and this was later converted into Karwar taluk under Bombay administration (the date is not available; perhaps in 1862). In 1859, Bilgi was merged with Sonda taluk and the new taluk was named Sirsi Taluk. Thus, before the transfer of the district to Bombay administration, there were five taluks in Uttara Kannada, namely, Supa, Sirsi, Yellapur, Honavar and Ankola, and Sadashivgad (later Karwar taluk) was a sub-taluk. Sometime in between (in 1862 ?) Karwar, Kumta, Siddapur and Haliyal taluks were created and Supa and Ankola were made mahals. In 1880, Ankola mahal was again elevated to the status of a taluk. There were eight taluks in 1880, namely, Honavar, Ankola, Supa (Haliyal), Yellapur, Sirsi, Siddapur, Kumta and Karwar and three pethas, *viz.* Supa, Mundgod and Bhatkal. In 1908, Supa taluk was renamed as Haliyal taluk. Mundgod petha was elevated as a taluk in 1948 and Bhatkal and Supa pethas in 1960. Till 1955, there had been only two sub-divisions, Karwar and Kumta, and after that a third sub-division, Sirsi was created. On the 10th of January 1983, certain territories (about 36 sq km) from Khanapur taluk in Belgaum district were transferred to the Supa taluk of Uttara Kannada and a new village, Ramnagar was created. This was with a view to

rehabilitate the displaced persons in the villages submerged under the Kali Project. As Supa town was submerged, the taluk headquarters was shifted to Joida.

The district, at present, has 11 taluks, divided into three sub-divisions as shown below. Karwar sub-division having the taluks of Karwar, Haliyal and Supa (total area 3,469.8 sq. km.), Kumta sub-division having Kumta, Honavar, Bhatkal and Ankola taluks (area 2,604.4 sq. km.) and Sirsi sub-division with the taluks of Sirsi, Siddapur, Mundgod and Yellapur (4,148.6 sq. km.).

There are 25 hoblis or revenue circles in the district as mentioned below in 1981.

| *Sl. No.* | *Taluk* | *No. of Hoblis (Revenue Circls)* | *Name of hoblis* |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 1. | Ankola | 4 | 1) Ankola (21)*<br>2) Balale (25)<br>3) Belekeri (20)<br>4) Bhasgod (20) |
| 2. | Bhatkal | 2 | 1) Mavalli (10)<br>2) Susgadi (54) |
| 3. | Haliyal | 4 | 1) Haliyal (25)<br>2) Murkwad (29)<br>3) Sambrani (22)<br>4) Dandeli (57) |
| 4. | Honavar | 3 | 1) Honavar (24)<br>2) Manki (35)<br>3) Mavinkurve (38) |
| 5. | Karwar | 4 | 1) Baad (6)<br>2) Ghadsai (21)<br>3) Kinnar (14)<br>4) Savantwada (17) |
| 6. | Kumta | 4 | 1) Gokarn (21)<br>2) Kujalli (46)<br>3) Kumta (10)<br>4) Mirjan (42) |
| 7. | Mundgod | 2 | 1) Mundgod (38)<br>2) Pala (53) |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| 8. | Siddapur | 3 | 1) Kodkani (71)<br>2) Kondli (45)<br>3) Umbalmane (80) |
| 9. | Sirsi | 4 | 1) Banavasi (72)<br>2) Hulekal (55)<br>3) Sampkhand (54)<br>4) Sirsi (46) |
| 10. | Supa | 3 | 1) Castle Rock (37)<br>2) Kumbarwada (42)<br>3) Supa (61) |
| 11. | Yellapur | 2 | 1) Manchikeri (76)<br>2) Yellapur (51) |

* Figures given in brackets indicate number of villages in each circle.

Total number of circles 35.

Total number of villages 1,338.

## TOPOGRAPHY

The district is hilly and thickly wooded in most of the parts. Its major part is essentially highland, the lowland being restricted to pockets along the courses of rivers. A somewhat broken and irregular Sahyadri range of central hills with an average height of 700 meters divides the district into two parts, the uplands or the regions above the ghat with an area of nearly 7,770 sq km, is 600 to 700 meters above sea level and the low lands covering about 3,370 sq km. Except the shallow Karwar and Belekeri bays in the north, the 144 km of the Uttara Kannada coast stretch in a long nearly straight line to the south south east. Though unbroken by deep bays or wide-mouthed estuaries, the coast is varied and picturesque with rocky islands and rocky capes, stretches of palm-fringed sand beach, low narrow river mouths and rough bluffs and headlands. There stretch rich winding valleys, waving woody hills and a wild background of high peaks behind the changing coast line. The district has three main and distinctive regions : the coastlands, the Sahyadrian interior and the eastern margin where the tableland begins. Relief and climate have introduced these regional differences. The coast lands are the best developed areas with a high degree of economic development and a high density of population. It is in this region the taluks of Karwar, Ankola, Kumta, Honavar and Bhatkal

are situated. The Sahyadrian region is mostly forested, and only the roads crossing the ghats sustain human activity, though the valleys have special significance as belts of spice and areca gardens for which the district has been famous since antiquity. The eastern margin is an undulating land, partly under forest and partly cleared up for agriculture. It is a transitional zone between the forests proper and the cultivated uplands of the Dharwad district. Parts of Haliyal, Yellapur and Mundgod taluks are plain country, comparable with the western half of Dharwad district. Though the main geographical divisions of Uttara Kannada and its major geographical characteristics have been described above there is an immense variety of detail in each region.

The coastal tract begins in the north from the village Majali on the Goa border and continues in the south upto the Dakshina Kannada boundary a little beyond the port of Bhatkal, till Gorte village. It varies in width from about 16 to 48 km depending upon the nature of estuaries and the intermediate tableland. Contrary to the general impression this is not a 'plain' but a succession of estuarine plains connected by narrow coastal strips. Thus the tract in its northern extremity is a narrow coastal strip with the large fishing village of Majali, a focus of human activity. A little to its south, overlooking the mouth of the Kali lies the ancient fort of Sadashivgad and its minor counterpart the Chitakula both standing on lateritic bluffs. Sadashivgad was an important hill fort as it commanded the entrance to the Kali estuary and its port Karwar, situated on the other bank of the river. The river is tidal upto about 33 km upstream. At the upper navigable limit is situated the old settlement of Kadra, now a straggling village, but till the last century a place of importance, where goods were unloaded for their overland journey across the ghats, on pack animals. Now, metalled roads connect the Karwar port with Belgaum and Dharwad regions *via* the Anshi pass. However, local trade is still carried on by this waterway by means of small sailing craft and by motor launches which specialise in passenger traffic. Between Kadra and its junction with the sea, the river widens out, and on either side, it is fringed with extensive mangrove swamps. Beyond the swamps lie wide patches of flat lands mainly given to rice, though lines of coconut trees form a prominent feature of the landscape. Cultivation is intensive and both the sweet lands and saline stretches locally known as *gazni* are given to rice. Only one crop of rice or sugar cane is raised during the year, and rice is followed by pulses and occasionally by vegetables wherever there is some well

irrigation. Large nucleated villages form another important element in the landscape. These generally prefer a junctional site between rice lands and the lateritic hills which are usually covered with poor scrub and given to rough grazing. Halga, on the northern bank, and Kadwad, on the southern, are such typical villages. Agriculture is evidently the main occupation of the people, but it cannot engage all the population, as most of the area is hilly or under forest. In the absence of a substantial support from local industry or commerce, a good part of the rural population migrates to the ghats in the winter for employment in the governmental projects in the forests and some of it in search of employment to the Bombay metropolis. Fisheries have assumed great importance, and much of it consists of both the sea and inland fisheries : mullusos, oysters and prawns. Soon after the tides, the shallow bed in the estuary is a scene of frequent activity for the local population in search of sea-food. Slightly beyond the rice lands, the topography on either side of the river valleys becomes more varied and irregular because of the lateritic hills and granitic bosses. Laterite occurs extensively, both in the form of low hills as near Kadwad and Siddapur and also as low plateaus which present a barren appearance. The lateritic areas are useful in local economy for one purpose only : they supply good building stone. Evidence of the destruction of forests in the past and the consequent impoverishment of good land, and its reduction to a lateritic state, is abundant. These extensive barren surfaces and the severely limited good quality land bring at once the contrast between the poverty of the natural resources of the Kali basin and the heavy pressure of population that it carries. The port of Karwar (population 47,210) controlled the somewhat once sluggish economic activity of the basin. The Karwar–Hubli road, the ore that it brings to the port and the recently built Kali bridge have made the town active and humming. Kadwad, about eight km in the interior, was the original site of Karwar. With the development of Karwar in the days of the East India Company, the town migrated seawards and occupied a position on the Baad plain, nestling below the heights of the Gudehalli range. While the town is situated in the interior, the administrative element fringes all along the beach. Towards the Kali mouth, a narrow road connected the town with Kodibag which has now become a part of Karwar, and Karwar appears even to extend itself to Sadashivgad and Chitakula after the completion of the Kali bridge. To the south, the town of Karwar extends along the Baitkol cove, which is natural harbour giving good anchorages to small steamers.

It extends its urban influence upto the fishing village situated at the head of the cove. The newly founded chemical factory at Binaga has given added importance to this region. Along the wharfs of the Baithkol runs the Karwar-Ankola road, which when it crosses the Guddehalli–Baithkol range in a small Ghat, leaves Karwar and its urban extensions abruptly, and enters the casuarina landscape of the Belekeri bay. It separates the Kali basin from that of the Gangavali.

About 20 km to the south of Karwar lies the small town of Ankola (population 12,153) situated on a small creek. It has a limited importance mainly because it is situated well away from the river basin and lies between two larger towns : Karwar and Kumta. The Gangavali basin is almost a counterpart of the Kali basin from the point of view of economic development and density of population. It is a smaller valley, and the lateritic plateaus seem to dominate the entire landscape. Villages are situated along the river banks and also along the coastline. Gokarn (population 11,085), situated on a lateritic bluff on the coast, is a famous religious centre. The Sanikatta salt flats hold economic importance since it is the largest salt producing unit in this part.

A narrow range of hills separates the Gangavali basin from that of the Aghanashini further south. Like the Kali, the Aghanashini river is navigable upstream for a distance of nearly over 30 km. At the navigale end is situated a small township–Uppinapattana. The river is however, practically enclosed by an advancing sand bar and is much silted up. Mirjan, on its northern bank, was a famous port in the fourteenth and fifteenth centuries, but now is a small village. Thus Kumta which is situated, not at the mouth of the Gangavali, but on a creek nearby, rose to importance. It became a famous port exporting spices and products of the plateau, notably cotton. Although Kumta, with the rise of Bombay, has long since ceased to be an important port, the Dharwad cotton which was exported *via* Kumta is still known as Kumta cotton.

South of the Aghanashini basin, the coastline is straight and sandy. Inside, the alluvial flat lands adjoining stream courses are severely restricted by the lateritic plateaus of Honavar and Shirali. Dhareshwar standing on a lateritic bluff has an ancient shrine. The sandy coastline and coastal dunes have considerably influenced local agriculture. Along the coast, the casuarina plantations try to arrest the

migrations of the sand inwards on the fertile alluvial land. Areas cleared of sand support a poor rice economy. Dumps of cleared sand strengthen the sand dune landscape and locally these are known as 'Chitte' lands. Good rice land is restricted to small belts adjoining the bases of the lateritic plateaus. Towards the estuaries, swamps induce *gazni* (saline land) cultivation. Haldipur is a large village. But economic importance gravitates round Honavar and the banks of the Sharavati river. Honavar (population 15,124) is a port of great antiquity. It specialised in exporting the products of the Ghats, especially pepper. Of all the rivers of Uttara Kannada, the Sharavati forms the best waterways from the ancient town of Gersoppa to Honavar. In historical times, goods used to be brought down the ghats on pack animals to Gersoppa, and thence by sail to Honavar for further export. Nagarbastikeri in the vicinity of Gersoppa was a famous seat of Jaina kings, but it is now completely overrun by jungle. On both sides of the Sharavati river, there is luxuriant growth of tropical forests; the immediate banks of the river are dotted with flourishing villages with rich rice fields, where double-cropping is often practised, and belts of coconut plantations. In spite of the silted-up harbour and the treacherous sand bar at the Sharavati mouth, there is a good deal of sailing traffic. With the completion of the Sharavati bridge and the fisheries harbour, Honavar has grown in importance.

South of the Sharavati basin, laterite assumes a more forbidding appearance, and agricultural land is restricted to a small strip along the coast. Except in the environs of Mavalli and Shirali which form good agricultural patches, the country is barren and monotonous due to laterite. Bhatkal situated at the southern end of the district was once an important port. It has one cultural feature of distinction: it is the home of the Navayat Muslims, an Arabian race with marked physical features. They constitute the major elements in Bhatkal's population, and they have retained their traditional occupation of trade with Persian Gulf and Africa, and that accounts for their general prosperity. The West Coast high way has given a blow to the growth of Bhatkal harbour.

**The Sahyadrian Tract and the Eastern Margins**

Beyond the low level plateaus of the coastal regions, lies the Malenadu (hill country) of the North Karnataka. This is physically an extension of the Sahyadrian main range from Maharashtra in

the north, and it continues to the south in the districts of Shimoga and Hassan. From Chandgad border in the north to the border of the Siddapur taluk in the south, it has a length of about 110 km. As in the Maharashtra region, the Sahyadris rise in a series of steps from the coastal lowlands, but the scarp face is not so bold as in the districts of Kolhapur and Ratnagiri. In fact the geological composition gives a greater variety and a definite 'break' which accounts for a more favourable rainfall in the Dharwad district. The 'rainshadow' area is not so sharp and immediate in northern Karnataka as it is in Maharastra. Another interesting feature is the eastward shift of the main watershed : the Kali and the Sharavati rivers drain a large portion of the plateau area and through their captured courses divert these waters to the Arabian Sea. Faulted topography is typical of the western Sahyadris. This has given rise to waterfalls and rapids of which the more noteworthy are the Jog– already harnessed for electricity. Lushington, Magod, Burde Jog and Lalguli, these and other waterfalls are the potential sources of power.

The central portion of the Sahyadris mainly consists of the crest line ridges and upper reaches of rivers developing more mature valley forms before they plunge into deeper chasms and gorges to join the coastal levels. The eastern margin has a rounded topography and broader valley features which mark the transition between the main Sahyadrian landscape and the drier plateau of the upghat regions. This three fold division of the Sahyadrian region persists in its features of vegetation and is well reflected in its regional economy. In the western spurs which abut the low-level laterite plateaus, the red soils favour a stunted vegetation, but in the higher terraces, vegetation improves in both density and quality to an astonishing degree. Here, one comes across the best strands of teak trees, and stately patches of tall evergreen trees in hollows wherever there is copious under-ground water supply to supplement the seasonal downpour. In the central belt, there is a marked contract between the hill tops and the backbone of ridges which support a thinner vegetal cover and the river valleys where luxuriant deciduous growth is to be found. Evergreen strands are a frequent feature, but the river banks almost invariably carry the thickets of bamboo growth. In the eastern part of the Sahyadrian region, increasing dryness is the keynote in the landscape. It is a mallowed landscape with poorer types of forests having a parkland scenery : these are, in the forester's jargon, the 'teak pole' forests. Valleys

open out towards the plateau margin of the Uttara Kannda district. Increasing cultivation and receding forest cover is a recurring pattern in the landscape.

The Sahyadrian region is, on the whole, thinly populated, and for well over four decades, it was recording a distressing decline which seems to have been arrested only during the recent decade. The population pattern, however, reflects both its past and present. On the edge of the region are situated the ancient capitals of Nagarbastikeri and Gersoppa on the west, and Sonda and Banavasi on the east. Though historically famous, these are now straggling settlements. In other parts, population closely follows two belts of economic advantage: the cultivable valley courses and the ghat routes which connect the upghat area with the coastal lowlands. Cultivation is generally limited to the tributary beds which have wider and mature valleys. Crop production mainly consists of rice, sugarcane, ragi and spices, that important group of crops for which this district has been famous ever since the days of early Hindu civilization. Valleys round about Yellapur, Sirsi and Siddapur are famous for areca and spice gardens.

Rich red soil, perennial water supply through streams, leaf manure from adjoining evergreen forests, and a uniform moist heat throughout the year, are its major needs ; but equally important is the hereditary gardener who belongs to the community of Havyak Brahmanas known for their skill and industry. Here, it may be stated that the crops of pepper, betelnut, cardamom and bananas which these gardens produce are the major economic assets of the Sahyadrian region. The valleys which favour the development of gardens are marked by a string of farmsteads having a characteristic lay out. The neighbouring towns are its commercial outlets. Yellapur, Sirsi and Siddapur do a flourishing trade in these products. In the course of the last decade, Mundgod area is growing into importance as a rice bowl due to the minor irrigation schemes taken up. The Tibetan settlements in the taluk has added one more racial strain to the district which is an "anthropological gallery".

In the forested parts, the main activity is that of the Government Forest Department. Most of the monsoonal cover, once upon a time ruthlessly exploited, receives major attention for conservation of plant life and now with the development of sanctuaries, animal life. "Working Plans" ensure better and more systematic exploitation.

In these parts, the Forest Department is the major employer of labour. It gives the migrant labour from the lowlands seasonal employment during winter when felling and clearing of selected areas is undertaken. Most of the forest products is routed out by the well constructed roads of the Department and is floated down the rivers, mainly the Kali, or is taken to the Dandeli rail-head where it is dressed into logs and transported. Besides teak and other useful timber, the forests supply fuel wood, wood for charcoal, bamboo and products such as myrabolans. Dandeli has saw mills as well as plywood factory and strawboard and paper mill. The development of the Sharavati and Kali power systems in recent years has opened out great economic prospects to Sahyadrian region. Better exploitation of its minerals has been possible. This supports considerable population of migratory labour. The forests of this region, as has been noted earlier, provide leaf manure to spice gardens. In the past, the practice of shifting cultivation *kumri* was quite common with the local nomadic communities, but it has now declined, being prohibited by Government as a wasteful practice.

Human interest in the Sahyadrian regions could be classified into three groups: the migratory element, some of which is very backward and in a state of wandering throughout as for instance the Siddis of the negroid stock originally hailing from Africa, and the more skilful farm labour from the coastlands who visit the forests in search of employment during the winter season; the farming communities of the spice gardens and the agricultural belts devoted to rice and sugarcane; and the urban communities in the towns. While the first type usually prefers temporary hutments in the cleared up tracts, the second adheres to settled sites on the valley flanks. But ghat roads are getting increasingly attractive even with the rural population. Several villages dot the main ghat routes of the Anshi, Devimane, Arebail and Mavinagundi passes. But where such routes meet in a natural gap, the villages there have grown into towns. Such are the towns of Haliyal, Yellapur, Sirsi and Siddapur. Haliyal at the northern extremity specializes in timber trade, though rice is by no means a negligible article of trade. Yellapur has a rich hinterland of teak and spices. Sirsi is a historically famous town for its arecanut and cardamom exports. Siddapur is a counterpart of Haliyal in the south, specialising in teak and spices. Sirsi and Siddapur were well known for their wood and ivory craft, which unfortunately are declining. All these gap towns have had an interesting change in fortune. During historical times, they were

flourishing centres as halting places for the caravans from the upghat to the coastlands. With the improvement of communications, especially the motor bus, the goods and passenger traffic no longer felt the need to have halting places *en route*. These towns accordingly suffered a decline. This decay was all the more hastened by the rise in the incidence of malaria during the last five decades. But DDT has accomplished encouraging results, and the region appears to be practically free from this danger. But by and large, the new industrial development initiated by the Sharavati power system promises to bring in greater and more stable prosperity, and what was once regarded as a thinly populated unhealthy area has of late become a smiling landscape of well managed forests, interesting animal sanctuaries, flourishing farms producing sugarcane as well as spices, large scale industries based on local mineral and forest products, and revived handicrafts brought into modern tune through electric power, state aid and education in modern markets to the skilled craftsmen.

Power generation activity has helped the opening up of many forest tracts. Dandeli has risen to be a notable industrial centre. Ambikanagar has grown up as a new township. Though Supa town has been submerged under the Kali power project, Ganeshgudi and Joida in the taluk are slowly emerging as new towns. The Bedti project in Yellapur taluk has similarly given rise to lot of activity. New roads and increased communication facilities have ended the isolation of many forest tracts. Wood-based industries have helped creation of more forest roads.

**Hills**

The district is almost covered with hills which may be arranged into three groups, *viz.*, the bare flat-topped blocks of laterite from 60 to 90 meters high which roughen the coast belt; the westerly spurs from the central hills from 300 to 600 meter high stretch rugged and woody to the coast; and the main range and eastern spurs of the central hills. The west face of the Sahyadris in Uttara Kannada unlike the Sahyadris in Konkan does not rise in a single scarp, but is approached by numerous spurs and lower ridges. It is not much lower as it averages about 600 mt and rises in places to 900 meters, but it is no longer the even wall-like crest of trap, unbroken by a river channel. In the district granite takes the place of trap, and through the rugged granite cliffs, large inland rivers force their way to the sea.

Locally the hills in the district are considered a break between two main ranges, the Sahyadris to the north which end at the Kalinadi near Karwar and the Malabar Hills or Malaya Parvata which stretches south from the Sharavati river. Of the eleven peaks in the Sahyadris of the district, varying in height from 458 to 915 meters, the Gudehalli and Shirvegudda are in Karwar taluk, the Bhedasgaon in Mundgod, the Menshigudda in Sirsi, the Hukali, Rakshasa and Mavinagudda in Siddapur, and the Motigudda, Kaltigudda, Darshanigudda and Nishanigudda are respectively in Ankola, Kumta, Supa and Yellapur taluks. The highest of these hills, the Darshanigudda in Supa, about 915 meters above the sea, rises near the meeting of the boundaries of Goa and Belgaum with Uttara Kannada. The Gudehalli in Karwar, 549 meters above the sea and the Kaltigudda in Kumta, about 763 meters high, are health resorts; and the Nishanigudda a small peak in Yellapur, 458 meters above the sea and Bhedasgaon in Mundgod about 765 metres above the sea are Trigonometrical Survey Stations. The following statement gives the heights and geographical positions of the eleven highest hills.

**Statement showing the Taluk-wise latitude, longitude, elevation and Rainfall, Rain Guage Stations and Annual Normal of the Uttara Kannada District**

| Sl. No. | Taluk | Location | | | | Elevation (Mtrs.) | Rainfall | |
|---|---|---|---|---|---|---|---|---|
| | | Latitude | | Longitude | | | No. of Rainguage Stations | Annual Normal (mm.) |
| | | From | To | From | To | | | |
| 1. | Ankola | 74°.18′ | 74°.43′ | 14°.29′ | 14°.48′ | 450—800<br>750—7300 | 2 | 3926.6 |
| 2. | Bhatkal | 74°.31′ | 74°.45′ | 13°.54′ | 14°.08′ | 450—800 | 1 | 3854.3 |
| 3. | Haliyal | 74°.33′ | 74°.56′ | 15°.04′ | 15°.24′ | 450—800 | 5 | 1267.7 |
| 4. | Honavar | 74°.27′ | 74°.48′ | 14°.07′ | 14°.21′ | 450—800<br>750—7300 | 3 | 3501.4 |
| 5. | Karwar | 74°.08′ | 74°.34′ | 14°.42′ | 15°.02′ | 450—800<br>750—7300 | 6 | 3010.9 |
| 6. | Kumta | 74°.24′ | 74°.45′ | 14°.17′ | 14°.35′ | 450—800<br>750—7300 | 3 | 3726.6 |
| 7. | Mundgod | 74°.52′ | 75°.07′ | 14°.42′ | 15°.04′ | 450—800 | 6 | 1155.2 |
| 8. | Siddapur | 74°.42′ | 75°.01′ | 14°.11′ | 14°.31′ | 450—800 | 3 | 2936.6 |
| 9. | Sirsi | 74°.35′ | 78°.05′ | 14°.27′ | 14°.48′ | 450—800<br>750—7300 | 15 | 2503.2 |
| 10. | Supa | 74°.17′ | 74°.36′ | 14°.58′ | 15°.32′ | 450—800 | 14 | 2331.8 |
| 11. | Yellapur | 74°.31′ | 74°.56′ | 14°.43′ | 15°.09′ | 450—800 | 9 | 2511.1 |

*Sources* : Chief Engineer, Minor Irrigation Department, Bangalore.

## RIVERS

The larger rivers in the district, unlike the Konkan rivers, drain a large area of the uplands, east of the Sahyadri scarp. There are four leading rivers, the Kalinadi in the north, the Bedti or Gangavali about 32 km south, the Aghanashini or Tadri rising far to the south but falling into the sea only about six miles south of Gangavali, and the Sharavati or Gersoppa river, about 24 km south of the Tadri when it reaches the foot of the hills and becomes a tidal creek. Each of these rivers takes a second name from the chief town of on its banks. Thus the Kalinadi (Karihole) is locally known also as the Sadashivagad river, the Bedti the Gangavali river, the Aganashini the Tadri river, and the Sharavati the Gersoppa river. In the hills the channels of all the rivers are broad and rocky, showing the force of their monsoon torrents. At the foot of the hills, they are broad back-waters, the mouths stopped by bars of sand, which during heavy rains block the passage of the flood waters till they overflow the lowlands along their banks.

### The Kalinadi

The Kalinadi or Sadashivagad river originates near the village Diggi in Supa taluk, and is known as Dagi in its upper reaches. It is also known as Karihole. Its total length is 184 km. After winding in the south-eastern course for about 55 km, it takes a sharp turn to the south-west near the village Devikop. Beyond this point, it flows 66 km till the village Kadra. From here, it takes an east-west course and falls into the sea, three km north of Karwar. Of the two branches of the main stream, the Pandri or Ujli originates in the extreme north. The two streams join at Supa, about 32 km south-east of the source of the Pandri which is the larger stream. The streams receive the names from their appearance before they join at Supa. The banks of the Kalinadi above the point of junction are comparatively high and those of the Pandri are sloping. Hence, a look from a hillock which overhangs the river at the junction, the Kalinadi has a darker appearance and the Pandri a brighter appearance. From Supa, under the name Kali, it flows about 32 km south-east till about 12 km north of Yellapur where it is joined on the left bank by the Tattihalia, a stream with a windirg southernly course of about 56 km from the north of Haliyal. Near the confluence is the famous stepped Lalguli falls. Below its meeting with the Tattihalla, the Kali flows about 16 km west, where it is joined on the right by the Nuji which has had a rough south-easterly course of about 40 km from the Goa

frontier. The Kaneri and the Vaki are its two other tributaries. The Kaneri originating near the village Kundal in Supa taluk, and flowing mostly in Supa taluk, taking a south-east direction *via* Zalawali takes a north-eastern course from the south of Ambolli. Again it takes south-eastern direction and joins the Kali to the south of Sannamaga village. The Vaki, starting from near Nuji in the same taluk, takes a south-eastern direction and joins the Kali near Tulasgeri in the same taluk. Below the Kadra, for about 32 km, the Kali river is navigable by boats of a tonne and a half to five tonnes. The mouth of the river has a depth of about 4.5 meters at low water and 6.5 meters at high water. Near Kadra, the river is joined by the Thananala, originating from Goa.

**The Bedti or Gangavali**

The Bedti is formed by the confluence of two streams one by name Shalmala which has its origin near Someshwara temple, south of Dharwad and the other, the Bedti stream, originating in Hubli taluk. These two join near Kalghatgi (Dharwad dt) and then, it is named the Bedti and flows for about 25 km westwards and enters the district, and after a fairly straight south-westerly course of about 32 km, falls into the sea about 32 km south of the Kalinadi. The united stream passes about eight km south-east to the border of Uttara Kannada and in the district when it flows for a length of 96 km (out of its total length of 161 km), the river receives no notable major feeder. At the village of Magod, about 40 km from where it enters the district, the Bedti dashes over the western face of the Sahyadris in a cataract known as the Magod Falls. The Sonda River, one of its tributaries joins it beyond Harigadde village. About 15 km further, near the village Gundbale, it meets the tide and for the remaining 24 km of its course, it is navigable to boats of one to five tonnes.

**The Aghanashini or Tadri**

The Aghanashini or Tadri (total length 121 km) river rises at Manjguni near Sirsi and after a winding westerly course of about 70 km falls into the sea about 10 km south of the Gangavali river. It receives no feeder of any size throughout its course. It has two sources, the Bakurhole rising in a pond at Manjguni about 25 km west of Sirsi and the Donihalla whose source is close to Sirsi. The streams meet near Mutthalli about 16 km south of Sirsi. Under the name of Donihalla it flows about 24 km south of Sirsi with a winding

westerly course to the western face of the Sahyadris. Five km from Heggarne, in Siddapur taluk, at Unchalli, it leaps in what is known as the Lushington Falls. Further down, six km from Bilgi, near Hemanbail village, it leaps low again and this is known as the Burde Jog. At Uppinapattana, the Donihalla meets the tide. For the remaining 24 km during which it is navigable to craft of four to nine tonnes, the river is known either as the Tadri or as the Aghanashini river from two towns on the right and left banks of its mouth. From Uppinapattana it winds south-west and then north-west together about 13 km to Mirjan an old seat of trade. From Mirjan, it forms a lagoon or backwater which runs parallel to the coast, about 13 km long and 2 to 6 km broad, cut off from the sea by a belt of land with a nearly uniform breadth of about a mile. The outlet to the sea is about five km from the north end of the lagoon. It is between two hills, one 91 and other 122 meters high and has a depth of about five meters at high tide. Inside, there is as much as eight meters of water so near the shore that vessels of 20 tonnes can be laden from the bank. Unfortunately, the entrance is narrow, nearly blocked by a rocky reef, and not to be attempted during the south-west monsoon.

**The Sharavati**

The Sharavati or Gersoppa or Banaganga river has its origin at Ambutirtha in Tirthahalli taluk of Shimoga District. After a northerly course of about 64 km from Nagar, it forms the south-east boundary of Uttara Kannada for about 13 km and then passes about 32 km west or 128 km in all to join the sea at Honavar. Soon after touching the border of Uttara Kannada, the river in four different bodies of water among magnificent forests and wild granite cliffs, dashes over the west face of the Sahyadris, at a height of 252 meters into a pool 117 meters deep. This is the famous Jog falls. About 30 km west, it reaches the ancient capital of Gersoppa. During the remaining 27 km to the coast, the river flows between richly wooded banks fringed with mangrove bushes, a broad tidal estuary, brackish in the dry weather but during the rains sweet even close to its mouth. About eight km from its mouth, the river widens to a lagoon about three km broad, containing a few islands, the longest being Mavinakurve which is more than five km long with a large area of paddy land and studded with mango and coconut. For about two km from the mouth, of the river has a breadth of about 1.5 km. At the mouth of it, again it narrows into a channel about 275

meters broad. Outside of it lies a formidable and changing sand bar. The island Pavinakurve at its mouth near Honavar has been completely washed off recently and the river has been depositing sand at Kasarkod on the left bank of its mouth.

**The Varada**

Besides the above four main rivers, there are many minor streams flowing in the district. Of the many, the Varada, tributary to the Tungabhadra river, originates in the north-east part of Shimoga district and flowing north and east, is an east flowing river in the district and passes through a corner of Uttara Kannada near the town of Banavasi, which stands on its northern or left bank and finally joins the Tungabhadra at Galaganath in the Haveri taluk of Dharwad district. Another east-flowing river in the district is Dharma, which originates at Islur, Sirsi taluk, from a tank. It passes through Mundgod taluk and joins the Varada in Dharwad dt. Its flow is 32 km in Uttara Kannada.

The other minor coastal streams are, beginning from the north, the Belekeri, the Ankola, the Kumta, the Badagani, the Venktapur and the Bhatkal (Sharabi) rivers. These are all tidal, from 91 meters to three km broad and at high water are navigable to small craft of one half to two tonnes from three to sixteen km inland.

*The Belekeri River* has deep water at all tides inside of the bar and is navigable for five km for canoes. Bamboos, timber and other local produce are shipped. It is limited only to Ankola taluk with two minor tributaries, joining it before the Shikliturli village on the north-eastern corner of the taluk. *The Ankola River* above the limit of navigation is known as the Sankadahole and during the last three km of its course is called the Ankola river after Ankola, chief town on its banks. *The Kumta River,* a small stream on which Kumta town stands, though navigable only at high tide carries the whole trade of the port to vessels that anchor in the sea about one km off its mouth. The bar is dangerous and can be crossed only by flat bottomed boats and light craft. *The Badagani River* rises to the north of the spur of the Sahyadris of which the peak of Kaltigudda is also at a high point. It receives the drainage of the extensive forest villages of Hadke, Sirur and Santgal and flows west and south, falling into the estuary of the Sharavati. It is navigable for light craft upto 20 to 24 km from the mouth. About 20 km from its mouth this river changes from west to south at a distance of about half a km

from the sea, and keeps this interval for the rest of its course. In the rainy season, it is liable to heavy floods which often swamp the low paddy lands lying between the river and the laterite plateau to the east which rises abruptly to 60 meters from the sandy plain. These floods are a problem in the local agriculture. An appreciable area is inundated by floods and rendered saline though some of it under the traditional skill of local farmer are worked as *gazni* lands. *The Venktapur River*, rising in the Sahyadris near the village of Kanti about 30 km north-east of Bhatkal, falls into the sea after a course of about 20 km near Venktapur. The river is navigable for the last five km of its course where it forms an estuary affording anchorage for small craft of five to ten tonnes. The Chitti and the Katagari are its two tributaries, joining it from the north. *The Bhatkal River* (Sharabi) rises in the Sahyadris, and, with a westerly course of 20 km passes the town of Bhatkal, about 5 km from its mouth, from which it is navigable at high water by boats of one-half to two tonnes. There is a difficult sand bar at the mouth but local craft drawing 2.4 meters of water can enter. *The Gorgaddehalla* is a small rivulet which originates from a tank at Garudamule and joins the sea at Belse in Ankola Taluk.

## GEOLOGY

The district consists of rock formation of Archaean complex, the oldest rock of the earth crust. Rocks of the Archaeozoic era occur over the whole of the district. They have not been submerged under the great lava flows known as the Deccan Traps which have overspread most of the Central India forming the great plateau with steep precipices. The district is characterised by a system of ridges and a plateau on the west descending rapidly to a rather narrow strip of low land covered by alluvium which with the abundant annual rainfall, supports cultivation. The low land appears to be the creation of a later period than the upghat regions. It emerged from the sea during the glacial and inter-glacial period due to the changes in sea level when addition of water from continental ice caps was removed. Sea has transgressed upto the level of the edges of the Ghats, submerging land upto an elevation of about 200 m. When the sea level retreated after long, it not only eroded the height of the present coastal region, but formed many sedimental platforms.

The Archaean formations are divisible into an older group of sediments and igulous viatrusives, all very highly metamorphosed,

which are classified as the Dharwar system and a younger group of plutonic intrusives termed the peninsular gneisses. Both the Dharwar and the peninsular gneisses are frequently overlain by a capping of laterite which is locally the source of iron and manganese ores and ochres.

In the western part of the district, nearly parallel to the coastline, there is a range of hills with several peaks over 700 m. high descending westwards gradually in broken country to the coast. This consists of a varied assemblage of granites and schists. These ridges separate the Sahyadris, consisting deccan traps and forming flat-topped plateau with steep western cliffs in the north, from the Western Ghats consisting of Dharwar schists in the South. Eastwards in the interior, the district is almost entirely hilly and consists of both the Dharwar and the peninsular gneisses, the latter frequently occupying the low ground. In this district the Dharwars are typically represented by chlorite-schists as opposed to the areas in Southern Karnataka where hornblende rocks predominate. The chloritic types are considered to be younger than the hornblende types. Other rock formations belonging to this system are quartzite, magnetic-quartzite, limonite-quartzite, senicite-quartz-schist, phyllite fine grained grey limestone, dolamite, epidiorite and other basic igneous rocks. The Dharwar rocks generally out crop as narrow lenses and shingers, elongated nearly NS enclosed in the intrusive peninsular gneisses which have invaded them after their folding. Most of the Dharwar rocks are highly plicated. Their folding is clearly seen in the lime-stones which are thought to be the youngest in the Dharwar sequences These limestones are well exposed as large, highly contorted masses in the Nagjhari valley, south of Kulgi and in the valley of the river Kalinadi below its confluence with the Nagjhari. Dolamite bands are known to occur in the westrern parts of the district.

The peninsular gneisses consist mostly of fine grained granite-gneisses outcropping in the lower levels of the central and southern parts of the district. The best exposures of these gneisses are near the southern boundary of the district where the Sharavati river plunges down a vertical precipice in the magnificent Jog Falls. They generally show a lower degree of metamorphism than the Dharwars, as they have been emplaced subsequent to the Dharwar folding. Usually there is great diversity of types amongst these rocks with frequent modifications caused by assimilation of disintegrated Xenocrysts of the Dharwar stopped out during intrusion. There are,

however, two main types of these rocks; one a granitrid, highly crystalline, massive type and the other a schistose, less crystalline, highly foliated, distinctly banded type, but each group includes a number of distinct variations. It is not moreover quite certain if all these granitic rocks belong to the peninsular gneisses or partly to the rocks of some of the other earlier or later periods of igneous intrusions of the Archaeozoic Era. These fine-grained gneisses and granites charactrise the lower levels of the district. Highly granitoid types are reported to occur to the north of the Dharwar outcrops in the neighbourhood of Shingargaon and Kudalgaon, but their precise age is unknown.

Pegmatites and quartz veins are also known to occur in this area. Some quartz crystals obtained from one of the quartz veins were found suitable for use in radio and allied instruments.

The Archaean granites and gneisses with their sparse bonds of Dharwars are capped by laterite at many places in the district. They are typical tropical rocks resulting from the alteration under tropical conditions of the basement rocks. They are found capping flat topped ridges and bluffs all along the coast of a hundred feet in thickness and occasionally show local enrichment of iron and manganese ores.

## MINERALS AND ORES

The district is rich in many minerals. Investigations have been conducted in the district by the Atomic Mineral Division of the Geological Survey of India and the State Department of Mines and Geology. Some investigations are yet to be completed. The economically important minerals available in the district are the iron ore, manganese ore, limestone, quartz, bauxite, limeshell, silica, sand and clays. The district is an important exploitation centre for iron and manganese ores and it is second only to Bellary district in the State in the production of these minerals.

### Iron Ore

Iron ore deposits are found in varying extents in the western half of the district, particularly in several places of Ankola, Honavar and Yellapur taluks. The ores are of different types, like haematite, limonite and litariferous iron ores. These deposits have been surveyed, mapped and prospected in detail by the Department of Mines and Geology of the State and the Geological Survey of India

has also conducted surveys in the district. These surveys have disclosed a reserve at 95.26 million tonnes of float and reef ore (about 58 to 65 per cent of Fe) in the district. In addition, there are several deposits of low to medium grade ores of content ranging from 44 to 54 per cent of Fe. The magnetite ore is of lesser importance and is also estimated to a reserve of 3.1 million tonnes as on 1-1-80 as per the National Inventory of the Indian Bureau of Mines. The location of the deposits and other available details of iron ore are described briefly here under.

*Apsarkonda area:* Iron ore occurs in the Apsarkonda area in Honavar taluk in bands, mostly on the western side of the ridge close to the sea. These deposits are closely associated with banded cherty and highly crumpled ferruginous quartzites, chloritic schists and other rock types, overlying the granitic gneisses. On the central and eastern side of a block in an area of 37.64 ha. of land forming an elevated ridge of about 125 m. above sea level, are seen rich bands and concentrated pockets of iron ore. The ore is mostly flaky, or fine grained lumpy haematite type, ranging in iron content from 62 to 67 per cent. The yield of deposit is estimated about 1.5 million tonnes containing haemetitic iron ore of over 58 per cent Fe.

*Bisgod area:* When an area of about 40 km in the vicinity of Bisgod in Yellapur taluk was closely investigated and prospected, two deposits were found, Nagarkan ridge deposit and the valley side deposit of medium grade iron ore with 54 to 56 per cent of Fe content and an estimated reserve of about 45,000 tonnes. The ore has to be blended with high grade ore for marketing. But, it is free from impurities like sulphur, phosphates and titanium. The deposits are at a distance of about 104 km from Karwar port.

*Kalche area:* Deposits of haematitic iron ore to 58–60% Fe have been found near Kalche, to the east of Kodsalli and to the NNW of Bogrigadde in Yellapur taluk. This area has been prospected in detail and an estimate of about 13 million tonnes of reserve has been made. The deposits in this area are found in the interior dense forest region and on both sides of the Kali river.

*Kodlagadde area:* Medium to high grade haematitic to limonitic iron ore is found to occur along with laterite at a distance of about 1.6 km of Kodlagadde village in Yellapur taluk and partly

in Ankola taluk. The deposits in this area are estimated to be nearly half a million tonnes with 58 to 62% Fe.

*Kuntagani area:* In the Kuntagani area of Ankola taluk, lateritic iron ore occurs along with hard laterite as pebble and small bands at about three km to the south-east of the Kuntagani village.

*Kumta area:* At about three km east of Kumta, pebbles of haematitic ore of low to medium grade are found along with hard laterite. The ore is spread over an area of about 110 meters with an average width of about 60m and the deposit is close to Kumta-Chandavar road.

*Bhatkal area:* Low to medium grade haematitic iron ore is found in association with hard reddish laterite to the south-west of Bhatkal in Bhatkal taluk.

**Titaniferous Iron ore**

*Nagari area:* Titaniferous iron ore is found in the form of pebbles and boulders embedded in laterite at a distance of about 0.8 km east of the Nagari village (Honavar tq) over an extent of about 180m into 90m. The area is about six km from the Honavar port.

*Nagur deposit:* This type of ore is found at Nagur, about 12 km south-east of Madangeri in Kumta tq.

*Madangeri area:* Pebbles and boulders of titaniferous iron ore stated to be found about six km east-south-east of Madangeri in Kumta taluk. The ore is stated to contain 8–10 per cent of $Tio_2$. Another deposit is found about 1.6 km N N E of Madangeri in which the $Tio_2$ is stated to be about six to eight per cent. This deposit is also in the form of pebbles embedded in the soil, covering an area of about 0.8 km in length with a width of 0.2 km.

*Achavegudda area:* In the villages comprising Kademane, Angadibail, Marnad and Keshavalli in Ankola taluk, a fairly large quantity of titaniferous iron ore with 10 to 14% $Tio_2$ is found to occur. The ore occurs as pebble, boulders and also as beds. The deposit extends to about three km in length and about 1.6 km in width and the estimated yield is about seven million tonnes of ore. Tadri is the nearest port to this area.

*Santepet area:* Pebbles and boulders of titaniferous iron ore occur at Santepet, just east of Hillur village in Ankola taluk. The total deposit available is estimated at about two million tonnes of ore including the Kenekere-Shivapur deposits. The nearest port is Tadri.

*Sunkasal deposits:* A bedded deposit of titaniferous iron ore containing 8 to 10% $Toi_2$ is found at about four km north of Sunkasal village at Mulemane–Heggar in Ankola taluk. The deposit is found in an area of about 1,220m. length with an average width of 150m.

There are two other smaller deposits, one at Halkar about 1.6 km NNE of Kumta and the other at Kanchikere village in the Ankola taluk. The deposit at Kanchinkere village is found over an area of 610m. in length with a width of about 90m. The Department of Mines and Geology surveyed the portions from Mavingundi to Anmod in disconnected hill ranges in the Sahyadri and has stated that iron ore reserves occur in about 5,180 sq. km. containing 58 to 65% Fe with a production of about 135 million tonnes.

The block-wise iron reserves potential along with its Fe content is given below.

| *Sl. No.* | *Name of Block* | *Fe grade %* | *Estimated reserve milloin tonnes* |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 1. | Anmod block | 60—62 | 31.0 |
| 2. | Kuveshi Diggi block | | |
| | a) Ivoli deposit | 58—61 | 12.5 |
| | b) Kuveshi deposit | 58—60 | 12.5 |
| | c) Dudmale deposit | 58—60 | 6.2 |
| | d) Gavaladari deposit | 58—62 | 3.0 |
| | e) Shirala deposit | 50—52 | 0.5 |
| 3. | Supa block | | |
| | a) Avarcha (Viral) Hill | 63—65 | 12.0 |
| | b) Pisose deposit | 63—65 | 1.0 |
| | c) Viliya-Avala deposit | 60—62 | 10.0 |
| | d) Siddi Hills | 60—63 | 10.0 |
| | e) Virkol deposit | 60—62 | 0.5 |
| 4. | Joida Block | 63—65 | 12.5 |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| 5. | Ulvi–Kalache–Bisgod Block | | |
| | Ulvi–Kalache | 58—60 | 13.0 |
| | Bisgod | 54—56 | 0.4 |
| 6. | Kodalagadde–Talaginakere-Vaddi Block | | |
| | Kodalagadde | 58—60 | 0.2 |
| | Talaginakere | 58—62 | 10.0 |
| | Vaddi deposit | Low grade | minor deposit |
| 7. | C. M. Block | | |
| | Chandragutti | ,, | ,, |
| | Mavingundi | 60—62 | 10.0 |

**Manganese Ore**

Manganese is one of the chief minerals of the district. The manganese ore of this district occurs associated with the shelf sedimentaries of rocks equivalent to Chitradurga group and is characterised by high Mn content with low phosphorous of low electro-negative elements. The low phosphorous manganese ores are popularly known by trade name "Londa Ore". The manganese bearing zone extends from near Castle Rock southwards for a length of about 80–96 km with its width ranging upto 32 to 48 km in the widest parts. Within this zone are found numerous lenticular bodies and patches of manganese ores, several of them being of no large dimensions. The manganese content in the ore varies from 11 to 46% and the resource position is put around 17.485 million tonnes of all grades (as on 1–1–82). Manganese silica and phosphorous have been found to be very low. In the dense forest of Dandeli, Virnoli and Kulgi, Manganese ores chiefly pyrolysite and psilomalane occur as small lenticular bodies associated with laterite. The structural deposition of the various deposits is rather difficult to ascertain correctly in the dense forest region. For descriptive purposes, the manganese bearing zone is divided into three regions. They are 1) Supa region, about 440 sq km in area, 2) Yellapur region, about 50 sq km 3) Sirsi, Kumta and Ankola regions, 30 sq km, the total area being 520 sq km. Ore production in the above said areas ranges from 38 to 44% Mn.

In the Supa region, which contains the largest number of deposits, the ore bodies are stated to be confined to four recognisable

belts. The first or the western belt passes through Kundal, Terali, Diggi and Solia regions, finally running into Goa, the second belt running near Kumbheli through several places and is reported to turn W N W and broadening passes through Hathakamba and Sulavali and passing through the north-west side of Castle Rock, runs further onwards into Goa. The third belt is parallel to the second and passes through Gangavali, Bapeli and other villages upto Villiya Dabe and then turning northwest becomes narrower and continues upto Castle Rock. The fourth belt though narrow, is traceable for a long distance from near Nagjhari Valley through Kulgi on to Usoda, Shingargaon regions. In Yellapur region manganese bearing belt emerges at Bisgod passes on to Nagarkan and Waddermane villages. Another belt commences at Taikabail and passes on to Hebbarkeri, takes a turn towards N-W direction and finally traverses on to Ulvi. In Sirsi, Kumta and Ankola region manganese bearing belt emerges at Yan and Bengon passes on to Nuggimane, Manigudda, Badgaon, Bali, Telginakere and Kammergeri villages. Major portions of the district is reserved for State exploitation leaving only small isolated patches under mineral concession to different private lessees. There are about 50 manganese deposits so far discovered, five in Kumta tq, three in Sirsi tq, five in Yellapur tq, one in Karwar tq and 36 in Supa tq. The various localities where manganese ores found in the district are : 1) on the hill slopes of Anmod and along the road leading to Goa border, 2) to the west of Asti village, 3) to the South of Ivoli village, 4) to the north of Kuveshi village, 5) west of Solian, 6) west of Verampoli, 7) north of Potoli, 8) around Gund, 9) around Ulvi, 10) north of Angaon Village, 11) about 2.5 km South of Kavla, 12) in the Culchupani, 13) west of Hudsa, 14) east of Joida, 15) near Kulgi, 16) in the Nagjhari gorge, 17) between Ninnor and Kevarla, 18) between Jagalbet and Supa, 19) Bisgod, 20) around Virampali, 21) near Kumboli, 22) near Kundal, 23) east and north-east of Pala Village, 24) sout-west of Badgund, 25) west of Aveda, 26) east of Khodli, 27) south of Vilva, 28) around Chapoli, 29) west of Hathkamba, 30) north of Diggi, 31) south and south-east of Bayarkunang, 32) around Palda village, 33) west of Pradhani village, 34) west of Kammani, 35) west of Mundu-ganamane and 36) east to Manigudde, 37) west of Nuggimane, 38) About one km S S E of Talaginkere village 39) Wes of Kammari village.

**Limestone**

Supa, Yellapur and Kumta taluks possess several band of limestone of varying extent and ranging in composition from high calcium to dolomitic types. A small band of high calcium limestone is exposed close to Kali river about four km E S E of Supa and this deposit is not of much importance. Dolomitic types of limestone is exposed for a distance of nearly five km discontinously with an average width of about 0.8 km, about four km of south-east of Ulvi temple in Supa taluk, in the vicinity of Chilni Hebal, Godemane and Naturge villages. The exposures are in some places rather high, some of them being 38 m above the surface level. The limestone contains on an average 28.63 per cent Cao and 16.78 per cent Mgo. The area is stated to yield about 130 million tonnes of ore. High calcium to dolomitic limestone types are found at about four km north-west of Vadehukli in Yellapur taluk for a length of about 1½ km with an average width of 0.25 km. The limestone here is said to contain 44 per cent Cao and two to four per cent Mgo. The probable yield is stated to be about three million tonnes.

Greyish crystalline lime stone of the high calcium type is found about four km to the northeast of Arabail in Yellapur taluk. The deposit is exposed discontinously within an area of about 430 m in length and 90 m in width with an estimated yield of 1,00,000 tonnes. Dolomitic to high calcium limestone is exposed just south of the iron ore band in the area of about 1.6 km north-west of Kodlagadde in Yellapur taluk and about four km to the south of the Yellapur-Karwar high road and is expected to yield about 10,000 tonnes. Dolomitic limestone is found exposed for a length of about 460 m with an average width of about 90 m about 0.25 km north-west of Kalche in Yellapur taluk. Medium to coarse grained greyish limestone is found discontinuously in the vicinity of Yan temple, about 1.6 km of Yan village in Kumta taluk. The limestone of this area varies from 42 to 46 per cent in Cao and one to two per cent in Mgo and the deposit is expected to yield about 1.5 million tonnes. Dolomitic limestone is exposed along western bank of the Nagjhari valley, about 8.8 km south of Kulgi at Kavla caves, for a length of about 1.2 km with an average width of about 0.2 km. The deposit is stated to yield about 10 million tonnes. About five km S W W of Kulgi, dolomitic limestone is exposed along the banks of the Nagjhari valley for a length of about 1.6 km and an average width of about 90 m. and is expected to yield about one million tonnes. In the Gaval and Sida

Dara *nalas,* at a distance of about 3.2 km south-west of Castle Rock in Supa taluk, greyish crystalline limestone is found with an analysis of 30.12 per cent Cao, 17.23 per cent Mgo, 2.37 per cent $R_2O_3$, 2.37 per cent insoluble and low on ignition 46.72 per cent. In the steep valleys situated in about 3.2 km south of the Kammani village in Sirsi taluk a similar type of limestone is exposed discontinuously over an area of about 460 m×90 m. The National Mineral Inventory of the Indian Bureau of Mines has tabulated that the reserves of limestone in the district as on 1-1-80 is 58.76 million tonnes of all grades.

**Kankar**

In Yellapur taluk, about four km to the north-west of Vadehukli village, bed of Kankary limestone occurs as a thick capping on the flank of the hill. This deposit is in a deep valley and extends for a length of about 200 m. with an average width of about 50 m. The composition of the Kankar is said to be very good as it contains 49 to 54 per cent Cao, 0.5 to 0.8 per cent Mgo with no silica. The deposit is estimated to yield about 2,10,000 tonnes. Kankary limestone similar to the above is found exposed on the eastern flank of the hill, about 3.2 km to the east of Gangoda in Supa taluk. The same type occurs along the banks of the nullah in the Nagjhari valley, about 3.2 km south of Kulgi forest lodge. A bed of Kankar is found about 2.4 km to the north-east of the Ulvi temple in Supa taluk. It is exposed for a length of about 120 m. with an average width of about 60 m.

**Bauxite**

Aluminous laterite analysing upto 42 per cent $Al_2O_3$ is found all along the coast line of the district. Bauxite containing more than 50 per cent alumina and low percentage of silica and titanium is found to occur in a reddish brown laterite covering an area of about 5.18 sq km at Mundolli and Talgod villages near Bhatkal. Small deposits are also found at (1) Swarnagudda, (2) Kumta plateau, (3) Haldipur and (4) Nirthadgi. Minor deposits are found at Apsarkond, Chikankod, Kadra, Ramtirth, Honavar, Tadri, Gokarn and Idgunji areas. In the National Inventory it is mentioned that a reserve of 16.424 m. tonnes of bauxite of all grades is found as on 1-1-1982. Of this, about 2.88 M.T. is of metallurgical grade (III).

**Copper**

Copper is found in a small patch in Kaiga which is associated with ultramafics and meta-volcanics of Dharwar super-group.

Massive pyrrhotite with minor chalcopyrite is associated with the pyroxenite and peridotite. The analysis has revealed that Cu ranges from 0.60 to 1.0% with 0.03 to 0.36 Ni and 0–09 to 0.19% Cu. It is estimated that the inferred reserves of one million tonnes of ore in two grade classes of (1) over 1% Cu and (2) 0.5 to 1% Cu.

**Clay**

Deposits of China clay (Kaolin) are reported to occur at the following places in the district: 1) The clay deposit is exposed over an area of about 180 m in length with an average width of about 60 m. about 1.6 km to the west of Castle Rock railway station. This clay is pure white in colour and is mixed with silica and tiny particles of mica. 2) A similar type of China clay is exposed for a length of about 430 m with an average width of 46 m about 0.8 km north-east of the Castle Rock Railway Station and occurs just 0.6 or 0.9 m below the surface. 3) About 1.6 km to the east of the Castle Rock railway station, China clay is exposed forming low mounds in the valley and is mixed up with a fairly large proportion of silica. 4) About 0.8 km to the east of Kunagini in Supa taluk, a small deposit of ash grey variegated clay is found along the cart track and is stated to be not of much use. 5) A clay deposit below a soil cap of 1.2 m thick is found about five km north-west of Supa lend to the west of the Supa–Londa high road and the clay is stated to be slightly plastic and mixed with a high proportion of silica. 6) A bed of kaolin is exposed on the eastern flank of Motigudda for a length of about 90 m. with a width of 30 m. about 1.2 km southwest of Kodemane in Achave village Ankola taluk. The clay here is slightly reddish and is stated to be highly plastic. 7) A bed of China clay occurs to the southwest of Kumta in the Hervatta extension, beneath 1.5 m thick of the soil cap which extends for a length of about 610 m with an average width of 60m. The clay is white in colour, highly plastic and mixed with considerable proportion of gritty material. 8) China clay is found to occur below the capping of soil and laterite boulders, about 3.2 km S S E of Bhatkal, exposed for a distance of about 60m. in length with a width of about 15m. This clay here is stated to be mixed with grissy material and mica particles. 9) China clay is exposed discontinuously on the southern bank about 1.5 km of the Venktapur river in Bhatkal taluk and clay is white to light reddish in colour and seems to be highly plastic. 10) China clay is exposed on the southern flank of the hill below a thick capping of laterite, about 0.8 km north–west of Hadinbal

village of Honavar taluk. 11) A bed of variegated clay is exposed on the western flank of the low hillock situated about four km north-east of Honavar at Varnakeri village. It covers an extent of about 440 m. in length with a width of about 15 m.

**Asbestos**

A small deposit of asbestos associated with talc is reported to occur about 1.2 km west of Dhareshwar in Kumta taluk of the district and it is not of much economic importance.

**Mica**

It is stated that some abandoned working for mica are found about 0.8 km north-west of Amdalli in Karwar taluk. But workable deposits of mica have not been reported. Near Amdalli, small books of greenish fringed mica are found in a small irregular run of pegmatite but they are not of any economic use.

**Mineral pigments**

Among mineral pigments, only ochre of different grades seems to occur. Ochre is a mixture of hydrous oxides of iron and some earthy material. The greater the proportion of the hydrous oxides of iron on the ochre, the better will be their colour and quality. Yellow and red ochres are the two chief types that are commonly found. Ochres of fairly good quality have been reported to occur in the neighbourhood of Castle Rock. The occurrence of yellow ochre of inferior quality is reported in Kallemane and Kumbaragadde villages in Ankola taluk.

**Vanadium Ore**

Titaniferous-Vanadiferous magnetite occurs as late magnetic deposits intimately associated with the ultramafic rocks like pyroxenite and peridotite. The important deposits are found at (1) Santepet, (2) Mulemane, (3) Surya Kalyanigudda ,(4) Kanlal hill, (5) Hiregutti, (6) Madangeri, (7) Motigudda, (8) Sanyasigudda, (9) Angudibail, (10) Kodemane, (11) Kantgani (12) Kanchinkere and (13) Achavegudda area. A total 3.1 M.t. resources with $V_2O_5$ varying from 0.67% to 0.75% have been computed in the National Inventory of the Indian Bureau of Mines as on 1-1-1980.

**Rock crystal**

Partially developed rock crystals (transparent quartz crystals) showing pyramidal termination at one end found encrushing the drusy

cavities in a vein or reef of quartz in the granite near Nidgod in the Siddapur taluk. Fully developed crystals are stated to be rare.

**Sand**

*Glass sand:* At a distance of about 0.4 km east of the sea shore near Bengre in Bhatkal taluk fine to medium grained white silica sand (beach sand) occurs in the *malki* lands below 0.6m of the surface sandy soil. This deposit is stated to extend for a length of about 0.8 km with a width of about 0.4 km. An analysis of a bulk sample from this area has shown 98.26 per cent $Sio_2$ ; but the iron content in it has not been mentioned. White silica sand is stated to occur close to the sea at Karikallu in Bhatkal taluk. Similar white silica is found associated with ordinary beach sand near about 1.6 km west of Haldipur in Honavar taluk. The silica sand is stated to be medium to coarse grained and from pure white to light reddish in colour.

*Ilmenite sands:* In several places along the sea shore from Bhatkal to Ankola, deposits of black sand containing largely ilmenite associated with several other minerals have been located. This sand is said to contain largely ilmenite and zircon and also monazonite, rutile, apatite, haematite, amphibole, epidote and chlorite in much smaller proportion. 1) Beach opposite to Mahabaleswara temple in Gokarn is covered with layers of black sand along with the usual beach sand traceable over an extent of 107 m length and 30 m in width. About 60 per cent of this mixture consists of black sand, 2) Just north of the above deposit the beach is covered with medium grained black sand traceable for a length of 155 m with a width of 30 m. 3) Further north is another deposit of coarse grained black sand extending upto Gangavali for a length of about four km with the width ranging from 15 m to 30 m. In this sand, the proportion of black sand to the ordinary beach sand is said to be only about eight per cent. 4) Fine-grained black sand is exposed below a layer of sandy soil of about 1.2 to 1.5 m in thickness, about 1.6 km north-east of Gokarn at Kadime village. The portion of black sand to ordinary beach sand here is stated to be 60:40. 5) Thin layers of black sand are exposed to a small extent below a capping of ordinary beach sand about 3.2 km north-west of Bhatkal at Karikallu and is seen over a small area of 7.5 m in length and 1.5 m in width. 6) The beach at Bailur in Bhatkal taluk is covered over with black sand to the extent of about 60 per cent.

In the Kali river basin and other river basins considerable quantity

of moulding and different types of sand are found to occur and are being used in different industries and also in constructional use.

**Steatite**

In Kumta taluk about 1.2 km to the west of Dhareswar near Ramgundi, a band of good quality steatite is found, exposed for a length of about 75 m along the western flanks and on foot of the hill. Weathered and impure steatite is reported to occur as a small band, about eight km to the north-east of Karwar.

**Dolerite Dyke Rocks** (Black granite)

The dolerite dyke rocks of coastal area of the district have made a name in Germany for its standard quality and for the nearness of ports. The material is well sought for as ornamental stones for building and decorative purpose aborad. The deposits are reported from Aversa, Herwada Bagribail, Amdalli and Kodur.

**Building stones**

Granite gneisses and laterites are the chief building stones of the district. They are quarried at some places in the granitic regions and are being used as building stones. Laterite in the coastal areas is cut into the shape of large sized bricks and is used as such for building purpose.

The following table gives us the number of mining lease block and area in hectares of the major and minor minerals of the district.

| *Sl. No.* | *Mineral/Ore* | *No. of M.L. Blocks* | | *Area in hectares* |
|---|---|---|---|---|
| | Major Minerals : | | | |
| 1. | Manganese Ore | 81 | | 10,227 |
| 2. | Iron Ore | 11 | | 940 |
| 3. | Clay | 3 | | 391 |
| 4. | Moulding Sand | 8 | | 838 |
| 5. | Quartz | 5 | | 179 |
| 6. | Limestone | 5 | | 1,722 |
| 7. | Lime Shells | 14 | | |
| 8. | Ferrogenous Quartzite | 3 | | 79 |
| 9. | Minor Minerals | 4 | | 3.89 |
| 10. | Dyke Rock | 16 | 483 | 195.72 |
| 11. | Ordinary Sand | 5 | 41 | 16.90 |
| | Total | 25 | | 14,592.51 |

The output and the value of the various major and minor minerals are given below : 1982–83.

| *Sl. No.* | *Mineral* | *Quantity in tonnes* | *Value in Rs* |
|---|---|---|---|
| I. | Major Minerals : | | |
| 1. | Manganese Ore | 1,58,640 | 1,26,91,200 |
| 2. | Iron Ore | 20,200 | 2,02,000 |
| 3. | Iron Ore fine | 4,200 | 42,000 |
| 4. | Limestone | 17,094 | 1,70,940 |
| 5. | Moulding Sand | 4,840 | 58,080 |
| 6. | Lime shells | 37,364 | 13,07,740 |
| 7. | Quartz | 1,460 | 14,600 |
| II. | Minor Minerals : | | |
| 8. | Building Stone | 18,761 | 2,81,415 |
| 9. | Ordinary Sand | 16,120 | 64,480 |
| 10. | Ordinary Clay | 88,120 | 3,96,540 |
| 11. | Boulders | 9,410 | 56,460 |
| 12. | Bricks (nos.) | 2,00,000 | 20,000 |
| | Total | 3,75,409+ 2,00,000 bricks | 1,53,05,455 |

The percentage increase (+) or decrease (—) in the value of mineral productions in the district from 1972 to 1980 is as follows :

| | | | | | |
|---|---|---|---|---|---|
| 1972 : | — 8.4 ; | 1973 : | —36.2 ; | 1974 : | +29.5 ; |
| 1975 : | +176.8 ; | 1976 : | —32.7 ; | 1977 : | +33.8 ; |
| 1978 : | + 14.0 ; | 1979 : | — 6.0 ; | 1980 : | +4.3. |

The revenue realised out of the major and minor minerals during the years from 1977–78 to 1982–83 is given below :

| *Year* | *Revenue realised* |
|---|---|
| 1 | 2 |
| Major Minerals | Rs. |
| 1977–78 | 7,76,713 |
| 1978–79 | 7,02,887 |
| 1979–80 | 13,76,794 |
| 1980–81 | 13,40,937 |
| 1981–82 | 13,99,521 |
| 1982–83 | 11,44,501 |

| 1 | 2 |
|---|---|
| Minor Minerals | Rs. |
| 1977–78 | 69,934 |
| 1978–79 | 79,168 |
| 1979–80 | 75,212 |
| 1980–81 | 1,04,609 |
| 1981–82 | 95,449 |
| 1982–83 | 1,96,729 |

**Ground Water**

Ground water in the district occurs under water table conditions in the weathered mantle and jointed and fissured in bed rocks. Along the costal belt ground water occurs in the sandy alluvium. Major part of Uttara Kannada district is covered by a thick capping of laterite mantle on granites, schistose rocks and sand stones. These laterites are highly porous and hold and transmit good quantity of ground water. The average annual rainfall in the district is 2,741.7 mm. The ground water recharge is mainly a result of infiltration of this rain water and little extent through seepage from streams, tanks, reservoirs and water applied for irrigation. It is discharged artificially by abstraction of water from dug wells. The fluctuation of water table varies in the district from 3 to 12 m for hard rock area and alluvium, the specific yield varies from 2 to 3 per cent. The ground water recharge and discharge balance potential and percentage in utilisation in the district are given below.

| *Sl. No.* | *Name of the Taluk* | *Recharge (MCM)* | *Discharge (MCM)* | *Balance Potential (MCM)* | *Percentage Utilisation* |
|---|---|---|---|---|---|
| 1. | Ankola | 67 | 4 | 63 | 6 |
| 2. | Bhatkal | 31 | 13 | 18 | 42 |
| 3. | Haliyal | 45 | 1 | 44 | 2 |
| 4. | Honavar | 112 | 20 | 92 | 18 |
| 5. | Karwar | 51 | 17 | 34 | 33 |
| 6. | Kumta | 113 | 27 | 86 | 24 |
| 7. | Mundgod | 35 | 1 | 34 | 3 |
| 8. | Siddapur | 25 | 1 | 24 | 4 |
| 9. | Sirsi | 62 | 1 | 61 | 2 |
| 10. | Supa | 48 | 1 | 47 | 2 |
| 11. | Yellapur | 28 | 1 | 27 | 4 |
| | Total | 617 | 87 | 530 | 13 |

The statement discloses that only 13 per cent of ground water has been utilised in the district, the survey conducted in the district by the State Ground Water Cell indicates that there is ample scope for tapping ground water for irrigation and other domestic purposes. The number of dug wells, dug wells fitted with pumpsets and additional wells feasible (as on 30–6–1979) in the district are given below.

| *Sl. No.* | *Name of the Taluk* | *No. of dug wells* | *No. of dug wells with pumpset* | *Total No. of wells* | *Add. wells feasible* |
|---|---|---|---|---|---|
| 1. | Ankola | 2,391 | 196 | 2,587 | 13,700 |
| 2. | Bhatkal | 2,692 | 207 | 2,899 | 1,460 |
| 3. | Haliyal | 29 | 26 | 55 | 3,570 |
| 4. | Honavar | 3,375 | 550 | 3,925 | 7,460 |
| 5. | Karwar | 3,717 | 125 | 3,842 | 2,760 |
| 6. | Kumta | 5,130 | 540 | 5,670 | 6,970 |
| 7. | Mundgod | 29 | 14 | 43 | 2,760 |
| 8. | Siddapur | 177 | 79 | 256 | 1,950 |
| 9. | Sirsi | 16 | 144 | 160 | 7,180 |
| 10. | Supa | 14 | 2 | 16 | 3,810 |
| 11. | Yellapur | 48 | 25 | 73 | 3,180 |
| | Total | 17,618 | 1,908 | 19,526 | 54,800 |

In 1983–84, the number of wells fitted with pumpsets rose to 3,381, and 50 borewells have been also in operation in the district in 1984 (for details, see Chapter IV, Irrigation).

**The Income and Expenditure of the Ground Water Survey Unit in the District for the year from 1978–79 to 1982–83 are as follows**

| *Year* | *Income* | | *Expenditure* | |
|---|---|---|---|---|
| | *Consultation fee for Geohydrological method of site selection* | *Borewell drilling and yield testing Charges* | *Plan* | *Non-Plan* |
| 1978–79 | 470—00 | 24,500—00 | 2,310—00 | 1,04,299—47 |
| 1979–80 | 790—00 | 54,160—95 | 4,206—50 | 1,07,449—00 |
| 1980–81 | 990—00 | 63,971—55 | 2,600—00 | 1,16,903—30 |
| 1981–82 | 710—00 | 92,408—65 | 2,796—00 | 1,35,561—13 |
| 1982–83 | 1,600—00 | 58,550—00 | 1,826—00 | 1,37,372—00 |

*Source* : Department of Mines and Geology, Ground Water Survey Unit.

## FORESTS

The creation of vast forest assets is regarded as essential to any country's progress and prosperity. Their conservation and development constitute a separate programme in government planning. In the slopes of the Western Ghats from north to south of the Uttara Kannada district, there is beautiful cover of dense forests of magnificent timber. The forests, stimulated by the hervy rainfall, start growing within a few kilo meters from the coast. They are generally lofty, dense and evergreen, characterised by a large number of trees which occur together with fine canopies of tree crowns and shrub growth. As one moves towards the coast from the ghats, the forests are semi-evergreen with grassy banks along the coast, interspersed with stunted growth of secondary species and scrub and also *Acacia catechu* in its own way for *katha* manufacture. The teak of Gund in the district is said to be the finest in the world. The officers of the British Government maintained that they were the trustees of the world for the teak of the district. Teak was used for ship building by the Europeans during past centuries. The district had produced teak with maximum girth in the country, the girth of a bole at chest level being 602 cm.

### Types of forests

The types of forests found in the district are as follows: 1) Evergreen, 2) Semi-evergreen, 3) Moist deciduous, 4) Scrub and thorny forest and 5) Unwooded forests.

The evergreen forests are found in places where the rainfall is more than 225 cm and form a narrow strip along the Western Ghats. The soil types of these evergreen forests are mostly laterite but along the river basins, it is alluvial. The semi-evergreen forest are found in places where the rainfall is from 150 cm to 250 cm. The evergreen and semi-evergreens are the home of soft woods utilised for plywood, matchwood and packing timber and raw material for electric transmission lines.

The moist deciduous forests are situated in the rainfall areas of 100 cm and more. These types of forests are rich in timber trees, etc. Rosewood, teakwood, *honne, matti, nandi,* etc., grow naturally. These forests are important for timber production, firewood production and also from the management point of view. In areas where the rainfall is below 90 cm. the dry deciduous forests are found. The scrub and thorny forests are found in places where the rainfall is below 60 cm

and the soil types that are found in these are trap soil, mixed red and black soil. In these forests, sandal and other minor forest produce species, firewood and timber species are grown. Unfortunately, these forests are subject to heavy pressure from firewood extraction, grazing and fauna.

The types of forests found in the various taluks of the district are as follows :

*Ankola taluk :* In Ankola taluk, as one goes from east to west, the forest types change from laterite thorn to moist deciduous, laterite semi-evergreen in nala pockets and interior depression. The western part which is adjoining the coast is also denuded to unrestricted exercise of privileges and due to *kumri* cultivation in the past. The inland areas of moist deciduous and semi-evergreen are closed as fuel forest and high forest area, yielding firewood and timber respectively. Round about Hattikeri, in laterite thorn forests, one can come across the khair trees *(Acacia catechu)* which yield valuble economic forest produce called *katha.* The Gangavali river valley area supports valuable teak forests having the most common undergrowth, bamboo.

*Bhatkal taluk :* The type of forests in Bhatkal taluk changes from laterite thorn to laterite evergreen. There is very little of moist deciduous forests. The barren hills around Murdeshwar and Bhatkal are a testimony to the acts of unrestricted feelings. As one goes in the interior, the vegetation improves gradually. The evergreen forests round about Kop village in the north-east part of the taluk contain valuable timber for matches and plywood. The laterite thin forests situated in the north-west and southwest of the taluk contain a large number of khair trees. These are bigger in the girth in the Balke forests in the south-west part of the border of the Dakshina Kannada district.

*Haliyal taluk :* The eastern and north-western parts of Haliyal taluk comprise teak pole area tending to scrub types towards the border of Dharwad district. The forest towards western half of this taluk are constituted at High Forests, yielding valuable teak timber. The timber (teak and hard woods) extracted from these high forest areas are transported to Dandeli and Alnavar forest depots. There is sandalwood in drier parts of the area and is extracted annually on a sustained yield basis. There are patches of ever-green forests towards tha western side in the lower portions of the valleys of rivers and perennial nalas. Bamboo is considered as one of the most valuable constituent of economic forest produce.

*Honavar taluk:* In the Honavar taluk, the forest type changes from laterite to latrite semi-evergreen and evergreens. There is very little of the moist deciduous type which can be seen only on tops of small hills in the western part of the belt. The coastal strip of the forests is all denuded and in many parts, the land has become unfit even to bear poor grass. As one advances in the interior, the forest growth improves gradually. These forests contain valuable timber trees like *poon, ganjan, bobbi, honne, kindal, jamba, nandi, bharangi* and others, suitable for matches and plywoods. The laterite semi-evergreen forests and evergreen forests in the north-east corner, in Mahime and Jankadkal villages of the taluk, contain *tale* palms. The belt of *Acacia catechu* also passes in this taluk, mostly confined to the south-west part of the taluk. The evergreen forests of Gersoppa contain varieties of canes which are exported outside the district.

*Karwar taluk:* In Karwar taluk, as one goes from west to east the forest types gradually change from laterite thorn to moist deciduous and laterite semi-evergreen to evergreen. The forest to the west of Honkane village have been depleted due to the unrestricted exercise of privileges. The deciduous forests in lower slopes tend to be towards high forests, yielding valuable timber of teak, *sissum, honne, kindal*, etc. *Jamba* is the predominant species of this tract. The upper slopes and lower valleys and banks of perennial nalas contain patches of evergreen forests and large quantities of canes (*calamum*) that are exported to various places. The upper slopes are not worked due to their inaccessibility. Reserved forests of the moist deciduous type in the patches of laterite semi-evergreen in the interior situated on the steep hills round Karwar had been classified as "Karwar Town Five Miles Special Reserves".

*Kumta taluk:* In the Kumta taluk types of forests change from laterite thorn to moist deciduous, laterite semi-evergreen and evergreen as one advances from west to east as is the case in other taluks. The timber bearing high forests are confined to the south-east part of the taluk at the foot of the Nilkund and Dodmane ghats round about the Soppinahosahalli village. Round about Mirjan, the laterite thorn forests contain khair trees which yield valuable *catechu.* Bamboos occur in the Aghanashini valley round about Soppinahosahalli.

*Mundgod taluk:* The forest type in Mundgod taluk changes from scrub in the south-west near the Sirsi taluk boundary. The stock improves as one advances from east to west. The eastern half is

comprised of teak pole area and the western in the high forest area. The deep valleys, in the south-west and the perennial nala belts are covered with patches of semi-evergreen forests. The drirer parts of the teak pole arch towards the border of the Dharwad district contain sandalwood. The forests also contain bamboos.

*Siddapur taluk:* Going to the scanty growth in the eastern side and also to the major part of Siddapur taluk being very hilly, no part is organised except the area covered by sandalwood trees towards the north-east, east and south-east. This sandalwood belt extends to Sirsi, Mungod taluks also. The eastern part is drier and as one advances form east to west towards the ghats, the forest type improves to semi-evergreen. There are many large patches of evergreen forests callad *kans* in this taluk mostly confined to the west round about Dodmane, Nilkund and Malemane ghats. These contain valuable matchwood, the extraction of which will be economical only when communications are improved.

*Sirsi taluk:* The forests of Sirsi taluk are firstly semi-evergreen and evergreen types. The evergreen forests are attached here and there all over the area. The belt of sandalwood forest of Siddapur taluk runs over this taluk and is mostly confined to the south-eastern part bordering Siddapur taluk and Shimoga district.

*Supa taluk:* The greater part of the Supa tract is very hilly and preciphorous. The forest area falls into two different types of forests, The south-eastern part of this taluk contains high forests. near about Gund and portions of the Nagjhari valley and the Kalinadi and the Kaneri slope forests, yielding mainly timber of valuable species. Gund has the finest teak plantations. Evergreen patches are also found in the valleys, The forests of the northern point near about Castlerock yields only fuel and it merges into scrub forests, wherever the soil is very poor. Bamboo grows abundantly in this taluk.

*Yellapur taluk:* The northern parts of the Yellapur taluk is a valuable forests of teak. Bamboo is also plenty here, confined to the catchment area of Gangavali. The bamboo belt extends to Ankola taluk also.

*Area of forests:* The district has a very large area under forests. According to State Survey, out of the 10,291 sq km (1981) of the total geographical area, about 8,292.65 sq km are occupied by forests forming about 80.57 per cent of the geographical area, the highest

in the districts and far above the proposed national average of 33⅓ per cent. The *per capita* land area is about 1.05 hectares and the *per capita* forest area is 0.84 hectares and these figures are the highest in the state. The extent of forests in the five administrative divisions of Forest Department in the district as in 1980–81 is given below.

| | *Sq km* |
|---|---|
| Haliyal division | 1,441.70 |
| Honavar ,, | 1,408.88 |
| Karwar ,, | 2,240.08 |
| Sirsi ,, | 1,713.18 |
| Yellapur ,, | 1,488.81 |
| Total | 8,292.65 |

The forests are divided as follows according to convenience of administration : 1) Reserve forests maintained by the Forest Department. 2) Forest plantations maintained by the Forest Department. Out of those areas notified under the Forest Act, the barren lands and hillocks that are denied of tree growth are being afforested by raising plantations like cashew, etc. 3) Reserve Forests under Section 4 of the Karnataka Forest Act, 4) Revenue plantations maintained by the Revenue Department representing the afforestation works done in the unreserved lands for which a notification under Section 4 of the Act is issued. 5) Unreserved lands are maintained by the Revenue Department. Protection and management of tree growth in unreserved kinds are vested with the Forest Department. Suitable areas of unreserved lands in compact blocks have been surveyed and demarcated and the notification under Section 4 of the Act has been issued for constituting them as reserve forests. 6) Several panchayats in the recent years have commenced maintaining certain areas of waste lands to develop forests under the scheme "Farm Forestry" which envisages the creation of fuel reserves to help people to get their supply of fuel, small-sized timber to meet their agricultural demands and to provide green manure, fodder and grazing to village cattle.

The following gives details of forest area according to legal status as in 1980–81 in the district.

| | *sq km* |
|---|---|
| Reserved forests | 7,727.84 |
| Protected forests | 542.77 |
| Village forests | 20.20 |
| Unclassified forests | 1.84 |
| Total | 8,292.65 |

## Loss of Forest Area

The increasing population has a direct bearing on increased demand for agricultural lands and this has always an adverse effect on valuable forests. Unauthorised cultivation poses a serious problem. The high tension electricity lines riddling the forests, increased communications, settlement of expropriated ryots and refugees on release of lands for irrigation and hydro-electric projects have a heavy impact on forests. People settling down in colonies in the interior depend on forests for their requirement of timber and firewood. Grazing also has deleterious effect on forests. The release of forest lands has now been discouraged and any such proposal has to be approved by the both Houses of Legislature. According to the recently enacted Central Forest Conservation Act, no forest land can be released for non-forestry purpose in the State without specific approval of the Government of India. The following table gives the purpose and the areas so far lost.

| *Purpose* | *Extent lost (in hectares)* |
|---|---|
| Area gone under submersion | 304 |
| Area released for rehabilitation | 4,202 |
| Area gone under power lines | 626 |
| Area given for cultivation | 50,158 |
| Area gone under mining | 26,713 |
| Area given for townships | 1,097 |
| Area given for non-agricultural purposes | 7,383 |
| Area lost under the Kalinadi Project | 14,176 |
| Area lost under the Bedti Project | 300 |
| Area lost for colony and roads | 273 |
| Total | 10,52,232 |

## Exploitation of Forests

Forest wealth is systematically exploited on the principle of progressive and sustained yield, encouraging the natural regeneration, reforestation and afforestation measures to meet the demand of the forest-based industries. The various forest products are extracted and sold to various industries and individuals. Apart from the revenues from the market determined goods, the value of the forests in terms of 1) non-marketing services, 2) eternal economics and 3) intangibles are very high. The government has made a policy decision not to release forest areas any more for agricultural purposes.

**Timber**

The hard and soft wood species of commercial importance are exploited and sold in public auctions through the Government Timber Depots besides supplies made by selection of tree to the railways, defence, ship-building industries, housing and private uses. In addition, timber and poles are being supplied for the construction of houses under the "Peoples' Housing Scheme". Trees standing in coupes are also sold by public auctions, but the system is being gradually discontinued as the work of exploitation is taken up by the Forest Department in large proportions.

**Matchwood and Plywood**

Specific portions in the evergreen and semi-evergreen forests are released to matchwood and plywood industries for extraction of softwood of commercial importance. These industries have been allotted certain forest areas for extraction and removal of softwood species. Recently, the government through the Forest Department has taken up the work of extraction and supplying to the industries in the interest of proper conservation and protection of forests. Trees of exploitable girth, *i.e.* 1.8 m and above at breast height are permitted to be extracted, and a maximum of four trees per acre from the coupes marked by the Department are to be made use of. The industries have also been allowed to remove 50 per cent of the available quantities of hollow and unsound logs, short girth logs and material below 60 cm in girth for manufacturing purposes to encourage industries, to make the best use of such material instead of allowing it to rot in the forests. The other fifty per cent of the available material along with the material not fit for manufacturing purposes is brought to the roadside depots for disposal to the registered packing case industries and other small-scale units of wood-based industries like slate, photo-frames, etc. In order to encourage small scale industries, soft wood is made available in large quantities.

**Bamboo**

The bamboo is supplied to the West Coast Paper Mills Ltd., Dandeli on long lease basis. Bamboo forests of Yellapur and Dandeli have been allotted to the West Coast Paper Mills. The allotment of bamboo to the mills is 1,85,000 tonnes annually. But the full quota has not been extracted due to the non-availability of bamboo in the State owing to the gregarious flowering from 1960 and onwards. The fresh regeneration of bamboos is taking place and harvesting at

the proper age is continuing. Green bamboos are also being supplied to craftsmen like the Medars and the Buruds and the Scheduled Castes and Scheduled Tribes through bamboo depots.

**Firewood**

The government has opened a number of firewood depots in the district to cater to the needs of the people particularly the weaker sections. The objectives of opening such depots are to discontinue the pre-paid license system which has caused damage to the forests and to make available firewood for domestic use at reasonable rates at convenient places. In the beginning, all the depots are run by the Forest Department and subsequently, many depots were handed over to the Karnataka State Forest Industries Corporation. The Corporation has opened new depots with a view to have at least one depot at each taluk headquarters and other major towns.

**Development Schemes**

Various development schemes are being implemented in the district and they can be classified under the following major categories: 1) State Plan Schemes, 2) Central Sector Schemes, 3) Centrally-Sponsored Schemes, 4) Forest Development Fund Schemes, 5) Command Area Development Schemes and 6) Western Ghats Development Schemes.

**Afforestation**

Plantations of teak, softwoods, cashew and fuel species are raised to meet the increasing demand of the forest based industries and the public. The demand for teak timber is increasing year by year for constructional, industrial and defence purposes. Teak plantations are raised in the areas clean-felled and after removal of the existing tree-growth. Softwood is in great demand for the match and plywood industries. The existing demand is partially met from the natural forests. In order to meet the existing and the future demands, a scheme is in operation for softwood and suitable areas have been earmarked. A scheme of rehabilitation of degraded forests is in operation for raising fuel plantations, timber and other economic species like sandal, tamarind, *honge, hippe, hale* and some others.

**Cashew**

Cashew plantations on large scale have been raised in the district since 1950 under the State Plan and Centrally-sponsored Schems.

The areas where cashew plantations have been raised are those which are barren and lateritic. Initially, cashew was planted as a soil conservation measure. As the demand for cashew increased, extensive areas of barren lands were utilised for cashew cultivation. The yield from such a land was not satisfactory. Although cashew is a very hardy tree, capable of thriving in waste lands where no other crops grow, it is observed that the tree responds very well to richness of soil and abundance of soil moisture. In the year 1968–69, a Centrally-sponsored Scheme, a package programme for manurial and prophylactic treatment in older plantations was taken up and the scheme started functioning in 1972-73. In the same year, the following programmes were taken up under the Centrally-sponsored Scheme for increasing the yield of cashew from the plantations : 1) Maintenance of cashew plantations, 2) Schemes for establishment of proginy orchard and 3) Scheme for expansion of area in cashew. The Karnataka Cashew Development Corporation is implementing a package programme of intensive cultivation. The Government of India have sponsored a scheme for raising subsidised plantation of cashew in forest area from 1976–77. The amount of subsidy provided under the scheme during 1977–78 was Rs. 5,00,000. A scheme for development of cashewnut by veneer grafting and patch budding is also in operation. The object of the scheme is to improve the newly raised cashew plantatious.

**Forest Development Fund Scheme**

The allocations made towards forestry in the successive Plans were much less than the requirement and the allocation under Plans has already been dealt with. This low allocation deterred the implementation of the afforestation and re-afforestation programmes to the extent of meeting the demands for forest produce. Then, it was felt necessary to create a Forest Development Fund by levying cess on all forest sales, revenue contracts and industrial releases. The Government of Karnataka issued the Karnataka Forest (Amendment) Ordinance 1975 which was subsequently enacted. The amended Act provides for collection of the Forest Development Tax at the rate of five per cent on all the forest produce disposed of by the Government. The Forest Development Tax has been subsequently raised to eight per cent from 1st of April, 1980.

**Integrated Development of Western Ghats**

The heavy forests of the Western Ghats are subjected to heavy exploitation and a loss of about 2.25 lakh hectares has resulted. This

has caused a serious ecological imbalance. Therefore, a scheme for the development of the Western Ghats is in operation, which includes bamboo plantation, matchwood and plywood plantations, cashew plantations, cultivation of medicinal plants and rehabilitation of mining areas, etc.

**Tree Improvement**

Research on forest trees is being conducted to tackle the various problems connected with them. Under the Tree Improvent Works, some teak plantations have been identified for being constituted as the Test Seed Production Stands and also for thinning and application of fertilizers to encourage wider cover formation and increase in the yield of seeds. These plantations will provide seeds of superior genetic source for the State Teak Plantation Programme. The stumps of rosewood trees which have yielded the highest price in auction sales are identified and root suckers are developed for being planted to form seed orchards. This going back or retracing from log to the stem to identify the genetically superior strain is necessary because of the price of rosewood. High yielders of Indian lavender are marked for development of cuttings. In the case of tamarind, high yielders are located for collection of seeds and raising seedlings. Grafting experiments of tamarind high yielders are also being conducted. Seedling of *jamun, sithaphal* and *nelli* are also raised utilising superior sources.

**Vegetative Propagation**

As a substitute for seedling propagation to control genetical variations and to propagate quality clones, vegetative propagation experiments were conducted on *sambrani,* teak, *atti* and bursera and good results were obtained. Budding and grafting experiments in teak are in progress to establish germ–plasm bank at Dandeli of the district.

**Grassy Blank Afforestation**

Various field trials have been taken up to find out suitable species for various categories of grass lands. Various indigenous and exotic species have been tried. Experiments to find out best species for afforestation of grass lands in the Western Ghats are in progress. The exotic bamboo, *Bambus vulgaris,* which is thornless, fast growing and does not die, has given good results in the valley portions.

**Medicinal Plants**

With the increased demand for various species of medicinal plants, several wet nurseries of the State have been brought under the

cultivation of *Vinca rosea, Rauwolfia cauescens* and *Discoria floribunda.* Nearly 16 species of medicinal value have been introduced in Dandeli Nursery to study the growth data and behaviour pattern, for further trials.

**Other Trials**

The technique of raising seedlings of about 23 evergreeen species has been standardised. Techniques of various other species are also being standardised. Inter–material provenance trials have been taken up of *Gmelina arborea (sivane)* at Dandeli during 1977. The seeds are obtained from Food and Agricultural Organistation or DANIDA Tree Seed Centre, Denmark through the Forest Research Institute, Dehra Dun. Provenance trials of eucalyptus, sandal and others are also in progress. Trials of using polythene bags of different sizes and gauges are in progress, with a view to reduce the cost of transport of seedlings. Experiments of coppice shoots regulation to find out the lowest proportion of bark with reference to the number of shoots are being pursued. Experiments at the rate of growth of coppice shoots have shown that till the eighth year after felling of the original crop, the rate of growth is high.

**Social Forestry**

The problem of fuel shortage is expected to be solved by planting on the available open lands under the Social Forestry Schemes, with the objective of involving the common man in the massive movement of planting trees. The Social Forestry and Extension Forestry Schemes are implemented since 1979–80 under the Social Forestry Programme. The objective is to finance individual farmers who are interested in planting trees where they can get benefit after 15 to 16 years. In addition, compulsory planting has been enforced in the State under the Tree Preservation Act. The 'C' and 'D' classes of land which are not fit for agricultural cultivation are being transferred to the Forest Department by the Revenue Department for raising forest.

**Forest Acts**

Before the Karnataka Forest Act 1963 and Rules 1969 thereunder was brought into effect the district had the Canara Forest Rules in operation (see section under Forest Privileges). At present, the Karnataka Preservation of Trees Act 1976 and Wild Life Protection Act of 1972 and Wild Life Protection (Karnataka) Rules 1973 and

amendment thereunder, and Forest Conservation of Act India 1980 are in force in the district.

**Forest Protection**

In order to protect the forests, mobile squads have been organised by the Forest Department. The main functions of the forest mobile squads are to achieve effective prevention of smuggling of forest produce from Government lands and reserved forests in particular by intensive and extensive patrolling in forest during night and also organising surprise raids. There is a forest mobile squad at Sirsi. The officers in charge of the forest mobile squads are also entrusted with investigation and vigilance work. The various protective staff of the Department has been supplied with arms and ammunition, especially in border areas prone to organised smuggling.

**Karnataka Preservation of Trees Act 1976**

The large extent of private forests and tree crops are grown mainly as shade crops for coffee and cardamom and also trees are being grown in the private holdings which are granted as privileges for cultivators. The land owners are entitled to use these trees for their bona fide purposes. Because of high value of timber, they started exploiting indiscriminately particularly *bane* lands, *kumki* lands, *kan* lands, etc. This Act has prevented the indiscriminate felling in private holdings. The private land holders will be permitted to fell only when trees are found scientifically unsuitable. Whenever permitted, they have to plant five trees in place of one tree to be felled; if they fail to plant, the security planting deposit amount will be used to plant the required number of trees in their holdings,

**Wildlife Protection Act**

The indiscriminate killing and poisoning rich wild life population have been dwindled to the minimum and many are on the verge of extinction. Wild Life Protection Act 1972 and 1973 which has come into force in Karnataka from 1st July, 1973, where hunting has been totally prohibited in game sancturies and National Parks and almost all the species are declared as preserved species. Export of trophies, hides and skin etc., are banned. This Act has helped considerably to prevent export of tigers' skins, trophies of birds and other animals.

**Forest Privileges**

There were certain forest privileges extended by the government for the bona fide use of the cultivators in the district. The privileges

were, rights of way to villages, temples and water. Grazing was also permitted in the open forests on payment of fee. Bona fide cultivators were permitted free of charge to collect and remove dead leaves for manure, to cut and remove the grass for fodder or manure, to cut and remove *karvi* for agriculture purposes and to cut and remove with the prior permission of proper authority barren sago and other palms for water courses and other agricultural purposes from any reserved forests in their villages or in the neighbourhood of their villages. Grazing privileges were regulated by the special rules for grazing in the organised teak area. *Soppinabettas* were also allowed to provide green manure for the agriculturist. Many regulations were opposed by the cultivators as they were not provided sufficient protection from the wild animals, and also not providing sufficient amenities to the farmers. It was also alleged that the cultivated areas were also taken over by the government, when forest settlement took place. The occupants of the coastal taluk had only one privilege—removing the dry leaves for manure ; but the Forest Department had prevented them from continuing even this practice. This was the cause for the agitations of the people and their organising meetings against "forest grievances" in 1886, 1887, 1916, 1917 and 1918.

In 1924, the forest privileges were regularised under the Kanara Forest Privileges Rules, by which certain trees like teak, sandal and others were not permitted to be felled, but the cultivators were permitted to take dry leaves for manure, grass for fodder and manure, etc. In 1976, under the Karnataka Forest Manual published by the government, the privileges of this district were mentioned separately. According to this, the existing jungle privileges were not affected in the *soppinabettas* or *kans,* but the farmers were not permitted to fell or lop or otherwise damage the reserve spicies. The farmer has to apply to the Divisional Forest Officer for any extra wood required by him. The government has prescribed the rates for the different types of wood required by the farmer for his use. The forest area of the district has been classified into 1) *kans* and coastal taluk and 2) all other forest area. In *kans* strip clearance will be permitted upto 80 meters around habitations and 40 meters around cultivated area. In coastal taluk, strip clearance will be permitted from 80 meters to 160 meters around cultivation. In all other forest areas, strip clearance is permitted from 80 to 160 meters around habitation and 40 meters around cultivation. Rules have been framed for grant and maintenance of these strips. Blank area with gentle slope is mine-

forest may be granted for raising plantation or fruit trees under *sanads*. The maximum area granted under the *sanads* should not exceed four hectares and the area must be planted within three years. Lands on steeper slopes may be leased out for planting cashew nut. There are certain privileges open to gardeners in protected forests assigned to them as *bettas*.

Inspite of all these rules and regulations imposed on the forests of the district, it was alleged by the public that the forest is being denuded. There was a movement called 'Appiko' started in September, 1983 to stop indiscriminate felling of trees wherein people embraced the trees to be felled and prevented felling.

**Forest Settlement**

The Forest settlement in the district was conducted between 1879 to 1897. Prior to the introduction of the Indian Forest Act 1878, classification adopted for forest settlement was 1) Special Reserve, 2) Ordinary Reserve and 3) District Reserve. The forest areas other than Bettas and Kumris classified were in three stages between 1879–1897 i.e., 1) Reserved and protected forests between 1879–1891, 2) All forests were classified as Reserve, which were sub-divided into a) Forest proper b) Fodder Reserves or Fuel and Fodder Reserve and c) pasture reserve between 1892 to 1897, 3) From 1897 onwards all forests were classified as Reserved, and sub-divided into a) Forest proper and b) Minor Forests. The advantage of the single classification of Reserved Forest is that it brings all the forests of the District under one category and one chapter of the Act with all the rights of the people and of Government properly recorded. The settlement work from the time of the Act was divided into four periods – 1) The earliest settlements in 1879–80, 2) The main settlement work which is spread over a period from 1880–1900, 3) The resettlement of Supa and of the areas settled, from 1904–1908. 4) The miscellaneous settlement work carried out from 1920–22.

In all the settlements the area assigned for grazing has a definite scale and based on a standard of two acres per head of cattle, co-extensive with those assigned for other privileges. The strict reservation of *"kan"* area was also one of the principles of the forest settlements. Under this the teak pole areas of Haliyal and Mundgod and high forests areas of the district have been restricted by exercising of the privileges. The general account of the system and principles of settlement work in the district was given in some length in order

that the particular account of the settlement of each taluk and petha could be more readily understood,

The privileges exercised in the beginning was embodied in a set of administrative order known as the "Kanara Permit Rules" based on privileges exercised from time immemorial. In 1902 the "Kanara Protected Forest Rules" were issued. By this time classification of protected forests had been replaced by that of reserved forests. Subsequently in 1911 the Kanara Forests Privileges Rules and the Kanara Forests Permit Rules were framed and brought into force to have control over the forests of the district.

**Forest Industries Corporation**

The Karnataka Forest Industries Corporation was registered under the Companies Act 1956 with effect from 1st May, 1975, to establish, administer, own and run industries for manufacturing forest products in the State. The Corporation has undertaken the green grass dehydration and pelletistaion project in 3.7 hectares at Balekoppa, Siddapur Taluk utilising grant–in–aid provided under the Integrated Development of Western Ghat region. The total investments in this project to the end of the financial year 1983–84 was Rs 85 lakhs. A sum of Rs 9.6 lakhs was received as share capital contribution and Rs 52.9 lakhs as grant to this project. The dehaydrated grass is being sold in the district in summer season. The improved variety of pineapple plants have been raised by the Corporation in an area of 1.25 ha at Banavasi, at a total investment (from 1974–75 to 1983–84) of about 24.2 lakhs. It has prepared a project to convert the existing pineapple project into *agave* plantation for its ready market. The logging operations have been taken up by the Corporation at Haliyal, Sirsi and Yellapur Forest Divisions from 1983–84 at a coast of Rs 4.18 lakhs. The Corporation is running a saw mill at Dandeli. The total investment in this project to the end of the financial years 1975 to 1984 was Rs 331 lakhs.

**Forest Plantation Corporation**

The Karnataka Forest Plantation Corporation Ltd. was established during 1971. At present, the Corporation is engaged in raising Eucalyptus and Cocoa plantations in the district. It has raised 7,299 hectares of Eucalyptus plantations during 1972 to 1980 at a cost of Rs 23.85 lakhs. The eucalyptus wood plantation has yielded about 5.51 tonnes of wood and a revenue of Rs 16.75 lakhs. Eucalyptus oil

is being distilled from eucalyptus citrodora plantations of the Corporation. Over 0.0587 tonnes of oil is distilled between 1976 and 1983, yielding a revenue of Rs 4.23 lakhs. The cocoa plantations have been raised by the Corporation in the Gangavali valley from 1977 to 1980 over an area of 355.75 ha. But this was discontinued from 1983 due to poor market rates and high investment. Now, the cocoa plantations have been transferred to M/s. Camco Ltd., Mangalore, on long-term crop collection and maintenance lease basis.

**Cashew Development Corporation**

The Karnataka Cashew Development Corporation Ltd. was established during 1978 to improve the potential of existing cashew plantations and for raising high-yielding plantations. The Corporation at present is engaged in maintaining 2,500 ha of old cashew plantations in Uttara Kannada, transferred by the Forest Department during 1979 and having a programme to raise high-yielding cashew plantation in 500 ha. The Corporation was able to complete the spraying with insecticide for controlling the tea mosquito in all the old plantations. The total investment in this project from 1980–81 to 1983–84 was about Rs 10.93 lakhs. Over 764.14 Mt of cashew were produced during 1980–81 and 1983–84, yielding Rs 47.77 lakhs as revenue.

**Dandeli Wild Life Sanctuary**

The Dandeli Wild Life Sanctuary was established during 1953 and the area of this sanctuary is 5,729 ha where games like bison, sambar, cheetal, barking deer, elephant, mouse deer, rabbit, procupine, tiger, panther, bear, wild dog, wild cat, civet cat and several other varieties of birds and reptiles are found.

**Forest training**

There is a Forester Training School at Dandeli (1960). The standard of training was slightly elevated to Foresters-cum-Surveyors Training from 1974 with a minimum qualification of P.U.C. in science and the duration of the training is about 15 months. The trainees are being paid Rs 100 p.m. as stipend and also provided residential accommodation during the training period. After successful completion of training, the trainees will be absorbed by the department. There is also a Guard Training School at Kiruwatti of the district (1973). The minimum qualification required for the candidate to undergo training is S.S.L.C. The duration of the training is six months and the trainees are being paid Rs 100 p.m. as stipend and

are provided residential accommodation. The successful trainees will be appointed in the department.

**Mini Zoo**

The Mini Zoo at Sirsi was established during 1971 with an object to exhibit various animals and birds to the public, particularly children, with a view to create love towards wild life, thereby to inculcate in their minds the need to preserve the wild life of the nature. Here animals and birds like sambars, spotted deer, peacock, pigeons, pythons, panther cubs, fox, guinea pigs, monitors, crocodiles, rabbits, parrots, tortoise, barking deer, etc. are found. A snake park maintained by a private person has been merged with this.

## FLORA*

Uttara Kannada can justly be proud of its rich plant cover. Out of a total geographical area of 10,291 ps km (1981) the official forest area is 8,292.65 sq km giving a percentage of 80.57. Most of the other areas also have lush green vegetation at least during the wetter months making the District a treasure house of tropical plants. The Angiosperms alone numbering around 1,800 species.

**Littoral Vegetation**

The coastal taluks have a seaboard about 144 km in length made up of sandy beaches broken up by the estuaries of the Kali, Gangavali, Aghanashini and the Sharavati rivers. The littoral vegetation on the sandy beaches in typically psammophytic with plants adapted to the scorching sun, shifting sands and salt-laden winds. Sand binders are common. Some like *Remirea* and *Spinifex* have spiny, silicifed leaves which resist desiccation and browsing by cattle. *Canavalia maritima* and *Ipomoea pes-caprae* are sand-binders with attractive flowers and broad, cuticularised leaves. *Euphorbia atoto* and *Hydrophyllax maritima* are common succulents on the dunes above the high-tide mark. *Pandanus fascicularis, Scaevola frutescens* and *Vitex trifolia* form clumps on the rear beach. Besides the coconut (*Cocos nucifera*) and palmyra (*Borassus flabellifer*) palms on the rear beach, there is a seasonal herbaceous cover especially at the end of the Sout-West Monsoon. The sandy soil lacks good organic nutrients. Carnivorous plants like the sundew (*Drosera indica*) and

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* Authored by Rev. (Dr.) Cecil J. Saldanha.

bladderwort *(Utricularia reticulata)* can however supplement their nutritional needs by trapping and ingesting insects, They occur in abundance among the sedges and grasses towards the end of the monsoon.

There are extensive estuaries at the mouths of the rivers especially in the Karwar, Kumta, Gokarn and Honavar areas. The saline marshes associated with these estuaries are known as *khar* lands and support a halophytic mangrove vegetation. *Avicennia, Bruguiera, Cerbera, Kandelia, Rhizophora* and *Sonneratia* are common trees with stilt roots that can resist the drag of the rising and ebbing tides. They carry on sustained endosmosis despite the salinity of the water and overcome the limitations of the marshy soil by negatively geotropic pneumatophores. Bouyant fruits as in *Cerbera* and vivipary as in *Rhizophora* ensure dispersal and survival of these specialised plants. *Acanthus ilifolious* and *Derris trifoliata* are typical of mangroves, one a shrub and the other a twiner. *Acrostichum aureum* is a prominent fern with a thick brown rhizome, large pinnate fronds and exindusiate sori on the lower side of the pinnae. This mangrove vegetation plays an important role in the interphase between land and sea, fresh and brackish water. The margins of the estuaries are used for growing salt-resistant varieties of rice.

**Coastal Hinterland**

There is a narrow strip of coastal hinterland between the sea shore and the Western Ghats which varies in width from about 5 to 20 km. It scarcely exists near Karwar since the mountains here dip into the sea, the valleys forming beautiful bays and the peaks emerging as offshore islands. The hinterland is generally made up of a flat-topped low lateritic hills through which numerous swift-flowing streams have carved out narrow, low-level beds. The flanks of these hills were once densely wooded but in most places they have been mercilessly felled for fuel and timber. A remnant of these moist deciduous flank forests can be seen near Dhareshwar between Kumta and Honavar. *Alseodaphne semecarpifolia, Aporousa lindleyana, Diospyros malabarica, Holigarna arnottiana, Ficus arnottiana, Mammea longifolia* and *Mimusops elengi* are common trees when the forest is well preserved. *Ixora coccinea* is a common shrub in the undergrowth. During the monsoon there is a rich herbaceous vegetation. *Begonia crenata* clings to the lateritic boulders and covers them with its white blossoms. The flat lateritic sheet rock of the plateaux seems barren during most of the year except for the succulent *Euphorbia* and the laticiferous tree *Sapium*

*insigne*. However a spectacular herbaceous cover clothes the entire area during and immediately after the monsoon. Several species of *Alysicarpus, Eriocaulon, Exacum* and *Lindernia* occur in prodigal profusion. The pink flowered sundew *Drosera indica* and several species of blue and purple flowered bladderworts like *Utricularia lazulina* and *Utricularia reticulata* turn the plateaux into carpets of flowers. The hemi-parasite *Rhamphicarpa longiflora* produces long, white flowers that bloom in the evening and fade by the next morning having been in the meantime pollinated by noctural moths. As the wet season turns into dry, the grass turns from green to brown and it is cut for fodder and thatch or is grazed by cattle.

**Tropical Evergreens**

The western slopes of the Ghats were until a few decades ago covered by a continuous stretch of Southern Tropical Evergreen forests. Several biotic factors have considerably reduced the extent of these forests. The closed forest canopy is made up of the confluent crowns of giant trees, unbranched for a considerable length of their height and supported by buttressed bases. There is a wide species diversity in the canopy composition. *Artocarpus hirsutus, Calophyllum polyanthum, Diospyros ebenum* and *D. malabarica, Dipterocarpum indicus, Garcinia xanthochymus, Hopea ponga, Lophopetalum wightianum, Mammea longifolia, Mesua nagassarium, Myristica fatua* and *M. malabarica, Vateria indica* and *Vitex altissima* are some of the common species. *Calophyllum apetalum* and *Madhuca nerifolia* grow along streams while *Elaeocarpus tuberculatus* prefers swampy soil. Some of these trees may even form emergents in favourable situations.

The closed canopy ensures controlled conditions of light and humidity within the forest. As the intensity of light and degree of humidity vary within the forest, plants that can carry on metabolic activities at these levels form strata or storeys. *Beilschmiedia dalzellii, Cinnamomum malabatrum, Cryptocarya procera, Dysoxylum binectariferum, Knema attenuata* and *Xantolis tomentosa* are frequently found in the topmost understorey. *Syzygium laetum* with scarlet filaments occurs at a lower level. *Caryota urens* and *Corypha umbraculifera* are tall, monocarpic palms while *Arenga wightii* and *Pinanga dicksonii* are smaller and polycarpic.

Shrubs are frequent in these evergreen forests. *Eugenia macrosepala, Dichapetalum gelonioides, Ixora nigricans, Memecylon terminale, Psychotria dalzellii* and *Rauvolfia serpentina* are but a few of the many interesting species.

The ground cover is poor in grasses but has a rich composition of sciophytes especially during the wetter months. *Alpinia, Ammomum, Boesenbergia, Curcuma, Globba* and *Zingiber* are frequent rhizomatous herbs of the Zingiberaceae that produce aerial shoots and flowers during the monsoon. *Costus speciosus* with flowers and red peduncles prefers water-logged areas.

The evergreen forest is replete with large woody lianes that spiral to the canopy supported by the forest trees. *Diploclisia glaucescens* and *Gnetum ula* have cauliferous fruits. *Entada pusaetha* has probably the largest beans in the country. *Beaumontia jerdoniana* and *Chonemorpha fragrans* festoon the trees with their large white flowers. *Moullava spicata* is an endemic with spikes of red and yellow.

Epiphytic orchids are relatively few in the evergreen forest. However *Porpax jerdoniana, Sarcanthus pauciflorus* and *Thunia venosa* prefer the high forest. *Remusatia vivipara* is an epiphytic aroid that propagates itself by the help of bulbils. *Aeschynanthes perrottetii* is a succulent gesneriad with long, tubular, red flowers that together with the asclepiadaceous *Hoya* drapes the forest trees. *Schefflera* and *Fagraeca* begin their life as epiphytes but gradually send down roots into the soil from their arboreal perch.

*Pothos scandens* and *Raphidophora pertusa* are two common aroids that cling to the tree-trunks clothing them with their attractive foliage. Wild peppers *(Piper)* also prefer this ecological niche.

There are several mosses, lichens and fungi in these forests. The latter especially help in breaking down the forest debris into simple organic nutrients in a natural process of recycling.

The tropical evergreen forest is a rich ecosystem that can be very easily degraded once the canopy is opened and the ground cover of leaf litter and humus lost by rapid run-off and erosion. The invasion of cleared forest land by the aggressive weed *Chromolaena odorata* is a direct result of the opening of the canopy.

**Semi-evergreen Forests**

Semi-evergreen Forests often replace the Evergreen Forests when the ecological conditions are modified by soil or by biotic pressures. Selective felling causes gaps in the canopy. Initially this encourages juvenile plants to grow faster. At the same it permits the introduction of species from drier habitats. *Calliearpa tomentosa, Macaranga peltata* and *Trema orientalis* are early colonisers in disturbed areas. As the

canopy is opened, the original trees are replaced by species of *Lagerstroemia* and *Terminalia dillenia pentagyna* and *Bombax insigne* are typically deciduous trees found in forest glades with superficial and poor soil.

**Moist Deciduous Forests**

The Evergreens and Semi-evergreens are surrounded by moist Deciduous Forests on the Western coastal plains as well as on the eastern uplands. A simultaneous leaf-fall helps trees in these forests to avoid excessive transpiration during the dry months from February to May. The canopy of these forests if relatively open, the stratification less marked and the shrub layer better developed. Flowering takes place during leaf-fall aed fruiting is advanced when the monsoon breaks. Epiphytic orchids are extremely common. Most shed their leaves during the dry season but generally put forth exquisite sprays of intriguing flowers during this period.

Common among the trees are *Careya carborea, Ficus amplissima, Ficus exasperata, Haldina cordifolia, Lagerstroemia parviflora, Mitragyna parvifolia, Sterculia guttata, Terminalia bellirica, T. chebula, T. crenulata* and *T. paniculata. Xylia xylocarpa* is often a dominant and easily recognised by its globose clusters of tiny yellow flowers and the axe-shaped woody legumes. *Stereospermum colais* has long and slender capsules while *Strychnos nux-vomica* is often loaded with globose fruits that turn red at maturity. *Tectona grandis* is native and is extensively planted. Among the stragglers and climbers the most prominent especially when in fruit is *Calycopteris floribunda* with accrescent calyces. *Jasminum* has several species, the commonest being *J. malabaricum* and *J. rottlerianum. Milletia racemosa* is another straggler with bluish-white flowers.

The shrub layer becomes conspicuous soon after the convectional showers in April and May. *Holarrhenna pubescens* is an ubiqutious white-flowered plant. *Ardisia solancea* and *Embelia acutipetala* are frequent.

The ground cover in the moist deciduous forests is seasonal. *Eragrostiella bifaria, Eragrostis uniloides, Panicum tripheron, Sporobolus piliferus* are some among the many grasses that appear in a scattered manner. A number of plants that perennate by underground parts put forth flowers with the early showers. *Amorphophallus bulbifer, Arisaema tortuosum* and *Sauromatum venosum* are some of the common

aroids. *Chlorophytum orchidastrum* and *Curculigo orchioides* are representative liliaceous taxa. Several species of *Habenaria* also appear during the monsoon months.

The moist deciduous forest protects the epiphytic orchids under its light canopy. *Aerides crispum* and *Aerides maculosum* are common. There are several species of *Dendrobium, Gastrochilus, Luisia* and *Oberonia* that flower and fruit in these forests. Clusters of *Cymbidium aloifolium* and *pholidota pallida* are visible almost everywhere.

**Rheophytic Vegetation**

Besides the four larger rivers there are several rivulets and streams traversing the district. The banks of the rivers and the stream beds harbour plants that are specially adapted to these situations. *Calophyllum apetalum, Crateva magna, Lagerstroemia reginae, Salix tretrasperma, Terminalia arjuna, Trewia nudiflora* and *Vitex leucoxylon* are frequent riparian trees. *Barringtonia acutangula, Diospyros angustifolia, Memecylon angustifolium* and *Syzygium occidentale* are smaller trees in similar situations. *Homonoia riparia, H. retusa Rotula aquatica* are shrubs that are submereged for part of the year but leaf, flower and fruit as the monsoon flushes decrease and the stream bed becomes exposed. *Crinum asiaticum, Cryptocoryne spiralis* and *Lagenandra toxicaria* are bulbous or rhizomatous herbs frequently found on the sandy or marshy river banks. Ferns are common along the streams. *Angiopteris evecta* and *Cyathea gigantea* are among the larger ferns with fronds over 2 m long. *Osmunda regalis,* abundant among boulders along the streams, produces its terminal tassels of sori as the level of water decreases in the post-monsoon period. Where the water is pure and clear several crustose and thalloid species of the Podostemaceae attach themselves to the rocks in the streams near the water line or just below it.

**Pressures on the Vegetation**

The rich vegetation of Uttara Kannada district is under heavy pressure. The fuel-wood crisis has resulted in vast areas of forest being felled both licitly and illicitly. The once beautifully wooded hills between Honavar and Karwar have been mercilessly mutilated. The rate of denudation is about fourfold the rate of replanting, especially around urban areas.

The Forest Department has considered Uttara Kannada as one of its principal sources of timber. The soft-wood species in the evergreen forests have been systematically extracted by selective felling

thus degrading the evergreens. Other areas have been clear felled and planted with monocultures of eucalyptus and teak and recently of *Acacia auriculiformis*. These and other mixed forest plantations have not been able to recreate the original ecosystems.

Some forests of the above Ghat areas have been allotted for use of the local people either as minor forests to supply village needs or as *soppinabettas* to serve as source of leaf-manure and fodder for local farmers. Most of the minor forests are in a degraded condition and need to be brought under better management practices. The farmers of Uttara Kannada have developed an intensive multiple cropping pattern in their areca gardens. Besides the areca palm, pepper, cardamom, cocoa, banana and coconut are grown simultaneously. This intensive cropping pattern is sustained by large quantities of leaf manure obtained by lopping in the surrounding *soppinabetta* lands. Due to indiscriminate lopping and lack of proper tending the *soppina betta* trees are badly mutilated and many trees have died. It is difficult to find a wholesome tree in these *soppinabettas*. Some farmers have however, initiated action to improve these forests by better lopping methods and replanting the blanks.

Industrial development in Uttara Kannada has often been forest based. The brick and tile factories along the coast have depended both on fuel logs from native trees as well as on *Casuarina equisetifolia* generally planted on the stretch of littoral sand dunes.

The Mysore Paper Mills at Bhadravati and the West Coast Paper Mills at Dandeli relied heavily on the large stocks of bamboo especially *Bambusa arundinacea (dowga)* and *Dendrocalamus strictus (medar)*. Green culms were normally extracted until the gregarious flowering of *Bambusa arundiancea* from 1958 onwards. Since the clumps die after this flowering, large quantities of dead culms were available in the sixties and early seventies. The regeneration of the bamboo clumps after the flowering was poor. The forest habitat of the bamboo had also shrunk due to various reasons. Not only have the bamboo areas been degraded but other areas have been converted into plantations of quick growing exotics thus changing the type of plant cover.

Mining in Uttara Kannada is another source of pressure on the forests. About 26,688 hectares of forest lands are under mining leases with 137 lessees (1983). Each labour colony consists of 100–150 people stationed inside or close to the forest. The labour force and the cattle they rear destroy the natural regeneration in about 8–10 km

around the mine. The proposal to mine the limestone outcrops near Yan is expected to degrade an area of rich evergreen forests.

The greatest threat to the plant cover of the District is from proposals to develop the hydel potential of the rivers that flow through the steep and narrow gorges. While run-of-the river generation of power is possible during the monsoon, the turbines have to be kept revolving right through the year by water impounded in vast reservoirs behind high rise dams, The Kali Stage I with its dams, tunnels, powerhouses, penstocks, colonies, roads and quarries destroyed vast expanses of forest. Kali Stage II will utilise the releases from the Supa and Nagjari Power Houses by the construction of three dams with power houses at their toes at Dandeli, Kodsalli and Kadra. The Gangavali Stage I and Stage II as well as the Sharavati Tail Race Dam are on the drawing boards. These as well as the contemplated dams on the Aghanashini can result in a loss of over 40,000 hectares of forest land in the district. The conversion of wooded valleys into sheets of water will make a marked change in the vegetation of the District.

**List of Botanical, English, Kannada and Konkani names of some plants mentioned in the Text**

| *Botanical* | *English* | *Kannada* | *Konkani* |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Acanthus ilicifolius | Sea-Holly | Holechulli | — |
| Alseodaphne semecarpifolia | Penny nerved laurel | Massi | Phadgus |
| Ammomum cannicarpum | Raven cardamom | Dodda yalakki | Ranphala |
| Amorphophallus bullifer | Wild yam | Suvarnagadde | Soornu |
| Aporousa lindleyana | Kokra laurel | Salle | Chelle |
| Arenga wightii | Wight's sago palm | Dodsala | — |
| Ardisia solanacea | — | Bodina gida | — |
| Arisaema tortuosum | Cobra plant | Kadu suvarnagadde | — |
| Artocarpus hirsutus | Wild jack | Hebbalasu | Pachpanasu |
| Avicennia officinalis | Indian mangrove | Kandal | — |
| Barringtonia acutangula | Indian oak | Holekavamara | — |
| Bambusa arundinacea | Spiny bamboo | Hebbidiru | Bambu, Kantyavaso |
| Beilschmiedia dalzellii | Cuspid leaved cinnamom | Kamate | — |
| Borassus flabellifer | Palmyra | Tale | Tadguli, Tada |
| Bombax insigne | Larger red silk cotton tree | Buruga | Savarikappusu |
| Callicarpa tomentosa | Western Ghats mulberry | Kadueezi | — |
| Calophyllum apetalum | Alexandrian laurel | Kalhonne | — |
| Calophyllum polyanthum | Malabar poon | Surahonne | Suragi |
| Calycopteris floribunda | White wheel creeper | Baguli | — |
| Canavalia maritima | Beach sword bean | Tamteballi | Koshvali |
| Careya arborea | Matchwood tree | Kavalumara | Kumbhayi |
| Caryota urens | Fish tail palm | Bainimara | Bayani rooku, Birli |
| Casuarina equisetifolia | Australian beef-wood | Galimara | Varia rooku, Soori ruku |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Cerbera odollam | Wax dog bana | Chinde | — |
| Cinnamomum malabatrum | Wild cinnamom | Kadudalchini | Dalchini |
| Cocos nucifera | Coconut tree | Tengina mara | Narlamaddo |
| Corypha umbraculifera | Great fan palm | Sitale | Tada |
| Costus speciosus | Mountain sweet flag | Padmapatra | — |
| Crateva magna | Sacred bama | Holethumbe | — |
| Crinum asiaticum | Asian crinum | Visha moongili | Nagdali |
| Cryptocarya procera | Brazilian nutmeg | Golimavu | Gulamba |
| Curculigo orchioides | — | Nelatale | — |
| Dendrocalamus strictus | Solid bamboo | Karibidiru | Kondevaso |
| Derris trifoliata | Mangrove rose wood climber | Vadanigida | — |
| Dillenia pentagyna | Dog teak | Kaduganigalu | Karambala |
| Dipterocarpus indicus | Indian Dipterocarp | Challanne | — |
| Drosera indica | Sunders | Kriminashini | Kidyamari |
| Dysoxylum binectariferum | Cup calyxed white cedar | Agilu | Sidara |
| Elaeocarpus tuberculatus | Downy olive linden | Dandale | Dondale |
| Embelia acutipetala | Wind berry | Huligaruke | Waghanagata |
| Entada pusaetha | Nicker bean | Gardala | Garayivali |
| Eragrostiella bifaria | — | Jarihullu | Darbo |
| Eriocaulon quinquangulare | Pincushion plant | Bettagundugida | Benakundi |
| Eucalyptus tereticornis | Mysore Eucalyptus | Nilagirimara | Nilgiri |
| Ficus arnottiana | Wild peepul | Bettada arali | Paira |
| Ficus exasperata | Sand paper Fig | Gargathi | Khravatepana |
| Garcinia xanthochymus | Mysore Gamboge | Devagarige | — |
| Haldina cordifolia | Saffron teak | Hethega | Etga |
| Holarrhena pubescens | Telicherry bark | Kodasige | Kooda |
| Holigarna aronttiana | Jungle marking nut | Kadugeru | Holgeri, Bibbayi |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Homonoia riparia | Water croton | Holenage | — |
| Hopea ponga | Dipterocarp damar | Kalbevu | Bovu, Kiralbogi |
| Impoea pes-caprae | Goat-foot creeper | Adambu balli | — |
| Ixora coccinea | Scarlet Ixora | Kepulahu | Padkalephula |
| Knema attenuata | Narrow leaved nutmeg | Rakthamara | Ranjayiphala |
| Lagerstroemia parviflora | White Indian Lilac | Chennangimara | Beeti |
| Lagerstroemia reginae | Pride of India | Challa | Challe |
| Lophopetalum wightianum | Spindle tree | Boralupale | Bolpalli |
| Macaranga peltata | Lotus croton | Chandakala | Uplaphala |
| Madhuca neriifolia | Narrow leaved butter tree | Madhuca | Vovala |
| Mammea longifolia | Alexandrian laurel | Suragi | Surgi |
| Memecylon angustifolium | Narrow leaved tree berry | Belavanakana | — |
| Mesua nagassarium | Serpent champak | Nagakesara | Nagchampe |
| Mitragyna parvifolia | Water cadamba | Kadavala | Kalam, Apatya |
| Moullava spicata | Orange brasiletto | Gajjigaballi | Gajgyavali |
| Myristica fatua | Travancore nutmeg | Ramapatre | Rampatri |
| Myristica malabarica | Wild nutmeg | Doddajajikayi | Jayiphala |
| Pandanus fascicularis | Screw pine | Kattale | Kedagi |
| Pinanga dicksonii | Cane betel palm | Kadu adike | Ranti phoppala |
| Piper nigrum | Black pepper | Kadu menasu | Meere |
| Pothos scandens | Arecanut climbing arum | Adike balli | Agachevali |
| Psychotria dalzellii | Bastard Ipecacuanhe | Dathale | — |
| Raphidophora pertusa | Indian Ivy | Kandodiballi | — |
| Rhizophora mucronata | Mangrove | Kandala | — |
| Salix tetrasperma | Indian willow | Neeranja | — |
| Sapium insigne | Tiger's Milk Spurge | Kannupade | — |
| Spinifex littoreus | Spiny sand binder | Ravana meese hullu | — |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Sterculia guttata | Red Indian almond | Jenukathala | Sarda, Karde |
| Tectona grandis | Teak | Saguvani | Saguvani |
| Terminalia arjuna | Arjuna myrobalan | Arjuna, Bilimatti | Arjuna |
| Terminalia bellirica | Bellerie myrobalan | Shantimara | Gotinga |
| Terminalia crenulata | Leathery myrobalan | Matti | Matti |
| Terminalia paniculata | Flowering murdah | Hongalu | Hongala |
| Trema orientalis | Oriental nettle | Gorku | Khargola |
| Utricularia reticulata | Bladderwort | Neerugullegida | Chakranika |
| Vateria indica | White dammar | Bilidamar | Dhupa |
| Vitex altissima | Peacock's foot tree | Naviladi | Bharanige |
| Vitex leucoxylon | Water peacock's foot tree | Holenakki | Angura |

## FAUNA*

The district possesses a remarkable range of climate, topography and vegetation which has harboured a great variety of animals. The faunal pattern could be classified into four well demarcated categories, namely, marine, fresh water, coastal strip, and high land. Emphasis is given to those animals which are not of common occurrence in other parts of the state. Local names are given in brackets 'Kan' and 'Kon' to denote that names are Kannada and Konkani respectively. Binominal scientific names are given in *italics*.

### Marine

From Bhatkal to Karwar, the Arabian sea is quite deep and is teeming with sea animals. The shore is mostly sandy, and in some places like Murdeshwar, Dhareswar and Kini, rocky shores could be observed. The abysmal (dark depths of the sea) animals are not yet studied systematically. Sponges, corals, protochordate which live in shallow sea are totally lacking. Sea surface is loaded with plankton. Some of which are luminous at night and thus give an impression that the sea is on fire.

Jellyfish, *Aurelia* sp., Portuguese man-of-war, *Physalia* sp., live in swarms in the upper few feet of the sea. At low tides many of them are washed ashore. Sea anemones, *Anemonia* sp., are sedentary and are found on rocky shores. They are brightly coloured and feed on tiny fishes. Spiral shelled conches live in sea-bed and shells of dead animals are washed ashore. However, these are too small when compared to those found elsewhere in the country. Many species of clams (*balchu,* Kan ; *khubbe,* Kon) live buried in the sand and mud. At low tide, these are collected in large numbers at Karwar, Kumta and Honavar. Mussels and oysters are attached to rocks. The edible oyster, *Ostrea* sp. (*kalga,* Kan ; *kalva,* Kon) are collected after the rains at Karwar, Kagal (Kumta taluk) and Honavar. Several hundred species of other bivalve shells could be collected from sandy sea shores. Cuttlefish, *Sepia,* sp., squid, *Loligo* sp, and octopus regularly creep into the fisherman's nets. Barnacles, Acorn barnacles and Shipworms settle down on any substratum that is available and multiply in large numbers. Wooden boats and machvas are given thick coat of cashewnut oil to protect them from these pests. Edible shrimp, *Crago* sp. (*shettli,* Kan ; *sungat,* Kon), Lobster, Pill bug, and

*Authored by Dr. Krishnanand L. Kamath.

Mantis shrimp, *Squilla* sp. are of common occurrence all along the coast. A great variety of crabs live buried in the soil or cling to the rocks. Fiddler Crab, *Uca* sp. (*edi,* Kan ; *kurli,* Kon), Mole Crab, Hermit Crab could be collected in any number by anybody.

Starfish, *Astropecten* sp. *(nakshatra-meenu* Kan), Brittle star, *Ophicthrix* sp., are common on sandy shores. Sea cucumber, *Holothuria atra* Jaeger, and Sea urchin, *Temnopleurus* sp. are usually found among the crevices of the rocky shores. Sea urchin is a delicay for the coastal children who roast them on the beach and eat like a snack. Sea lily, *Drawida ferine* Gates leads a sessile life by attaching itself to the substratum by a stalk.

Cartilagious fishes like sharks, rays and skates are fierce, savage, extremely bold and often attack swimmers, bathers and others. Dogfish shark, *Squalus* sp. *(hulimeenu, sora,* Kan ; *mori,* Kon), have sharp triangular teeth by which they feed on other fishes. Presence of dogfish is usually an indication that shoals of other fishes is moving nearby. Spotted shark is very cunning and at times marks its appearance like a floating object, so that it can attack unsuspecting prey. Hammer headed shark feeds on tiny fishes, squids and crabs. Sting ray *(mullu-pataka,* Kan*)* is a bottom feeder. It has a long tail and saw-like spines by which it attacks its prey and enemy. Eelectric Eel *(vidyut packet,* Kan) gives out an electric shock in self-defence.

A great variety of bony fishes live in the warm waters of the district. Sardine, *Sardinella longiceps C.V. (matti* Kan ; *tarle* Kon), appear in large shoals in June and remain there till following March. Mackerel-*Scomber* sp *(bangde* Kan and Kon) is a surface swimmer and appear in enormous shoals. Tuna, *Thunnus* sp. (*gether,* Kan) attain enormous size but are not preferred to mackerels. Seer fish (Isvan, Kon) is carnivorous and weighs three to six kilogrammes. White and black pomfrets (*pamplet,* Kon) are considered to be delicacies and hence bring good price.

Sea-snakes (*kadala havu,* Kan) often make their way into the fishermen's nets, who either kill them or throw them back into the sea. Sea turtles *(kadalu ame,* Kan) often visit the shore for egg laying. In summer sea gulls migrate to the district and flock together wherever fishing operations are undertaken. Occasionally, whales could be sighted in deep waters. A few years ago, a medium sized white whale (dead) was washed ashore at Karki.

**Fresh Water**

The rivers of the district are short, fast-flowing and have a high gradient, and therefore, they are relatively free from sea water. The lakes, ponds and wells have their own faunal patterns which are different from that of fresh water rivers. A great variety of single-celled animals, fresh water sponges, hydrozoans, free living flat worms like Planaria, round worms, leeches, fairy shrimps, water fleas (*Daphnia* sp.), cyclops, sow bugs and bivalves multiply in large numbers in shallow waters. Large and varied groups of insects like, springtail, stonefly, mayfly, dragonfly and caddice-fly inhabit in slow flowing streams.

Some of the marine fishes migrate to rivers for breeding. Fishes living in river-mouth are said to be more tastier than marine or fresh water fishes. Glassy perch (*Ambassis ranga* Ham.), Chela (*Chela argentee* Sykes), Sole (*Cynoglossus lingua* Ham.), Giant danio (*Danio aequininnatus* Mc Clell), Garra (*Garra bicornuta* Rao), Green snake head (*Chana punctatus* Bloch), Barb (*Punitus vittatus* Day), Rohtee (*Rohtee neilli* Day), Rasbora (*Rasbora danicornis* Ham.) are the some of the commonly found fresh water fishes. Some lung breathing fishes are found in muddy and stagnated waters.

In rainy season, frogs, *Rana tigrena* (*kappe,* Kan ; *bebbo,* Kon) are common sight everywhere. Diamond-back turtle, musk turtle, swim around in fresh water as well as walk on the land. These are very small and colourful when compared to marine turtles. Stagnated pools of the Kali river present special attraction to crocodiles, (*Crocodilus palustris*). Rat snakes (*kerebodda*, Kan) frequently visit fields, ponds and rivers in search of frogs and tadpoles on which they feed. Water loving birds like Pond Heron, *Ardeola gravii* Syke (*narayan pakshi*, Kan), Open billed stork, *Anastomus oscitans* (*baka pakshi*, Kan), Night heron, *Nycticorax nycticorax* (*irulu kokkare*, Kan) frequently visit fresh water to gather their food.

**Coastal Strip**

Between the Arabian sea and the Western Ghats, there runs a narrow coastal strip which has its own faunal pattern. Hot and humid climate of the area is an ideal breeding place for a great variety of insects which are active during the major part of the year. Leaf bugs, flower bugs, tree bugs and lace bugs cause extensive damage to different parts of the plants. Stink bugs and red bugs give out an offensive odour when they are disturbed. Aphids, tree hoppers and

frog hoppers, mealybugs inflict considerable damage to fruit crops. Chiidren collect dragon flies and damsel flies, tie strings to their tail end and fly them as live kites. Long-horned grass-hoppers, field crickets and cicadas provide musical concerts for the people around. Click beetles, tiger beetles, ladybird beetles, blister beetles, dung beetles, nut weevils and potato weevils could be found in enormous numbers. Fire-flies, in millions illuminate large trees in the monsoon season.

This strip is a paradise for the butterfly collectors. Swallow-tails, monarches, sulphurs and lemon butterflies could be collected in any number. At night, a great variety of moths are attracted to lights. Diamondbacks, clearwings, luna and hawk moths could be collected by erecting light traps at night. Bumblebees, carpenterbees and honeybees are active most part of the year. The farmers keep honey combs in their premises and regularly collect pure honey of mango, cashew and soapnut flowers. Subterranean ants and white ants (termites) are the pests of trees, buildings and furnitures. Mosquitoes breed in large numbers and transmit diseases like malaria. House flies, robber flies, fruit flies, bot flies, blow flies and stable flies build up their numbers in summer.

In this part of the state, man has to learn to live with snakes. Here, snake-bite deaths are among the highest in the country, Cobra-*Naja naja* (*nagarahavu*, Kan), viper–*Echis carinata* (*mandaladahavu*, Kan), pit viper-*Trimeresurus malabaricus*, Russel viper-*Vipera russellii* and krait (*kattuhavu*, Kan) are some of the important snakes. Pythons-*Python reticulatus*, are not poisonous, but squeeze their prey to death in their body coils. Tree snakes, rat-snakes and whip snakes (*chavati-havu*, Kan) are the harmless varieties.

Wall lizard, *Hemidactylus brooki* (*halli*, Kan ; *parli*, Kon), keeps the house–hold pests like cockroaches, crikets and bed bugs under control. The garden lizards, *Calotes varicolour* (*otiketa*, Kan ; *shirlo*, Kon), have a fascinating variety of colours. One is lucky to come across a chameleon, *Chameleon calcaratus* (*gosumbe*, Kan), as it mimics its background completely. Giant lizard, *Varanus bengalensis* (*uda*, Kan ; *chap*, Kon) is very much sought for its skin which is used in preparing musical drums.

Common sparrow, *Hirunda rustica* (*gubbachhi*, Kan), house crow, *Corvus splendens* (*kage*, Kan ; *kavulo*, Kon) and jungle crow, *Corvus macrorhynchos* (*kadu kage*, Kan ; *mhar–kavulo*, Kon) have shouldered the responsibility of keeping towns and villages clean. Doves,

*Chalcophaps indica,* pigeons, *Terophoenicopters chlorigaster* (*parivala,* Kan ; *Parvo,* Kon) and blue rock pigeon, *Columba livia* (*nili parivala,* Kan) sing love lyrics throughout the year. Whereas cuckoo, *Eudynamys acolopaces,* (*kogile,* Kan) and blue jay *Coracias bengalensis* (*maina-hakki,* Kan) are vocal mainly in the breeding season. Green barbet (*kutra shetti,* Kan), lands at the top of a tree and gives out repeated calls to its mate. Wood peckers, *Picoides mahrattensis,* (*marakuttika,* Kan) generally prefer insect infested tree trunks for nesting. King fisher, *Halcyon smyrnensis* hover around water holes in search of fishes and frogs. Mynas *(Acrotherio tristis)* feed in meadows and bushes, whereas bulbuls, *Pycnonotus jocosus* prefer tree tops. Fantailed flycatcher, *Rhipidura sureola* (*nona–hiduka,* Kan) merrily fly around while on a food gathering mission. Occasionally Malabar pied hornbill, *Anthracoceros coronatus* could be seen nesting in the trunk of a tall tree. Tailor bird, *Orthotomus sutorius* (*tuvvi,* Kan) prefers broad leaves to sew its nest. This bird is busy throughout the day collecting nectar from different flowers and singing in shrill voice. Black drongo (*kajana,* Kan ; *mahar-kavuloo,* Kon) climbs to top of the tree and then flies to the next tree.

Scavenger vulture (*rana–haddu,* Kan) and white backed vultures hover in the sky in search of frogs, snakes, tiny birds, rats, squirrels and as soon as they spot one, they swoop on it. King vulture, (*kappu ranahaddu,* Kan) is very much fond of carcass. Brahminy kite, (*garuda,* Kan) usually attacks other birds' nets. Copper's hawk (*giduga ; shikra,* Kan) is very attractive but at the same time most dreaded by other birds. Orange-tail owl, *Bibasis sena,* (*goobe, googe,* Kan) and plain banded owl, *Hesora vitta* hunt their preys only at night. Great horned owl, (*kodina googe,* Kan) gives out fearsome calls. Spotted owlet, (*chitti googe,* Kan) lives in deserted buildings and feeds mainly on insects.

House rat, *Rattus rattus* (*ili,* Kan ; indur, Kon) and house mouse, *Musboodurga* are responsible for destruction of more than ten per cent of stored food grains. Bandicoot, *Bandicoot indica* (*heggana,* Kan ; *kolindur,* Kon) usually lives in the field, but if it gets a chance to enter a house, then it plays havoc with the farm produce. Black faced langur, *Presbytis entellus* (*musya,* Kan ; *mankad,* Kon) is a dominant arboreal monkey which lives in the vicinity of towns and villages. When these langurs descend on fruit and vegetable farms, the owner has to use crackers and guns to frighten them away. The short nosed fruit bat, *Cynopterus sphinx* (*kannu kappadi,* Kan ; *pakko,* Kon) is a

nightmare to the fruit growers. Stripped squirrel, *Funambulus tristriatus* (*inachi,* Kan ; *channi* ,Kon) damages more fruit than it eats.

**High Land**

The Western Ghats of evergreen forests, areca, cardamom and black pepper plantations cover the hill taluks of this region. This is one of the richest parts of the state in forest wealth.

Some of the animals mentioned earlier are also found in this area ; however, wild life dominates over others. Herds of Indian elephant, *Elephas maximus* (*kadane,* Kan ; *hasti,* Kon) roams about in the valleys of the Sharavati and the Kali rivers. Tender bamboo shoots attract them and hence they are abundant in Gersoppa and Dandeli forest ranges. Every villager who lives in the vicinity of thick forest has glimpses of a tiger, *Felio tigris* (*huli,* Kan ; *vaghu,* Kon) at some time or the other in his life time. Even today, one can meet people who have fought tigers bare-hand and escaped from its clutches. Firewood, fruits and leaf collectors are always aware that a tiger get a surprise spring on them at any time. Panthers, *Panthere pardus* (*chirate,* Kan ; *chirchu,* Kon) have a wider distribution than the tiger, They are very cunning and climb trees and wait for their prey. Wild dogs, *Kunn rutilous* (*kadu nayee,* Kan) are fearsome animals and move about in groups. In dense forests, they hunt deer, boars, hogs and at times straying cattle in the forest. Jackal, *Canis aureus,* (*toole* Kan) restrict their activities to thick woods, whereas foxes, *Vulus bengalensis* (*nari,* Kan ; *kollo,* Kon) frequently visit village farms and lift poultry animals.

Spotted deer, *Axis axis,* (*chitte jinke,* Kan ; *chittal,* Kon) is a majestic animal of the district. They move in groups of 30 to 40 animals in Gersoppa and Dandeli forests. Occasionally one may be lucky to have the glimpses of a barking deer, *Muntiacus muntijak,* or a mouse deer, *Tragulus meminna,* running for shelter in deep forest. Bison, *Gavaena gaurus* (*kadukona,* Kan) could be spotted in the valleys of Kali and Bedtihalla rivers. Lion tailed monkey, *Macaca silenus* (*simhadabalada koti,* Kan) is restricted to Siddapur and Gundbala forests. Giant squirrel, *Ratufa indica* (*kadu inachi,* Kan), found in Sirsi and Supa forests, a delicacy to the tribals and hence much sought after. Flying fox, *Pteropus giganteus* (*haro-bekku,* Kan) climbs tall trees at night and glides to lower trees by the help of a skin-fold, that runs between fore and hind legs. Mungoose (*mungusi,* Kan) keeps the lizard, snake and rat denizens under control. Porcupine, *Histric*

*leucura* (*mullahandi,* Kan) is not preferred as food by the majority of wild animals because of its quills. Wild boar, *Sus cristatus* (*kadu-handi,* Kan ; *randukkar,* Kon) very often destroys standing crops in the fields.

Black bear, *Ursus labiatus* (*karadi*, Kan) feeds on honey, white ants and jack fruit. A native Siddi from Sambrani (Haliyal taluk) claims that he fought three bears with bare hands. Hare, *Lepus nigricollois* (*mola,* Kan ; *soso* Kon), multiplies in large numbers and hence is an important source of food for primary carnivores. One is lucky to see a pangolin, *Manis crassicaudata* outside its hide out. Very rarely one comes across a pygmy shrew, *Suneus etruscus* Indian false vampire, *Magederma lyra*, or pygmy pipistrella *Pipistrellus mimus.*

After a close scrutiny of faunal changes of the district during past half a century, one will have a fairly good idea about the influence of man's interference and greed on animals around him. In fact, man has upset the ecosystem of the district in the past three decades. The traditional fishermen were leading a contented life on their day's catch in their country-craft. After introduction of mechanised boats, fishing operations are carried out so intensively that even egg masses and fingerlings are not left behind. This has resulted in fish famine and the coastal people are denied use of the only one source of protein in their food. The dams constructed up the streams of Sharavati and Kali rivers have led to much destruction of down-stream fresh-water fauna. Every year, ten to fifteen feet of silt gets deposited which has driven away many animal species. Excess water released from these dams has also proved to be not congenial to many species living down streams. Insecticide used in an around the wells, ponds, tanks and streams have played havoc with the faunal pattern. The new industries and factories located on the banks of the Sharavati, Aghanashini and the Kali rivers have compelled the aquatic fauna to migrate if not eliminated.

Indiscriminate poaching of animals for their tusks, skins, furs, bristles, teeth, claws, horns and meat has proved to be disastrous to the existence of these animals. The shrimps are sieved from the sea to earn foreign exchange. Frogs are killed for export of their legs. Snakes are caught in hundreds just because the Westerners have a fancy for the coats, hand bags and purses made from their skins. The crocodile has almost become extinct for the same reason. The deers and boars are hunted to suit the palate of the wealthy. The

tuskers are almost certain that they carry execution orders on their heads. The tigers and panthers are killed for their beautiful skins. There were days when foxes were regular visitors to the towns and villages after the dusk. Now, they are not frequently seen in the forest itself. Illegal occupation of forest land, release of forest land for agriculture, mining operations in forests, cattle and sheep grazing in forest have resulted in depletion of wild life.

## CLIMATE

The climate is generally determined largely by geographic locations with respect to the sea and the monsoon winds and topography. The most important feature of physiography is the Western Ghats which acts as a divide between the West Coast and the adjoining hilly regions with heavy rainfall, and the areas of dry–low rainfall to the east. The Western Ghats form the main watershed from which all the east and west flowing rivers originate. The Western Ghats which run almost north–south at right angles to the path of the south–west monsoon current and are the main cause of the heavy rainfall over the coast and also *malnad* which largely provide the water resources of the State, may well be said to be the backbone of the State. In this area, the Uttara Kannada district lies.

The district consists of the coastal strip, the region of the Western Ghats and the Plateau region to the east of the ghats. The elevations vary from sea level to about 1,800 m (6,000 feet) and as such, the climate is characterised by high humidities, nearly all the year round in the coastal strip and in the Western Ghats region, while in the area to the east of the ghats, the climate is drier, except in the south-west monsoon season. The rainfall is plentiful, particularly in the coastal and Western Ghat region.

### Seasons

The year may be divided into four seasons, 1) the summer from March to May has rising temperature with the maximum temperature of the year occurring in April or May. Humidity begins increasing from May onwards. Occasional thunder-storms occur in April and May, 2) the south-west monsoon season, from June to Semptember which lasts for four months from the beginning of June is characterised by overcast skies and heavy rainfall in the coastal region, Western Ghats and *malnad* area, 3) October and November constitute the retreating monsoon or post-monsoon season, and 4) the period from

December to February is generally dry with clear bright skies, low humidity and agreeably low temperatures. There is very little rainfall in this season.

**Rainfall**

Records of rainfall in the district are available for 11 stations for periods ranging from 22 to 84 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 2,741.7 mm (107.94″). The rainfall in the district in general decreases gradually from the coast towards the Western Ghats region and thereafter rapidly further eastwards. The southern most portion of the coastal strip in this district is the region with the highest rainfall along the whole of the West Coast of India. The rainfall in the district varies from 3.854.3 mm (151.74″) at Bhatkal near the south-western border of the district to 1,155.5 mm (45.48″) at Mundgod near the north-eastern border. Heavy rainfall occurs during the three months June to August and later decreases rapidly. July is the rainiest month. The rainfall during the monsoon months June to September constitutes about 89 per cent of the annual rainfall. The rainfall during the pre-monsoon month of May and the post-monsoon months of October and November is mostly in the form of thunder showers. The variations in the rainfall from year to year is small. During the 50 year period from 1901 to 1950, the highest annual rainfall amounting to 133 per cent of the normal occurred in 1933. While 1905 and 1918 were the years with the lowest annual rainfall which was 70 per cent of the normal. Rainfall less than 80 per cent of the normal occurred in five years out of these fifty years in the district and none of them were consecutive. However, considering the rainfall at the individual stations, two consecutive years with rainfall less than 80 per cent of the normal occurred once or twice at eight out of the eleven stations and three consecutive years of such low rainfall once each at Bhatkal and Haliyal. It will be seen from table 2 that the annual rainfall in the district was between 2,500 and 3,100 mm (98.43″ and 122.05″) in 27 years out of fifty years.

On an average, there are 103 rainy days (*i.e.* days with rainfall of 2.5 mm-10 cents or more) in a year in the district. This number decreases from 114 at Bhatkal and Honavar on the coast to 87 at Mundgod near the north-eastern border of the district.

The heaviest rainfall in 24 hours recorded at any station in the

district was 480.6 mm (18.92") at Kumta on 11th October, 1887. Sometimes, depressions and cyclones cause heavy rainfall resulting in havocs and damages.

*Rainfall Nakshatra :* The rainfall period is divided according to 27 *nakshatra* periods because farmers traditionally base and adjust their farming operations according to rainfall received in particular *nakshatra* periods. This does not mean that *nakshatras* have any influence on the rainfall. It was only another way of dividing the year into periods on an astronomical basis which the farmers traditionally understood. The 27 *nakshatra* periods divide the solar year into 27 periods corresponding to 27 stars of the Indian astronomical calender, beginning with Ashvini (the first *nakshatra*) of the Constellation Mesha (Aries) and ending with Revati (the last *nakshatra*) in the Constellation Meena (Pisees).

**Pressure and Winds**

The general surface wind flow over the district is from west or south–west in the south–west monsoon season. In winter, atmospheric pressure is low. The pressure gradient is weak in winter and the winds are from north–east to east which are variable. Pressure begins to decrease in March and by April, there is a reversal of pressure gradient with higher pressure. In March and April, pressure gradient is still weak and winds are high or variable with a westerly tendency in the afternoon in the coast.

Winds are generally strong in June and July than in May and from west to south–west with more westerly components in the afternoon in the coast. The wind and pressure regime remains more or less similar in August and September. In October, there is a reversal of pressure gradient with lower pressure.

**Temperature**

There are three meteorological observatories in the district *viz,,* at Shirali, Honavar and Karwar. The records of these observatories may be taken as broadly representative of the conditions in the district in general, except that the temperature at higher elevation over the ghats is likely to be a couple of degrees lower and in the region east of the ghats a few degrees higher than in the coastal region. Temperatures begin to increase steadily from about the end of February. April and May are the hottest months with the mean

daily maximum temperature at about 32° C to 33° C (89.6° to 91.4° F) and the mean daily minimum at 25 to 26° C (77.0° to 78.8° F) in the coastal part. On individual days, the day temperature may go up to about 35° C (95° F) in the coastal region and to about 38° C (100.4° F) in the portion east of the ghats. Weather during the period, March to May is very oppressive due to the moist heat. Thunder showers which occur in the afternoon of some of the days bring welcome relief. In the coastal areas, the oppressive heat is often relieved by the comparatively cool sea breeze which blows in the afternoons. With the onset of the south-west monsoon by about the beginning of June, temperatures decrease and weather becomes pleasant. By about the first week of October, when the south-west monsoon withdraws, day temperatures increase slightly but night temperatures begin to decrease. During the post-monsoon period day temperatures upto the end of December are as high as during the period March to May. But, night temperatures decrease steadily. After December, both day and night temperatures decrease till February and thereafter they increase.

The highest maximum temperature recorded at Honavar was 37.8° C (100.0° F) on 17th March, 1948, while it was 38.9° C (102.0° F) at Karwar on 16th April, 1956. The lowest minimum temperature at Honavar was 14.2° C (57.6° F) on 18th February, 1960 and 11.9° C (53.4° F) at Karwar on 3rd February, 1911.

**Humidity**

Relative humidity depends not only on the amount of water vapour in the atmosphere but also on temperature. The relative humidity is generally high throughout the year and particularly so in the south-west monsoon months. In general, the coastal area, the ghats area and the *malnad* areas are more humid, and over the coastal and *malnad* areas low humidity of 30 to 40 per cent can occur in March-April. In July and August, very high humidities, exceeding 90 per cent, generally decreases gradually upto November and more rapidly thereafter.

**Cloudiness**

Cloudiness is recorded in oktas *i.e.,* in one-eighths of sky covered. An overcast sky is said to be covered by 8 oktas of cloud and half covered sky by four oktas of cloud. In the district, the sky is mainly clear or lightly clouded in the period from December to February. Cloudiness gradually increases from March and during the period

March to May, afternoons are more cloudy than the mornings. During the south-west monsoon season, skies are mostly overcast or heavily clouded, when there is rainfall in more than 20 days in a month and the sun is not seen for days together. Form October, cloudiness decreases.

**Winds**

Winds are light to moderate with some strengthening in the south-west monsooon season. In the south-west monsoon, winds blow from directions between south-west and north-west. In the period, October to February, winds are mostly north-easterly to easterly in the mornings and from directions between south-west and north-west in the afternoon. In the summer season, northerly to north-easterly winds are more common in the mornings, while in the afternoon, they continue to be from directions south-west and north-west.

**Special Weather Phenomena**

During the latter half of the summer season and in the post-monsoon season, the district, particularly the coastal region experiences very strong winds, sometimes reaching gale force, and heavy rain in association with cyclonic storms which develop in the Arabian sea and move in close proximity to the coast. Thunderstorms occur in the latter part of the hot season and the post-monsoon months. Fogs are fairly frequent in winter in the *malnad* and adjoining areas.

Tables 3, 4, 5 and 6 give the temperature and relative humidity, station level pressure, mean wind speed and special weather phenomena respectively from Honavar and tables 3 (a) and 4 (a) give similar data for Karwar. Tables 7 give the temperature of the district and 8 part A and part B give rainfall data of the district Headquarters and taluk Headquarters of the district.

**Trends**

Human activities like industrialised urbanisation (which means many concrete structures, tarred roads, motor transport which exhumes fumes, smoke from houses and industries, congested localities) and destruction of trees, deforestation, etc., have resulted in growing in atmospheric and water pollution. All these have an effect on climate. These change the radiational properties on the land-surface and increase the dust and other particulate contents of the lower levels of the atmosphere. The effect of all these is an increase in temperature. Investigations have found that there is a increasing trend of rainfall in

the coastal areas of the district. The changes in the mean rainfall from 1876–1976 reveal that there is generally no significant relationship between the rainfall series and solar activity, *i.e.*, June–September number and cycle between four to twelve years are present in the rainfall series, but they are not very significant statistically. A cycle between two to three years called "Quasi–biennial Oscillation" (QBO) is found in the rainfall series but this is also not of higher significance.

**Ecology and Environment**

The prevention and control of air and water pollution and the problems of restoration of degraded environment need urgent attention. This is particularly urgent in the ecologically sensitive zones such as the hill tracts of the Western Ghats, etc., in which the large area of Uttara Kannada District lies. The effort of ecorestoration should involve not only the Government agencies, but also the local population and educational, scientific and technical institutions. The Department of Ecology and Environment, which was started during 1981 has, initiated steps to preserve and promote the ecological and environmental balance in the district. It is functioning as an observant to ensure that the projects and programmes undertaken by the Government, as also by public and private bodies and individuals do not adversely affect the environment. The department is also working to bring about social awareness regarding environmental protection and in finding solutions for problems like dwindling forests, soil erosion, air and water pollutions, etc. These pollutions are caused due to introduction of extraneous materials into environment which are not normally found in them, thereby adversely affecting its normal use or reuse.

Industrial pollution in Uttara Kannada District at the four major plants, situated one on the sea coast and the other three on the banks of the river Kali at Dandeli has drawn public attention. These industries at present have adopted sophisticated treatment devices for air and water pollution control measures. All pollution controll activities are aimed at reducing the pollution load to the minimum and within permissible limits. The Ballarpur Industries Ltd, caustic soda factory has established the sodium tripoly phosphate and mercury treatment plants for both the domestic and industrial wastes as also a long pipe line into the sea carrying the treated effluents far away from the coast, in view of mercury being involved in the process. A Special Watch Dog Committee with the Deputy Commissioner as

the Chairman has been appointed in May 1985 to review the measures taken by the industry in this direction, as there has been public commotion over some derangement in the pipe line system. Air pollution is also being controlled by dispersing small quantity of surplus chlorine gas through a stack of about 45 mt height located on a hillock (137 mts MSL) near the factory. The West Coast Paper Mills Ltd., have a sophisticated treatment plant and the treated effluents are being discharged into the Kali river through Halmadinala. The Dandeli Ferro–Alloys Ltd., and the Indian Plywood Manufacturing Co. Ltd, are not significant water pollution industries. To the extent required, pollution control measures have been implemented in these industries. The air and water pollution problems are not of a magnitude in Uttara Kannada district as noticed in other districts of the State. This may be due to lack of industries, scant population and large forest area.

The Indian Institute of Science, Bangalore, has been actively engaged in the field of ecology and environment for the last 8–10 years in the district. It was involved in projects on bamboo resource and modernization of animal husbandry practices of the forest grazier along with the studies on rural fuel needs and measures required to meet them. The Hulgol Group Villages Co-operative Service Society, Sirsi Taluk has been entrusted with the work of the Eco–development Project and the Bharatiya Agro-Industries Foundation (BAIF), Urali Kanchan has been assigned the work of preparation of a project report for modernising the animal husbandry practices of forest graziers in the district. The project report on the forest graziers has been submitted by the BAIF to Government. The Technical Monitoring Committee has been set up to supervise the work of eco-development project conducted through the Hulgol Society. The State Government is providing free seedlings and other help through the Forest Department. The main focus of eco-development project has been the *soppinabetta* lands assigned to arecanut growers for meeting their requirements of leaf manure, fuel, fodder, etc. These *soppinabetta* lands have been ill–managed and degraded in many areas of the Uttara Kannada district. In this project, 15 volunteer farmers undertook certain measures like systematic reduction in the level of lopping of trees and regulation or stoppage of grazing by the livestock on *soppinabetta* land, replanting the tree species for providing manure, mulch, fuel and developing fodder grass and fodder legume on *soppinabetta* lands, etc.

With the help of Department of Environment, Government of India, the Indian Institute of Science has established a Centre for Ecological Science (1983) to focus its attention on the environent problems of the Western Ghat tracts and to develop the programmme of geographical focus around the theme of eco-development effort initiated through the Hulgol Society in Sirsi taluk. The area of activity was broadened to Sirsi, Siddapur, Yellapur, Kumta and Honavar. Two advisory committees were set up, one at State Level and another at the district level to monitor and guide the work of this programme. Active co-operation was secured from a number of local organisations and state departments for this programme.

A number of local organisations including farmers' co-operative societies at Manchikeri, Yadalli and Muroor-Kallabbe, Yuvak Mandalis at Bhairumbe and Umchagi, Areangadi, Manchikeri, Bhairumbe and Yadalli, educational institutions including schools at Masur, Muroor, Umchagi, College at Kumta, Sahyadri Parisara Vardhini and the Society for Environment Awareness, Kumta have been actively involved in the programme of eco-restoration in the district along with the various Government agencies, such as State Forest Department, District Rural Development Society and the State Department of Environment and Ecology and the Central Department of Environment as well as the Indian Institute of Science and other scientific and technical institutions. *Sahyadri Parisara Patra*, a quarterly is being published from Yadalli *(1984)*. Manjunath Bhagavat Hostota has been making use of the Yakshagana to propagate the ideas of protecting forests and on environmental problems.

TABLE 1

**Normal and extremes of rainfall**

| *Station* | *No. of years of data* | | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *June* | *July* | *Aug* |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ankola | 50 | a | 0.3 | 1.5 | 0.3 | 15.2 | 80.0 | 1,009.1 | 1,140.7 | 566.4 |
| | | b | 0.1 | 0.1 | 0.1 | 0.9 | 3.4 | 23.5 | 28.3 | 24.4 |
| Kumta | 12 | a | 1.5 | 2.5 | 2.3 | 15.0 | 93.7 | 1,097.5 | 1,236.7 | 694.7 |
| | | b | 0.1 | 0.1 | 0.1 | 1.0 | 3.9 | 23.8 | 28.5 | 26.2 |
| Honavar | 50 | a | 3.6 | 0.3 | 0.3 | 15.7 | 114.8 | 1,042.9 | 1,095.0 | 702.6 |
| | | b | 0.5 | 0.0 | 0.0 | 1.2 | 4.9 | 25.6 | 29.5 | 25.7 |
| Bhatkal | 50 | a | 4.6 | 0.8 | 1.3 | 17.3 | 110.5 | 1,084.8 | 1,281.2 | 756.7 |
| | | b | 0.1 | 0.1 | 0.1 | 0.9 | 4.6 | 24.5 | 28.6 | 26.6 |
| Haliyal | 50 | a | 1.8 | 3.8 | 12.7 | 45.7 | 76.7 | 192.5 | 397.0 | 232.4 |
| | | b | 0.1 | 0.1 | 0.9 | 3.3 | 4.8 | 14.6 | 23.7 | 18.7 |
| Supa | 50 | a | 0.5 | 0.8 | 7.4 | 40.6 | 53.9 | 402.8 | 976.9 | 500.6 |
| | | b | 0.1 | 0.1 | 0.5 | 2.7 | 3.5 | 17.9 | 27.1 | 23.8 |
| Yellapur | 50 | a | 1.0 | 1.0 | 7.6 | 31.7 | 57.9 | 485.9 | 1,008.1 | 553.7 |
| | | b | 0.1 | 0.1 | 0.6 | 2.5 | 4.2 | 19.7 | 26.9 | 24.0 |
| Mundgod | 50 | a | 1.8 | 1.3 | 7.6 | 42.7 | 72.9 | 182.6 | 338.1 | 206.8 |
| | | b | 0.1 | 0.1 | 0.6 | 3.1 | 5.0 | 13.9 | 22.4 | 19.0 |

| Station | No. of years of data | | Sept | Oct | Nov | Dec | Annual | Highest annual rainfall as % of normal & year* | Lowest annual rainfall as % of normal & year* | Heaviest Rainfall in 24 hours** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Amount (mm) | date |
| 1 | 2 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Ankola | 50 | a | 282.5 | 138.7 | 56.6 | 5.3 | 3,296.6 | 143 | 58 | 348.7 | 1897 Jun 16 |
| | | b | 14.8 | 6.9 | 2.7 | 0.3 | 105.5 | (1933) | (1941) | | |
| Kumta | 50 | a | 360.2 | 156.7 | 55.4 | 10.4 | 3,726.6 | 159 | 64 | 480.6 | 1887 Oct 11 |
| | | b | 16.5 | 7.3 | 2.6 | 0.4 | 110.5 | (1933) | (1911) | | |
| Honawar | 12 | a | 341.6 | 124.2 | 56.1 | 4.3 | 3,501.4 | 115 | 74 | 378.5 | 1919 Jun 5 |
| | | b | 16.7 | 6.6 | 3.1 | 0.3 | 114.1 | (1943) | (1941) | | |
| Bhatkal | 50 | a | 369.3 | 163.6 | 56.6 | 7.6 | 3,854.3 | 132 | 69 | 360.7 | 1923 Jul 9 |
| | | b | 16.9 | 8.4 | 2.8 | 0.5 | 114.1 | (1950) | (1941) | | |
| Hallyal | 50 | a | 113.0 | 135.4 | 44.2 | 12.5 | 1,267.7 | 153 | 53 | 220.5 | 1914 Aug 6 |
| | | b | 10.2 | 8.0 | 2.8 | 0.6 | 87.8 | (1933) | (1905) | | |
| Supa | 50 | a | 171.5 | 118.6 | 47.0 | 11.2 | 2,331.8 | 141 | 58 | 224.8 | 1923 Jul 20 |
| | | b | 13.2 | 3.0 | 3.0 | 0.6 | 100.5 | (1923) | (1918) | | |
| Yellapur | 50 | a | 187.7 | 125.2 | 41.9 | 9.4 | 2,511.1 | 141 | 64 | 248.9 | 1928 Jul 28 |
| | | b | 14.3 | 8.5 | 3.1 | 0.6 | 104.6 | (1933) | (1905) | | |
| Mundgod | 50 | a | 119.6 | 125.2 | 43.9 | 12.7 | 1,155.2 | 135 | 62 | 143.5 | 1914 Jul 24 |
| | | b | 11.4 | 7.4 | 3.0 | 0.8 | 86.8 | (1943) | (1905) | | |

| 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sirsi | 50 | a | 1.3 | 1.5 | 5.8 | 31.7 | 55.4 | 527.1 | 992.4 | 507.0 |
| | | b | 0.1 | 0.1 | 0.5 | 2.1 | 3.8 | 19.9 | 27.5 | 23.9 |
| Siddapur | 50 | a | 2.3 | 1.8 | 5.8 | 25.7 | 61.2 | 578.9 | 1,208.3 | 627.9 |
| | | b | 0.2 | 0.2 | 0.5 | 2.1 | 3.7 | 20.1 | 27.8 | 25.2 |
| Karwar | 50 | a | 0.5 | 1.3 | 0.0 | 15.2 | 82.0 | 987.3 | 1,010.7 | 507.2 |
| | | b | 0.1 | 0.1 | 0.0 | 0.9 | 3.4 | 23.2 | 27.7 | 24.2 |
| Uttara Kannada (District) | | a | 1.7 | 1.5 | 4.6 | 27.0 | 78.1 | 690.1 | 971.4 | 532.4 |
| | | b | 0.1 | 0.1 | 0.4 | 1.9 | 4.1 | 20.6 | 27.1 | 23.8 |

| 1 | 2 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sirsi | 50 | a | 187.7 | 134.9 | 49.5 | 8.9 | 2,503.2 | 139 | 65 | 340.9 | 1923 Jul 10 |
| | | b | 14.0 | 8.7 | 3.0 | 0.6 | 104.2 | (1923) | (1905) | | |
| Siddapur | 50 | a | 215.4 | 146.3 | 52.6 | 10.4 | 2,936.6 | 150 | 67 | 323.3 | 1901 Jul 9 |
| | | b | 14.3 | 8.1 | 3.1 | 0.7 | 106.0 | (1942) | (1905) | | |
| Karwar | 50 | a | 281.7 | 128.5 | 53.1 | 7.1 | 3,074.6 | 151 | 67 | 334.5 | 1897 Jun 16 |
| | | b | 15.1 | 6.6 | 2.8 | 0.5 | 104.6 | (1933) | (1941) | | |
| Uttara Kannada (District) | | a | 239.1 | 136.1 | 50.6 | 9.1 | 2,741.7 | 133 | 70 | | |
| | | b | 14.3 | 7.7 | 2.9 | 0.5 | 103.5 | (1933) | (1905) & (1918) | | |

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

TABLE 2

**Annual Rainfall Statistics of Uttara Kannada District** (in mm)

| *Sl. No.* | *Place* | *1958 to 1967* | *1968* | *1969* | *1970* | *1971* | *1972* | *1973* | *1974* |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1. | Bommanahalli | S.N.E. | 1168.0 | 1132.2 | 1174.3 | 711.1 | 1024.4 | 1110.6 | 1239.5 |
| 2. | Dandeli | -do- | 1206.8 | R.N.R. | R.N.R. | — | 1040.0 | 1097.0 | 1471.9 |
| 3. | Gersoppa | -do- | R.N.R. | 5107.0 | 5873.9 | 4414.3 | 3775.7 | 3832.6 | 4656.4 |
| 4. | Gopshitta | -do- | -do- | 3145.9 | 4608.7 | 3071.4 | 2120.1 | 3018.2 | 3710.7 |
| 5. | Kadra | -do- | S.N.E. | S.N.E. | 6574.9 | 4081.8 | 3192.6 | 3028.9 | 4143.9 |
| 6. | Gokarn | -do- | 2859.0 | 3201.5 | 4982.7 | 3011.8 | 2836.1 | 3043.9 | 3605.4 |
| 7. | Gunjavathi | -do- | S.N.E. | S.N.E. | 2045.2 | 1592.6 | 1313.4 | 1116.0 | 1518.3 |
| 8. | Malagi | -do- | 872.6 | 1565.0 | 1441.4 | 1163.4 | 1240.2 | 1377.8 | 1344.2 |
| 9. | Banavasi | -do- | 991.0 | 1818.0 | 1658.0 | 1380.7 | 1341.4 | 1394.6 | 1463.3 |
| 10. | Bandal | -do- | R.N.R. | 6028.6 | 5958.5 | 3393.7 | 3960.8 | 4128.1 | 4645.3 |
| 11. | Hulekal | -do- | S.N.E. | S.N.E. | 3372.0 | 2470.7 | 2287.5 | 2639.3 | 2728.8 |
| 12. | Anshi | -do- | -do- | -do- | 6808.8 | 4884.4 | 4387.8 | 4440.2 | 6319.6 |
| 13. | Castlerock | -do- | 5403.8 | 5919.4 | 6333.7 | 4906.0 | 4678.7 | 5292.3 | 6145.2 |
| 14. | Gund | -do- | S.N.E. | S.N.E. | R.N.R. | 1912.5 | 2211.7 | 1907.6 | 2369.2 |
| 15. | Joida | -do- | -do- | 2735.1 | 4205.5 | 1362.6 | 2587.0 | 2492.7 | 2220.5 |
| 16. | Kundal | -do- | 4194.0 | 5246.1 | 5167.1 | 3461.0 | 4103.0 | D.I.C. | 3623.0 |
| 17. | Supa Dam | -do- | S.N.E. | S.N.E. | 2478.3 | 1525.3 | 1815.8 | 2012.9 | 2048.3 |
| 18. | Arabail | -do- | -do- | 2845.0 | 2825.2 | 2916.0 | 3356.0 | 2613.6 | 3393.8 |
| 19. | Kirwatti | -do- | 1372.8 | 1722.0 | 2001.0 | — | 2252.6 | 4613.0 | 2383.0 |
| 20. | Manchikeri | -do- | S.N.E. | S.N.E. | 2035.8 | 1427.3 | 1477.2 | 1781.0 | 1843.0 |

| Sl. No. | Place | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 1. | Bommanahalli | 1113.2 | 694.1 | 913.4 | 1419.7 | 1489.2 | 1241.2 | 1041.2 | 978.7 | 1102.9 |
| 2. | Dandeli | — | 1418.0 | 1006.2 | 1453.9 | 1357.6 | 1720.4 | 1280.6 | 1509.9 | 1329.9 |
| 3. | Gersoppa | 4971.9 | 3937.0 | 4976.6 | 4116.9 | 3991.7 | 3537.4 | 4715.4 | 5110.9 | 4802.8 |
| 4. | Gopshitta | 4427.3 | 3345.1 | 4186.2 | 3959.2 | 3131.2 | 4105.4 | 4051.9 | 4371.0 | 4313.4 |
| 5. | Kadra | 5279.8 | 3241.4 | 4055.4 | 4960.7 | 3189.9 | 5206.3 | 3676.6 | 5454.1 | 4824.7 |
| 6. | Gokarn | 4565.9 | 3314.5 | 3898.3 | 3803.9 | 2648.4 | 3601.9 | 3210.4 | 3535.4 | 3839.8 |
| 7. | Gunjavathi | 2563.4 | 4619.9 | 4461.7 | 5586.3 | 4296.5 | 6054.8 | 1292.5 | 2961.4 | 1182.1 |
| 8. | Malagi | 1303.6 | 918.8 | 1358.0 | 1684.6 | 1172.0 | 1630.4 | 1240.8 | 1546.2 | 1414.2 |
| 9. | Banavasi | 1826.6 | 1099.5 | 1267.2 | 1463.6 | 1404.0 | 2036.4 | 1371.3 | 2025.2 | 1797.9 |
| 10. | Bandal | 5651.5 | 3708.5 | 4311.3 | 4904.9 | 4334.1 | 6805.8 | 5845.4 | 8225.8 | 7141.8 |
| 11. | Hulekal | 2015.4 | 2148.1 | 2392.3 | 3307.9 | 2455.0 | 3929.0 | 3043.1 | 3943.1 | 3157.2 |
| 12. | Anshi | 5843.0 | 4699.5 | 5280.9 | 6703.0 | 4398.4 | 6571.7 | 6417.5 | 6818.7 | 6055.0 |
| 13. | Castlerock | 6119.2 | 4725.6 | 5968.2 | 7789.0 | 5713.0 | 6933.1 | 6274.4 | 6640.4 | 6675.0 |
| 14. | Gund | 2401.9 | 2305.5 | 2629.5 | 2463.2 | 2123.4 | 2687.1 | 2321.0 | 2442.8 | R.N.R. |
| 15. | Joida | 2257.0 | 2121.1 | 3151.0 | 3502.1 | 2942.0 | 2646.4 | 2601.0 | 2846.7 | 2334.8 |
| 16. | Kundal | 5051.6 | 1422.2 | 4927.6 | 2681.9 | 4170.8 | 5431.9 | 4514.0 | 4234.8 | 4213.2 |
| 17. | Supa Dam | N.W | — | — | — | — | 4088.7 | — | 2171.6 | 1946.2 |
| 18. | Arabail | 3100.2 | 1959.4 | 2175.0 | 3761.0 | 2261.8 | 4786.7 | 3831.8 | 3970.2 | 2630.0 |
| 19. | Kirwatti | 1242.0 | 847.5 | 1030.0 | 1276.0 | 1617.0 | 1067.0 | 869.0 | 1108.0 | 1056.0 |
| 20. | Macnhikeri | 2372.2 | 1660.8 | 1774.2 | — | — | — | — | — | 2037.1 |

S.N.E.=Station Not Existing R.N.R.=Report Not Received D.I.C.=Data In-complete N.W.=Not Working

**Taluk-wise Annual Rainfall Statistics of Uttara Kannadda District (in mm.)**

| *Sl. No.* | *Place (Taluk Headquarter)* | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. | Ankola | 4,109.1 | 4,795.3 | 3,395.0 | 5,619.8 | 3,540.1 | 2,880.6 |
| 2. | Bhatkal | 4,553.8 | 4,689.2 | 3,974.9 | 6,888.3 | 5,010.1 | 4,505.7 |
| 3. | Haliyal | 1,709.1 | 1,757.5 | 1,044.6 | 1,921.2 | 1,327.9 | 1,129.4 |
| 4. | Honavar | 3,853.1 | 4,201.8 | 3,075.2 | 5,464.5 | 4,352.7 | 2,653.7 |
| 5. | Karwar | 3,085.7 | 3,173.6 | 3,073.6 | 5,508.2 | 3,990.0 | 2,929.6 |
| 6. | Kumta | 4,113.9 | 4,396.7 | 3,470.0 | 5,719.4 | 4,492.5 | 3,185.5 |
| 7. | Mundgod | 1,464.1 | 1,449.3 | 1,297.9 | 3,411.5 | 2,093.6 | 1,903.4 |
| 8. | Siddapur | 3,708.7 | 4,565.2 | 2,403.8 | 5,649.8 | 3,416.2 | 2,478.3 |
| 9. | Sirsi | 3,178.6 | 3,518.0 | 2,093.1 | 4,198.9 | 2,708.1 | 2,169.3 |
| 10. | Supa | 3,180.3 | 3,230.9 | 2,204.1 | 3,338.4 | 2,636.2 | 2,278.8 |
| 11. | Yellapur | 3,820.2 | 3,612.2 | 3,209.0 | 5,309.5 | 4,434.5 | 2,160.6 |

| | | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 16 | 17 | 18 | 19 | 20 | 21 |
| 1. | Ankola | 2,717.6 | 3,004.8 | 3,155.4 | 3,635.9 | 4,794.2 | 3,803.4 |
| 2. | Bhatkal | 3,692.7 | 3,331.0 | 3,624.0 | 4,441.0 | 4,855.2 | 3,616.5 |
| 3. | Haliyal | 994.1 | 1,068.6 | 1,195.5 | 986.5 | 1,288.0 | 750.8 |
| 4. | Honavar | 3,210.8 | 2,368.2 | 3,114.2 | 4,043.7 | 4,565.4 | 3,380.9 |
| 5. | Karwar | R.N.R. | 2,099.3 | 2,773.3 | 3,507.7 | 3,767.3 | 2,610.6 |
| 6. | Kumta | 2,924.5 | 2,664.2 | 2,931.0 | 4,045.5 | 4,740.0 | 3,292.4 |
| 7. | Mundgod | 2,052.3 | 1,362.5 | 1,108.8 | 1,389.5 | 1,372.5 | 1,134.5 |
| 8. | Siddapur | 2,336.8 | 2,696.8 | 4,108.1 | 4,162.7 | 5,557.9 | 3,339.8 |
| 9. | Sirsi | 2,158.9 | 1,830.5 | 2,269.2 | 2,067.0 | 2,650.6 | 1,808.6 |
| 10. | Supa | 1,587.4 | 1,831.1 | 2,058.6 | 2,018.4 | 2,557.1 | 2,064.4 |
| 11. | Yellapur | 2,137.3 | 2,256.6 | 2,853.4 | 2,504.0 | 2,745.8 | 2,101.4 |

R.N.R.=Report Not Received
O.O.O.=Out Of Order

| 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 2,790.0 | 2,856.5 | 3,289.3 | 3,088.3 | 3,162.6 | 3,101.4 | 4,407.4 |
| 3,696.0 | R.N.R. | 3,762.5 | 3,890.0 | 4,345.7 | 3,690.1 | 4,936.9 |
| 1,231.4 | 1,149.8 | 1,588.2 | 1,162.1 | 1,151.6 | 1,299.6 | 1,416.3 |
| 3,353.4 | 2,989.5 | 3,551.3 | 3,430.8 | 3,373.3 | 3,717.1 | 4,703.9 |
| 3,472.8 | 1,996.8 | 2,639.4 | 3,101.8 | 2,907.3 | 2,776.4 | — |
| 3,106.8 | 2,991.8 | 3,713.3 | 3,483.1 | 3,129.2 | 3,577.1 | 4,194.7 |
| 2,040.6 | 1,789.3 | 1,895.2 | 1,966.1 | 0,824.8 | 1,717.3 | 1,591.7 |
| 3,026.2 | 2,586.9 | 2,451.2 | 3,105.5 | 2,761.5 | 3,205.4 | 3,228.1 |
| 2,849.9 | 2,469.5 | 2,353.1 | 2,559.7 | 2,266.5 | 2,570.0 | 2,611.1 |
| 1,260.4 | 2,062.9 | 2,525.7 | 2,441.0 | 2,180.6 | 2,156.5 | 3,102.7 |
| 3,956.1 | 3,183.1 | 3,082.9 | 3,835.7 | 2,955.0 | 3,110.6 | 2,683.6 |

| 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 |
|---|---|---|---|---|---|---|
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 3,502.0 | 3,949.6 | 2,825.8 | 3,893.0 | 3,381.6 | 3,457.5 | 4,301.4 |
| 3,965.4 | 4,275.6 | 3,320.0 | 3,938.6 | 4,432.0 | 4,515.0 | 4,405.0 |
| 1,017.9 | O.O.O. | O.O.O. | O.O.O. | O.O.O. | O.O.O. | O.O.O. |
| 4,013.0 | 3,995.0 | 2,887.1 | 3,400.8 | 3,560.0 | 4,105.1 | 4,290.3 |
| — | 3,535.2 | 2,558.8 | 2,976.1 | 3,179.2 | 3,481.0 | 3,877.2 |
| 3,432.1 | 3,412.3 | 2,824.5 | 3,477.6 | 2,989.7 | 3,766.9 | 3,855.0 |
| 1,390.7 | 1,439.9 | 1,274.1 | 1,272.1 | 932.7 | 1,096.7 | 1,307.2 |
| 2,523.3 | 3,208.2 | 3,031.2 | 3,932.3 | 2,964.5 | 3,305.1 | 3,007.2 |
| 2,151.4 | 2,756.2 | 2,279.8 | 3,396.6 | 2,550.4 | 3,465.7 | 2,784.6 |
| 2,264.6 | 2,691.2 | 2,197.5 | 2,887.7 | 2,074.6 | — | — |
| 2,359.3 | 2,890.3 | 2,360.7 | 3,255.4 | 2,356.9 | 2,775.6 | 3,213.2 |

TABLE 3

**Normals of Temperature/Relative Humidity (Honavar)**

| *Month* | *Mean daily maximum temperature* | *Mean daily minimum temperature* | *AIR Temperature DRY Bulb °C* 08.30 | 17.30 | *Wet Bulb °C* 08.30 | 17.30 | *Relative Humidity %* 08.30 | 17.30 |
|---|---|---|---|---|---|---|---|---|
| January | 31.9 | 20.0 | 23.5 | 29.1 | 19.3 | 23.1 | 68 | 59 |
| February | 31.3 | 20.5 | 23.6 | 29.2 | 20.3 | 24.1 | 75 | 64 |
| March | 31.9 | 22.7 | 25.6 | 29.9 | 22.7 | 25.2 | 79 | 67 |
| April | 32.4 | 25.2 | 28.2 | 30.5 | 25.0 | 26.2 | 78 | 70 |
| May | 32.3 | 25.8 | 28.8 | 30.4 | 25.6 | 26.4 | 79 | 72 |
| June | 29.3 | 24.1 | 26.6 | 27.5 | 24.9 | 25.5 | 89 | 86 |
| July | 28.2 | 23.5 | 26.0 | 26.3 | 24.6 | 25.0 | 92 | 90 |
| August | 28.3 | 23.5 | 25.8 | 26.6 | 24.5 | 25.2 | 92 | 88 |
| September | 28.8 | 23.2 | 25.6 | 27.1 | 24.1 | 25.0 | 91 | 84 |
| October | 30.6 | 23.2 | 26.0 | 28.2 | 24.0 | 25.5 | 85 | 79 |
| November | 32.5 | 21.9 | 25.8 | 29.4 | 21.8 | 24.6 | 70 | 66 |
| December | 32.7 | 20.9 | 24.6 | 29.6 | 19.6 | 23.3 | 63 | 59 |
| Total or Mean | 30.9 | 22.9 | 25.8 | 28.6 | 23.0 | 24.9 | 80 | 74 |

TABLE 4

**Station level pressure—0.1 mb—(Honavar)**

| *Time* | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *June* | *July* | *Aug* | *Sept* | *Oct* | *Nov* | *Dec* | *Total or Mean* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08.30 | 1,011.0 | 1,010.3 | 1,009.1 | 1,007.9 | 1,005.8 | 1,004.8 | 1,005.1 | 1,005.9 | 1,007.2 | 1,008.2 | 1,009.4 | 1,010.7 | 1,007.9 |
| 17.30 | 1,007.0 | 1,006.7 | 1,005.6 | 1,004.5 | 1,003.0 | 1,002.9 | 1,003.5 | 1,003.5 | 1,004.6 | 1,005.1 | 1,006.2 | 1,007.0 | 1,005.0 |

TABLE 5

**Mean Wind Speed in km ph (Honavar)**

| *Jan* | *Feb* | *Mar* | *Apr* | *May* | *June* | *July* | *Aug* | *Sep* | *Oct* | *Nov* | *Dec* | *Total or Mean* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5.0 | 5.2 | 5.1 | 5.4 | 6.3 | 6.8 | 7.2 | 6.0 | 4.4 | 4.2 | 4.4 | 5.2 | 5.4 |

TABLE 6

**Oktas of sky (Honavar)**

| *Time* | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *June* | *July* | *Aug* | *Sept* | *Oct* | *Nov* | *Dec* | *Total or Mean* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **All Clouds** | | | | | | | | | | | | | |
| 08.30 | 2.6 | 2.7 | 3.1 | 4.4 | 5.8 | 6.9 | 7.2 | 6.9 | 6.3 | 5.4 | 4.1 | 3.2 | — |
| 17.30 | 2.4 | 2.4 | 3.0 | 4.3 | 5.3 | 6.8 | 7.1 | 6.9 | 6.2 | 5.7 | 4.3 | 3.2 | — |
| **Low Clouds** | | | | | | | | | | | | | |
| 0.830 | 0.8 | 1.0 | 1.8 | 2.7 | 3.9 | 5.6 | 6.3 | 5.3 | 4.5 | 2.9 | 1.7 | 0.8 | — |
| 17.30 | 0.7 | 0.9 | 1.9 | 3.0 | 3.7 | 5.4 | 6.2 | 5.4 | 4.5 | 3.4 | 2.0 | 0.9 | — |

TABLE 3(a)

**Normals of temperature and relative humidity (Karwar)**

| *Month* | *Mean monthly minimum temperature* | *Mean monthly minimum temperatuer* | *Mean monthly relative humidity %* | |
|---|---|---|---|---|
| | ° C | ° C | 08.30 | 17.30 |
| January | 3.5 | 18.9 | 76 | 60 |
| February | 30.8 | 19.7 | 80 | 66 |
| March | 30.9 | 22.5 | 81 | 71 |
| April | 31.6 | 25.3 | 76 | 71 |
| May | 31.5 | 26.3 | 80 | 75 |
| June | 29.4 | 24.8 | 88 | 82 |
| July | 28.0 | 24.0 | 88 | 86 |
| August | 27.9 | 24.1 | 89 | 86 |
| September | 28.4 | 23.8 | 90 | 83 |
| October | 29.7 | 23.6 | 87 | 79 |
| November | 31.6 | 20.9 | 76 | 69 |
| December | 32.1 | 19.4 | 70 | 62 |
| Total or mean | 30.2 | 22.8 | 82 | 74 |

TABLE 4(a)

**Station Level Pressure—0.1 mb—(Karwar)**

| *Time* | *Jan* | *Feb* | *March* | *Apr* | *May* | *June* | *July* | *Aug* | *Sept* | *Oct* | *Nov* | *Dec* | *Total or mean* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08.30 | 1,013.2 | 1,012.3 | 1.011.4 | 1,009.7 | 1,007.4 | 1,006.4 | 1,006.9 | 1,007.7 | 1,009.0 | 1,010.1 | 1,012.1 | 1,013.4 | 1,010.0 |
| 17.30 | 1,009.7 | 1,008.9 | 1,008.0 | 1,006.3 | 1,004.8 | 1,004.7 | 1,005.5 | 1,005.8 | 1,006.5 | 1,007.2 | 1,008.9 | 1,009.9 | 1,007.2 |

TABLE 6(a)

**Cloud amount (Oktas of Sky)—(1952–1960) (Karwar)**

**Monthly Normals**

| *Time* | *Jan* | *Feb* | *Mar* | *Apr* | *May* | *June* | *July* | *Aug* | *Sept* | *Oct* | *Nov* | *Dec* | *Total Annual Means* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08.30 | 1.7 | 1.9 | 1.8 | 3.3 | 5.0 | 7.0 | 7.6 | 7.2 | 6.0 | 5.3 | 3.0 | 2.0 | 4.3 |
| 17.30 | 1.6 | 1.7 | 1.9 | 3.3 | 4.9 | 6.9 | 7.5 | 7.2 | 6.0 | 5.4 | 3.0 | 2.1 | 4.3 |

TABLE 7

**The Temperature of the Uttara Kannada District for the period 1894–1903 are as fowllows**

| *Year* | *January* | | *May* | | *July* | | *November* | |
|---|---|---|---|---|---|---|---|---|
| | *Max* | *Min* | *Max* | *Min* | *Max* | *Min* | *Max* | *Min* |
| 1894 | 91 | 62 | 93 | 71 | 86 | 72 | 91 | 64 |
| 1895 | 90 | 62 | 91 | 76 | 86 | 72 | 92 | 65 |
| 1896 | 92 | 61 | 92 | 75 | 87 | 73 | 94 | 65 |
| 1897 | 94 | 62 | 92 | 74 | 88 | 72 | 93 | 62 |
| 1898 | 93 | 58 | 92 | 75 | 86 | 71 | 90 | 63 |
| 1899 | 91 | 58 | 91 | 72 | 86 | 73 | 91 | 62 |
| 1900 | 92 | 59 | 91 | 76 | 86 | 72 | 93 | 64 |
| 1901 | 93 | 61 | 93 | 74 | 86 | 73 | 93 | 59 |
| 1902 | 91 | 63 | 93 | 78 | 87 | 72 | 92 | 62 |
| 1903 | 91 | 62 | 92 | 72 | 89 | 71 | 90 | 59 |

**Statement showing the Monthly (Part A) Rainfall data of the Uttara Kannada District for the period 1894–1903**

TABLE 8

**PART A**

| *Months* | *Normal Mean@* | *RAINFALL** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *1894* | *1895* | *1896* | *1897* | *1898* | *1899* | *1900* | *1901* | *1902* | *1903* |
| | | In.Cts | In.Cts | In.Cts | In.Cts | In.Cts | In.Cts | In.Cts | In.Cts | In.Cts | In.Cts |
| Jan. | 0.12 | — | — | — | — | — | — | — | — | — | — |
| Feb. | 0.01 | — | — | — | 0.4 | 0.37 | — | — | — | — | — |
| March | 0.04 | — | — | — | — | — | — | — | 0.1 | — | — |
| April | 0.44 | — | 0.5 | 0.4 | 0.49 | 0.59 | 4.99 | 0.1 | — | — | — |
| May | 3.12 | 0.4 | 0.27 | 3.2 | 1.4 | 0.40 | 3.65 | — | 0.92 | 0.45 | 10.4 |
| June | 35.83 | 21.80 | 23.70 | 33.63 | 39.93 | 41.16 | 32.83 | 48.17 | 67.64 | 58.53 | 29.60 |
| July | 37.98 | 21.46 | 50.22 | 20.62 | 51.55 | 39.13 | 8.65 | 49.74 | 31.84 | 59.17 | 57.73 |
| August | 22.15 | 23.59 | 19.78 | 37.41 | 12.37 | 19.90 | 15.35 | 22.60 | 24.52 | 15.63 | 29.41 |
| September | 11.87 | 8.63 | 3.96 | 2.41 | 15.99 | 20.77 | 4.7 | 10.22 | 2.12 | 26.5 | 6.72 |
| October | 5.72 | 4.94 | 4.47 | 1.84 | 8.34 | 8.77 | 2.63 | 0.43 | 1.93 | 7.20 | 1.57 |
| November | 1.48 | 0.20 | 0.54 | 0.23 | — | 2.55 | 0.11 | — | 0.38 | 0.81 | 1.30 |
| December | 0.11 | — | — | 0.12 | — | 0.11 | — | — | — | 2.7 | — |
| Total | 118.87 | 90.66 | 102.99 | 99.32 | 129.75 | 133.75 | 72.33 | 131.17 | 130.53 | 149.91 | 136.37 |

**Statement showing the Taluk-wise rainfall data of Uttara Kannada District for the period 1894–1903**

TABLE 8

**PART B**

| *Taluk* | *Normal* | *RAINFALL* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1894 | 1895 | 1896 | 1897 | 1898 | 1899 | 1900 | 1901 | 1902 | 1903 |
| | *Mean* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* | *In.Cts* |
| Ankola | 134.76 | 96.76 | 116.11 | 117.76 | 141.56 | 158.06 | 77.33 | 143.96 | 127.38 | 165.83 | 150.96 |
| Honavar | 148.2 | 126.06 | 122.18 | 122.86 | 165.85 | 141.95 | 92.86 | 151.16 | 107.76 | 171.71 | 154.4 |
| Do-Bhatkal Petha | 155.1 | 140.53 | 153.98 | 144.72 | 195.03 | 156.80 | 108.32 | 157.64 | 122.35 | 181.67 | 159.49 |
| Karwar | 129.20 | 90.66 | 102.99 | 99.32 | 129.75 | 133.75 | 72.33 | 131.17 | 130.53 | 149.91 | 136.37 |
| Kumta | 151.88 | 97.62 | 126.79 | 121.10 | 146.40 | 143.27 | 34.52 | 123.19 | 117.74 | 186.76 | 165.31 |
| Siddapur | 112.21 | 94.46 | 95.47 | 157.90 | 106.39 | 114.75 | 75.80 | 157.77 | 111.23 | 126.67 | 100.36 |
| Sirsi | 102.45 | 88.02 | 99.35 | 136.81 | 96.70 | 97.87 | 60.49 | 117.07 | 96.51 | 104.5 | 91.71 |
| Haliyal | 49.27 | 40.07 | 51.72 | 51.20 | 50.25 | 54.09 | 28.38 | 41.70 | 43.63 | 4.90 | 41.35 |
| Do-Supa Petha | 99.52 | 81.33 | 83.21 | 122.66 | 93.62 | 91.66 | 50.79 | 127.70 | 94.69 | 88.42 | 80.41 |
| Yellapur | 102.66 | 78.66 | 100.61 | 139.23 | 116.96 | 92.69 | 61.09 | 124.91 | 89.63 | 98.64 | 93.1 |
| Do-Mundgod Petha | 43.92 | 39.83 | 48.78 | 51.14 | 52.49 | 55.22 | 31.41 | 42.00 | 44.98 | 54.66 | 40.55 |

* At district headquaters in part A of Tq. headquarters in Part B.

@ Averages for over 40 years ending 1900 in Part A and for 11 years ending 1872 in Part B.