General Topography of the Waterbodies
Kodagu is referred to as a “Scotland of India” for its natural beauty in terms of Terrain, Flora, Fauna and Culture of original inhabitants. Kodagu is a tiny hill district in the Western Ghats of southern part of Karnataka in south India. The main deity of Kodagu is Cauvery Matha and Iggutappa. Cauvery River runs from Brahmagiri hills and merges with Bay of Bengal. Hemavathi River is its northern boundary and Brahmagiri hills are its southern limit. Iggutappa is god of agriculture, who is supposed to have trained people of Kodagu in cultivation.

Kodagu measures 1,593 sq miles or roughly sixty miles in length and forty miles in breadth. River Cauvery is known as Ganga of South India. Laxmanathirtha and other minor streams are the entire tributaries of river Cauvery among these hills of Kodagu. Thadiandamol which is 5,726 ft from Sea-level is the highest. This is the second highest peak in Karnataka after Mullayanagiri. There are waterfalls like Barapole and Sarath Abbi falls in South Kodagu. The average rainfall varies from 60 inches in drier parts of South Kodagu to 200 inches in hilly regions (Keshavamurthy and Yoganarashimhan, 1990).

Kodagu is known as the treasure of plant wealth. But the vegetation has dwindled to alarming level due to agriculture, smuggling etc. Virgin patches of vegetation are seen only in Devara Kadu or Sacred Grooves. Principal crops are Coffee, Cardamom, Pepper, Paddy, Areca etc. Presently, the district enjoys the status of a tourist spot. Nagarahole, Dubare forest, Talacauvery, Mandalpatti, Irrupu falls are important tourist spots of this district.
Kodagu is a district of Karnataka state in southern India. It is often called by the anglicized name of Coorg. It occupies about 4,100 km² in the Western Ghats of southwestern Karnataka. It is a hilly district, the lowest elevation is 900 m above sea level. Pushpagiri, another peak, is 1,715 m high. The principal river is the Talacauvery river, which rises at Talacauvery on the eastern side of the Western Ghats, and with its tributaries drains the greater part of Kodagu. In the rainy season and the southwest monsoon from June to the end of September, the rivers flow with violence and great rapidity. In July and August, rainfall is higher and in the month of November, it is often showery. The yearly rainfall may exceed 4,000 mm, in the dense jungle track it reaches 3,000-3,800 mm; in the bamboo district in the west it reaches from 1,500-2,500 mm. Kodagu has an average temperature of about 15°C, the extreme being 11°C and 28°C. The hottest season is in April and May.

The principal town and district capital is Madikeri or Mercara, with a population of around 30,000. The beautiful Abbi falls is located nearby. The district is divided into 3 administrative taluks of Madikeri, Virajpet, and Somwarpet. Nagarahole National Park which is found to the south of Kodagu is a popular tourist destination. Kodagu in Kannada and Coorg in English are derived from local version Kodavu and the people Kodava. The name Kodava is supposed to have been derived from Kodimale and meaning higher forest land. Puranic version says that the land of initial settlement was called Krodadesa which later became Kodavu. The word Kodava means the people blessed by God mother Cauvery ('Kod' means give, bless and 'avva' means Cauvery) is supported by the Puranic version. Kodagu is the southwestern district of Karnataka bordering Kerala. Its maximum length is 96 km (north-south) and breadth 64 kms (east-west). The area of the district is 4,102 3sq km.
with an estimated population of 4,85,299 as per 1991 census. It is the land of Generals. The land of Coorg according to present boundaries is about 1,586 sq miles. It lies on the eastern slopes of Western Ghats. Just north of latitude 12° N and west of longitude of 76° E. The rivers of Coorg are well fed by monsoon rains and there begins a heavy run off due to steepy area. Coorg rivers are not remarkable either for their width or depth, but their water supply is everywhere abundant throughout the year.

**Climate**

The district shows higher variation in temperature, rainfall and other meteorological factors, since a major part of the district lies in the Western Ghats and the rest in the plateau region to the East. High humidity, heavy rainfall and an equitable pleasant climate are the characteristics of the climate on the ghats and its neighborhoods. The climate may be categorized as Mansoonic-temperature type. Towards the Eastern plain due to the relative low rainfall, tropical Savannah climate is present where the day periods are of longer duration. For the present study, seven water bodies, which were located in Kodagu district; have been selected. They are Rajeshwari stream, Koot-hole, Hutti river, Talacauvery river, Mallalli-falls, Irpu-falls and Abbi-falls.
Fig.1: Map of Karnataka showing different Districts.
Fig. 2: Map of Kodagu District Showing Sampling Sites
RAJESHWARI STREAM (Plate - 1)

It is a small stream in Madikeri taluk about 8 kms away from the Madikeri town. The stream originates near Rajarajeshwari temple in Madikeri and flows down and joins the Pampinakere, finally meeting Harangi in Kushalnagar. Physiographically the area is flat and covered with dense forest. The climate is pleasant characterized by moderate temperature. The surrounding area is covered with Coffee and Cardamom plantation with forest wood (Keshavamurthy and Yoganarashimhan, 1990).

Near the origin of the stream, a temple by name Rajarajeshwari has been built thereby the name Rajeshwari stream. People from throughout Karnataka visit this temple and therefore there is chance of pollution to this natural water body in coming days. Rajeshwari stream constitutes is a fresh water. The water of the stream is used for various purposes. The local people of the area near the stream use it for drinking purposes, estate owners uses it for irrigation and pilgrims who come visit the place use the water for bathing. Occasional visits by devotees often pollute the stream, especially during summer months, when the flow rate is reduces. During rainy season the stream flows with heavy water for 3-5 month from June to November and later reduces. The scenery surrounding the stream is very beautiful.

KOOT HOLE (Plate - 2)

The Koot hole reservoir is one of the major drinking water reservoir of Madikeri town. This reservoir takes birth in Nisane hill of Western ghats, near Galibidu village and has low discharge. The water from this pond is pumped and stored for filtration near stone hill in Madikeri where complete filtration of the water takes place and then it is supplied to whole of Madikeri town for drinking purposes.
Therefore physiological and microbiological analysis of Koot-hole is important in knowing the pollutants which helps for its treatment before supplying for drinking purposes. Being a seasonal stream the upstream areas will have only a lean flow in pre monsoon season and a good part of the upstream areas dry up in peak summer. The full channel flow is during the period of south west monsoon, with a maximum discharge. The reservoir receives the manure pesticide and sewage effluents from Galibeedu village. The major land is covered by Coffee and Cardamom estate. Common hydrophytic forms observed are the species of Vallisnaria, Pistia, Lemna, Chara, Nitella and Marginal emergent plants like Polygonium glabrum, Typha aengustata, Colocasia sp and Ipomea aquatica.

**HUTTI HOLE (Plate - 3)**

Hutti hole is one of the second major fresh water bodies of Kodagu situated 20Kms away from Madikeri town. It is a type of water reservoir used by the local people for various domestic uses and also for irrigation and cattle bathing etc. Abbi falls before entering Harangi dam, joins Hutti hole making the latter polluted, because Abbi falls water carries disposal wastes of Madikeri town. Hutti hole before reaching Harangi crosses the villages like Hutti hole village, Gargandoor, Mukkodlu, Hammiyala and Jamboor.

The surrounding of Hutti hole is covered by thick forest with Coffee and other important plantations like paddy, cardamom etc. The climate is pleasant with moderate temperature and slightly differs from the area of Abbi falls climate having hotter temperature. During monsoon, Hutti hole selves because of rain and also Abbi falls adding to. Physico chemical and microbiological analysis is very important in the view of human health (Keshavamurthy and Yoganarashimhan, 1990).
The villagers also utilize the river water to cultivate vegetables and seasonal crops like maize, ragi, jowar and paddy etc. The members of Hydrophytes in above water body include *Typha angustata* and species of *Pistia, Lamna, Wolfia* and *Azolla*.

**MALLALLI-FALLS (KUMARADHARA FALLS) (Plate - 4)**

This is an attractive falls found near Somavarpet. Being the proud falls of beautiful Kodagu it has various names. ‘Mallalli Abbi’, ‘Pushpahari Falls’, ‘Kumaradhara Falls’, this falls flows into froth of milk and jumps amidst the rich green forest near Mallalli village of Somavarpet taluk. Falling from a height of 150 feet with a width of 70-80 feet it catches the attention of viewers in the backdrop of lushly green forest. The trebling falls in Mallalli at a distance of 28 kms from Madikeri, though visited by lesser number of tourists, a number of trekkers establish their tents near the falls. The force of water from that great height and the melody created by the falls succeeds in mesmerizing onlookers to forget the time for a while.

The surrounding of the Mallalli falls is cover by forest less thickly-wooded bamboo country, the most common trees are the *Dalbergia latifolia* (Black wood), *Pterocarpus marsupium* (Kino tree), *Terminalia tomentosa* (Mathi), *Lagerstroemia parviflora* (Benteak), *Anogeissus latifolia* (Dindul), *Bassia latifolia*, *Butea monosperma* (Flame of the Forest, made in famous in colonial Indian history due to its association with the Battle of Plassery), *Nauclea parviflora*, and several species of *Acacia*, Teak and Sandalwood occur. Among the fauna may be mentioned the Asian Elephant, Tiger, Leopard, Dhole, Gaur, Boar, several species of Deer. The area is rich in birdlife although they are threatened by hunting (Keshavamurthy and Yoganarashimhan, 1990).
CAUVERY-RIVER (TALACAUVERY) (Plate - 5)

The most famous as well as the oldest pilgrimage center lying at a distance of 8 kms from Bhagamandala (46 kms from Madikere and 58 kms from Virajpet) is Talcauvery. Located at the bottom of Brahmagiri mountain ranges, Talcauvery is a place with a mythical background. Having a good road connection from Bagamandala for transportation, it has a good bus facility from almost all parts of the district. Adorned under various names like ‘Lokapavana’, ‘Lopamudra’, ‘Dakshin Ganga’, ‘Dalkshinatya Janoddarini’, ‘Kalikalmasha Nashini’, and river Cauvery originates at ‘Talacauvery’ or ‘Modal Cauvery’ (as written in the inscription) and hence has got such an importance since the past. To all the people of Kodagu Cauvery has remained the motivating spirit. Thus Talcauvery is the most visited pilgrimage center by the people of Kodagu. People visit Talcauvery to have a holy dip in the water of Cauvery and get purified. This practice has been followed since time immemorial. For the people of Kodagu Cauvery is tutelary Goddess. The mountain ranges in Talcauvery have been identified as Agnigiri (mountain of fire), Vayugiri (mountain of air) and Gajarajagiri (mountain of elephants). Amidst the beautiful attractive green hill ranges, there is a square shaped pit attached to 30 feet long and 2½ feet depth pond. This is called ‘Brahma Kundike’ or ‘Brahma’s bowl’ from where Cauvery takes its birth. Getting born in this small pit it flows into the huge pond in front of it and from there it covers a huge distance through the states of Karnataka and Tamilnadu.

According to Agnipurana and Skandapurana, sage Kavera performed a deep meditation and got a daughter ‘Vishnu Maye’ or ‘Lopamudra’ or ‘Cauvery’ from Brahma. As per the puranas ‘Vishnu Maye’ who was previously in Himalayas was nurtured by Kavera and got into the holy grail of sage Agasthya and thus came to
Talacauvery. As per the references in Mahabharatha, Pandavas visited this place, while they were on vanavasa. They took water from this Brahma Kundike and baptized the idle of Mahadeva at Kundagiri. (near Gonikoppa). The worship of Cauvery abandoned during the rule of Tippu Sultan but was restarted during the reign of Dodda Veerarajendra of Kodagu and is continued without any obstruction. Mass congregation of devotees insouthout the year is common and the water is greatly disturbed (Keshavamurthy and Yoganarashimhan, 1990).

Most of the surrounding area of the river is cultivated. Characteristic scenery has rice fields in valley bases, with plantation crops with tree cover in the surrounding hills. The most common plantations are of Coffee (especially C. robusta although some parts of south Coorg grow C. arabica); however many other crops are grown, including Black Pepper, para rubber, Teak, and Cocoa.

IRPU-FALLS (Plate - 6)

Irpu falls is one of the important falls of Kodagu District. It is at a distance of 87 kms from Madikeri. This falls is formed by Laxmana Tirtha, one of the sub rivers of river Cauvery. The origin of this river is in the Munikadu forest surrounding Devasi mountain of Brahmagiri mountain ranges south to Kodagu. Thus flowing, it forms a beautiful fall of two strains; one from a height of 100 feet and the other from a height of 70 feet at a place known as ‘Irpu’. To come to this spot, which is 35 kms away from Virajpet, one has to travel along Srimangala to Kutta road. Having visited the mesmerizing Rameshwar temple at Irpu, if you walk a distance of one km by walk on the edge of the paddy fields you will get the river Laxmana Tirtha. During the rainy seasons, if with an adventurous zeal, wade the river and hobble across the stony path you can view the falls (Keshavamurthy and Yoganarashimhan, 1990).
Flowing through the cliffs of the mountain the roaring falls create a stunning scene of grandeur. The sight seems short to fulfill the beauty while the water falls from between huge black rocks. These giant rocks and huge trees besides the falls have added to the beauty of the leaping water. The viewers may feel bit difficult to reach this spot during the rainy season but to watch that view of vaulting river with all festivity it is the finest occasion.

The flora of the jungle includes *Michelia champaca* (Champak), *Mesua* (Ironwood), *Diospyros* (Ebony and other species), *Toona ciliata* (Indian mahogany), *Chickrassia tubularis* (Redcedar), *Calophyllum angustifolium* (Poon spar), *Canarium strictum* (Black Dammar), *Artocarpus*, *Dipterocarpus*, *Garcinia*, *Euonymus*, *Cinnamomum*, *Myristica*, *Vaccinium*, *Myrtaceae*, *Melastomataceae*, *Rubus* (three species), and a rose. In the undergrowth are found cardamom, *Areca*, plantains, canes, wild Black pepper, tree and other ferns, and arums.

**ABBI-FALLS (Plate - 7)**

The Abbi falls in Western Madikeri is a small Perennial falls having a basin area of about 50 km. The falls originates from Pampanakere in Madikeri and routing through the Madikeri Taluk of Madikeri, Galibeedu, Huttihole, Madapur Garangadur and finally met with the river Harangi near the village Kallur.

Physiographically the area is generally flat and covered with Western Ghats. The climate of the area is characterized by moderate type of subtropical monsoon. The average annual rain fall in the area is about 1000 mm. Out of which the main part is received during the monsoon period. The major land is covered with Coffee and Cardamom estate (Keshavamurthy and Yoganarashimhan, 1990).
The falls basin contains towns and villages surrounded by agricultural areas. The quantity and quality of falls water are affected by discharges from municipal wastes and other human activities. The major portion of the municipal waste water of Madikeri town flows through a system of open drains and discharged into the falls.

Abbi falls near Madikeri is attracting a big swarm of nature lovers with its spectacular vault. Filling its bosom with all the filth of Madikeri, the falls does not run out of beauty. But by grabbing the distant tourist, who visit very rarely to her bosom it has shown her horrifying facet also. The distance between Madikeri and Abbi falls is just 8 kms. But as there is no transportation facility the visitor must take his own vehicle otherwise has to go by walk through the nature at last to reach the rippling falls. While falling from a height of 50 feet passing through huge rocks like flux of milk with an exhibition of all rhetoric, it is a delight to watch. The water descending as a milky white grandeur creates a spray like fog, which is burst out after the fall, which brought to us by the wind that blows, is a joy to sense. Having felt the sunrays only a few hours of the day the falls is made into four different channels but during the rainy season they make a united luxury. After the rainy season in October, the falls turns more beautiful; therefore it is suitable to watch the falls during October. By reaching the top of the hill climbing round the cliffs, one can suck still more beauty. It is better to visit the falls only to enjoy the beauty. If attracted by the water you decide to have bath, there are chances of getting trapped in dangerous twisters.

During the British rule this falls was known as Jessie falls. In memory of Jessie, daughter of the first Chaplin of Madikeri. But today as it waves hands to a number of tourists it is called ‘Abbi Falls’. As per the references in Mahabharatha,
Pandavas visited this place, while they were on vanavasa. They took water from this Brahma Kundike and baptized the idle of Mahadeva at Kundagiri. (near Gonikoppa). The worship of Cauvery abandoned during the rule of Tippu Sultan but was restarted during the reign of Dodda Veerarajendra of Kodagu and is continued without any obstruction.

The macrophytic vegetation adjoining the bund consist of *Achyranthes aspera*, *Asclepias currasapiaca*, *Capparis spinosa*, *Carrissa caranda*, *Cassia auriculata*, *Cuscuta reflexa*, *Mimosa pudica*, *Parthenium hysterophorous* and *Tridax procumbens*. 
Fig. 4–a : Rajeshwari Stream (During monsoon)

Fig. 4–b : Rajeshwari Stream (Showing sampling Collection site)
Fig. 5-a: Koot Hole Water Reservoir

Fig. 5-b: Koot Hole Water Reservoir (Showing Sampling Collection Site)
Fig. 6–a : Hutti River

Fig. 6–b : Hatti River (Showing Sampling Collection Site)
Fig. 7-a: Mallalli Falls (During monsoon season)

Fig. 7-b: Mallalli Falls (Showing Sampling Collection Site)
Fig. 8–a : Talacauvery (Origin of Cauvery River)

Fig. 8–b : Talacauvery River Water (Showing Sampling Collection Site)
Fig. 9-a: Irpu Falls (During monsoon season)

Fig. 9-b: Irpu Falls (Showing Sampling Collection Site)
Fig. 10–a : Abbi Falls (During monsoon season)

Fig. 10–b : Abbi Falls (Showing Sampling Collection Site)