CHAPTER I

GENERAL

INTRODUCING THE DISTRICT

Origin of the name of the district

The district of Cuttack is named after the principal town as well as the headquarters of the district of the same name. The word 'Cuttack' is an anglicised form of the Sanskrit word KATAKA that assumes seven different meanings out of which the two, namely, firstly, the 'military camp' and secondly, the fort of capital or the seat of the Government protected by the army, find applicable in this context.

Cuttack, which is one of the oldest cities of India and the capital city of Orissa for almost nine centuries was built as a military cantonment in 989 A. D. by the king Nrupa Keshari as stated by the distinguished historian Stirling. He based his opinion upon the Madalapanji, a chronicle of the Lord Jagannath Temple of Puri. The city, however, attended glory early in the 12th century as the capital of Imperial Gangas whose empire stretched from the river Ganges in the north to the river Godavari in the south. This capital town continued to prosper during the rule of the successive dynasties, except for a brief period of unrest when in mid-fourteenth century Firoz Shah Tughluq invaded Orissa and let loose an orgy of vandalism, looting and destruction. After the death of Mukundadeva, the last Hindu king of Orissa, the suzerainty of Cuttack passed on to the hands at first, the Muslim rulers and later, to the Mughals.

By 1750 Cuttack had come under Maratha rule and it grew fast as a business centre, being a convenient point of contact between Marathas of Nagpur and the English merchants of Bengal. It was occupied by the British in 1803 and became the capital of the then Orissa Division in 1816. From then onwards till 1948 when the capital was shifted to Bhubaneshwar, the city remained the administrative headquarters of Orissa. The designation of the town Cuttack (Kataka) which has a very rich and ancient historical background, was, in course of time, given to the surrounding country, now comprising the district.

Location, general boundaries, total area and population of the district

The district of Cuttack is situated in between 20° 1′ N and 21° 10′ N latitudes and 84° 58′ E and 87° 3′ E longitudes. It is bounded on its north by the districts of Kendujhar and Baleshwar; on the east by the Bay of Bengal; on the south by the district of Puri; and on its west by the district

of Dhenkanal. Its geographical area is 11,142·82 sq. km. as reported by the Surveyor General of India. It contains a population of 5,503,307 persons (2,801,612 male and 2,701,695 female) as per the provisional Census of 1991. In order of size and population the district holds the fifth and first place respectively among the thirteen districts of Orissa. The principal town is Cuttack. It is also the administrative headquarters of the district and is situated in a tongue of land formed by the Mahanadi and Kathjodi rivers at their point of bifurcation, in 20° 29′ N latitude and 85° 52′ E longitude.

History of the district as an administrative unit

After the conquest of Orissa by the British in 1803, two Joint Commissioners were appointed who at once took measures to place the administration on satisfactory footing. The office of the "Commissioners for settling the affairs of Cuttack" was abolished in 1805 and the province was placed under the charge of a Collector and of a Judge and Magistrate. The whole province formed but one district having its headquarters at Puri until 1816 when Cuttack was made the capital. In 1829, the province was split into three regulation districts of Cuttack, Baleshwar and Puri and the non-regulation Tributary States. After the formation of the district the criminal and revenue jurisdiction underwent many changes until 1870, when the Baitarani and Dhamara rivers were fixedas its northern limit. The next important change made in its jurisdiction after that year was the annexation to it of Banki in 1882. Four feudatory states of Athagarh, Tigiria, Badamba and Narasinghapur merged in the district on 1st January, 1948. Since then only the following minor adjustments in the area of the district had been made for reasons of administrative necessity.

Jijupada area (9·06 sq. km.) of Kendujhar district was transferred to Sukinda police-station of Cuttack sometime after merger. During 1964,two villages viz.,Kabatabandha and Goliamahanapatna ofDhenkanal district were included in Darpan Tahasil of Cuttack district. Thirty-five villages of Dashapalla Tahasil (Puri district) were transferred to Narasinghapur Tahasil in Cuttack district during 1967. In 1969, 31 villages covering an area of 78·06 sq. km. of Nimaparha Tahasil of Puri district were transferred to Jagatsinghapur Tahasil and 28 villages of Cuttack Sadar Tahasil were excluded from Cuttack district and included in Bhubaneshwar Tahasil of Puri district. Total number of villages after such inter-district transfer in the district stands at 6,781.

The subdivisional system was not introduced till 1859 when Jajpur and Kendraparha were for the first time constituted separate subdivisions. Just after Independence and merger of the princely states, the district comprised four subdivisions viz., Sadar, Kendraparha, Jajpur and Athagarh.

Before Athagarh became a subdivision consisting of the ex-states of Athagarh, Badamba, Narasinghapur and Tigiria, the area was declared the district of Narasinghapur with the District Magistrate of Cuttack becoming the *ex officio* District Magistrate of Narasinghapur. The Sadar subdivision covered the police-station areas of Lalbag, Mangalabag, Sadar, Tangi, Chaudwar, Salepur, Mahanga, Kisannagar, Tirtol, Erasama, Jagatsinghapur, Balikuda and Gobindpur. Banki Khasmahal area was included in Cuttack Sadar subdivision but it was looked after by a Deputy Collector. Jajpur subdivision consisted of the police-station areas of Jajpur, Binjharpur, Dharmashala, Barachana, Korei and Sukinda. Kendraparha subdivision consisted of the police-station areas of Kendraparha, Pattamundai, Patakura, Mahakalaparha, Aul(Aali) and Rajnagar. A separate subdivision of Jagatsinghapur comprising the police-stations of Jagatsinghapur, Balikuda, Tirtol and Erasama (formerly in Sadar subdivision) was formed in 1965. So also Banki area was detached from Cuttack Sadar subdivision and was formed a separate subdivision in 1969.

At present the district is divided into six subdivisions, twenty-six Tahasils and forty-three police-stations and forty-one community development blocks. The names of the subdivisions comprising the Tahasils and their component police-stations and the community development blocks are furnished in the following table:

Sl. No.	Name of the subdivision (Headquarters)	Name of the Tahasil (year of opening)	Name of the police-station	Name of the community development block
(1)	(2)	(3)	(4)	(5)
1.	Cuttack Sadar ..	1. Cuttack Sadar (1953-54)	Cuttack Sadar	Cuttack Sadar
			Lalbag	Tangi-Chaudwar
			Mangalabag	Salepur
			Madhupatna	Baranga
			Chauliaganj	Nischintakoili
			Bidanasi	Kantapara
			Puri Ghat	Niali
			Cantonment Road	Mahanga
			Malgodown	
			Baranga	
			Chaudwar (Part)	

(Contd.)

Sl. No.	Name of the subdivision (Headquarters)	Name of the Tahasil (year of opening)	Name of the police-station	Name of the community development block
(1)	(2)	(3)	(4)	(5)
		2. Tangi-Chaudwar (Jagatpur) (13.12.1982)	Tangi (Part) Chaudwar (Part)	
		3. Salepur (1.5.1954)	Salepur Tangi (Part) Jagatpur	
		4. Mahanga (23.9.1988)	Mahanga	
		5. Kisannagar (19.9.1988)	Kisannagar	
		6. Niali (29.3.1965)	Niali Gobindpur	
2.	Kendraparha ..	1. Kendraparha (1.2.1966)	Kendraparha	Kendraparha
		2. Pattamundai (1.1.1966)	Pattamundai	Pattamundai
		3. Rajnagar (14.2.1979)	Rajnagar	Rajnagar Derabisi
		4. Aul (27.11.1952)	Aul (Part)	Aul Garadpur
		5. Kanika (11.1.1953)	Rajkanika Aul (Part)	Rajkanika
		6. Marshaghai (1.3.1959)	Patakura Mahakalaparha	Marshaghai Mahakalaparha
3.	Jagatsinghapur ..	1. Jagatsinghapur (1.5.1954)	Jagatsinghapur	Jagatsinghapur
		2. Tirtol (17.3.1982)	Tirtol	Tirtol
		3. Kujang (27.11.1952)	Erasama Kujang Paradeep	Erasama Kujang
		4. Balikuda (15.3.1982)	Balikuda Nuagan	Balikuda Nuagan Biridi Raghunathpur
4.	Jajpur	1. Jajpur (1953)	Jajpur Mangalpur	Jajpur Dasharathpur
		2. Binjharpur (22.12.1976)	Binjharpur	Binjharpur
		3. Dharmashala (27.9.1988)	Dharmashala Balichandrapur (Part)	Dharmashala Rasulpur
		4. Darpan (27.11.1952)	Barachana Balichandrapur (Part)	Dangadi Barachana
		5. Sukinda (27.11.1952)	Korei Jajpur Road Sukinda Tomka	Korei Sukinda Bairi

(Contd.)

Sl. No.	Name of the Subdivision (Headquarters)	Name of the Tahasil (year of opening)	Name of the police-station	Name of the community development block
(1)	(2)	(3)	(4)	(5)
5.	Athagarh ..	1. Athagarh (1.6.1964)	Athagarh Gurudijhatia	Athagarh
		2. Tigiria (1.7.1965)	Tigiria	Tigiria
		3. Badamba (25.6.1965)	Badamba	Badamba
		4. Narasinghapur (1 12.1965)	Narasinghapur Kanpur	Narasinghapur
6.	Banki ..	Banki (1.12.1963)	Banki Baidyeshwar	Banki Banki-Damparha

There are eleven towns in the district viz., Cuttack (City), Chaudwar, Athagarh, Banki, Jajpur, Jagatsinghapur, Kendraparha, Pattamundai, Jajpur Road, Paradeep Phosphate and Paradeep. Besides, Gopalpur, Charbatia and Nuapatna are also towns containing more than 5,000 population, etc., according to the classification of 1991 Census. These towns contain a total population of 6,78,619 persons according to the Census of 1991.

The following table shows the names of towns including the Census towns with their population.

Sl. No.	Name of the town	Population (1981 Census)	Population (1991 Census)
(1)	(2)	(3)	(4)
1.	Cuttack Urban Agglomeration—		
	(a) Cuttack ..	2,95,268	4,03,418
	(b) Chaudwar ..	32,144	36,877
2.	Athagarh ..	11,087	13,661
3.	Banki ..	12,595	14,350
4.	Jagatsinghapur ..	21,126	25,016
5.	Jajpur ..	22,232	27,312
6.	Jajpur Road Urban Agglomeration—		
	(a) Jajpur Road ..	20,935	25,516
	(b) Chandama Commercial and Educational area	..	603
7.	Kendraparha ..	27,564	35,015
8.	Paradeep ..	33,042	48,104
9.	Paradeep Phosphates ..	..	2,972
10.	Pattamundai ..	..	28,220
11.	Gopalpur ..	..	5,451
12.	Charbatia ..	..	5,965
13.	Nuapatna ..	..	6,139

In the rural portion of the district there were 6,036 inhabited villages, * and 566 uninhabited villages with a total population of 4,152,807 as per 1981 Census and 4,844,040 as per 1991 Census.

TOPOGRAPHY

The natural divisions of the district form into three distinct parts differing widely in their physical characters. The first is the marshy woodland strip from 5 to 48 km. in breadth stretching along the coast from the river Dhamara on the north to the Devi on the south for a distance of about 135 km. The second is the vast cultivated alluvial plain formed from the deposits of its great rivers, and the third, the broken hills of the Eastern Ghats region forming the western boundary of the district.

The marshy strip along the coast is a low woodland tract. It abounds in swamps and morasses and is often intersected by innumerable winding creeks and lakes having a coarse jungly growth of canes, brush-wood and reedy grass on either side. The tract in its swamps, dense forest and noxious atmosphere resembles the Sundarbans and is rightly described as the Sundarbans on a miniature scale. This dismal region is subject to inundations of sea water which leaves a deposit of salt on the surface of the low-lying area, and in many parts render cultivation impractical. The coast is unbroken but on account of excessive deposition of the Mahanadi and its branches deltaic formation giving rise to capes and inlets have been formed at a number of places. The most conspicuous of these is at the mouth of the Mahanadi near Hukitola. Hukitola itself is a deltaic hook. The whole coast is covered with sand dunes. The maximum width of the sand dune-belt is nearly one kilometres. In the central part of the coast, that is near the mouths of Jambu and Kharnasi rivers, there are no sand dunes. The depth of the sea varies from thirty to sixty feet (nine to eighteen metres). The delta consists of a level plain stretching inland for about sixty-four kilometres and occupying the country between the marshy sea coast strip and the hilly frontier. It is intersected by several large rivers, which emerge from the western mountains and throw out a network of branches in every direction. The rivers geologically speaking have reached the old stage as they are full of meanders, elbows and interlocking as well as braided streams. It is a region of rich rice-fields dotted with banyan trees, bamboos, mango orchards and palm groves and it forms the only really fertile part of the district.

*As mentioned earlier the total number of villages according to the Revenue authorities is 6,781.

Hill System

The frontier separating the district of Cuttack from Dhenkanal district on the west consists of a chain of hills, with thickly wooded slopes and fertile valleys between. The greatest distance of this hilly region from the sea-coast is about 96 to 182 km, but in many places the breadth of the alluvial plain does not exceed twenty-four to thirty-two kilometres. This part of the district consists of hills which continue further to the west and south in the districts of Dhenkanal and Puri. These do not consist of long continuous ranges except a few like the Mahagiri Range running for a distance of nearly thirty-two kilometres close to the border of Kendujhar district. With the exception of a few naked bluffs, they are for the most part covered with vegetation; their outline, however abrupt, is always more or less rounded because of age-long erosion. On the other hand, some hills, which appear from a distance to be flat-topped, really consist of a series of steep rugged ridges separated by deep precipitous valleys cut out by the denuding action of running water. In this western tract lie all the hills of the district with the exception of a few isolated peaks which break the evenness of the plain to the north of Cuttack. None of them is more than 914 metres (3,000 feet) high. The highest peak is Daitari south peak 872 m. (2,861′) on the Cuttack-Kendujhar border. Here also lie other important peaks like Guhisal hill 706 m. (2,316′) and Siarimundi Parbat 740 m. (2,429′). Many are of great interest on account of the shrines or the ancient forts with which they are crowned. The most interesting hills are in the Assia range, particularly Lalitagiri with its sandal trees and Buddhist remains, Udayagiri with its colossal images of Buddha, sacred reservoir, ruined temples and caves. Assia Giri has five blocks of hills standing nearly 305 m. (1,000 feet) above the sea level with Alamgiri 762 m. (2,500′) above the sea level. The Mahavinayak peak in Darpan Tahasil has been consecrated for ages to Siva-worship by the devout ascetics and pious pilgrims. This hilly border lands and the low lands along the coast were formerly known as the Rajwara and were held by feudal chiefs, who paid tribute to their overlord, but otherwise retained an independent power; while the wide alluvial plains forming the delta of the Mahanadi, Brahmani and Baitarani rivers constituted the Mughalbandi or Khalsa, i.e., the crown lands from which the Mughal conquerors, like the native sovereigns before them, derived the greater part of their revenue.

RIVER SYSTEM AND OTHER WATER BODIES

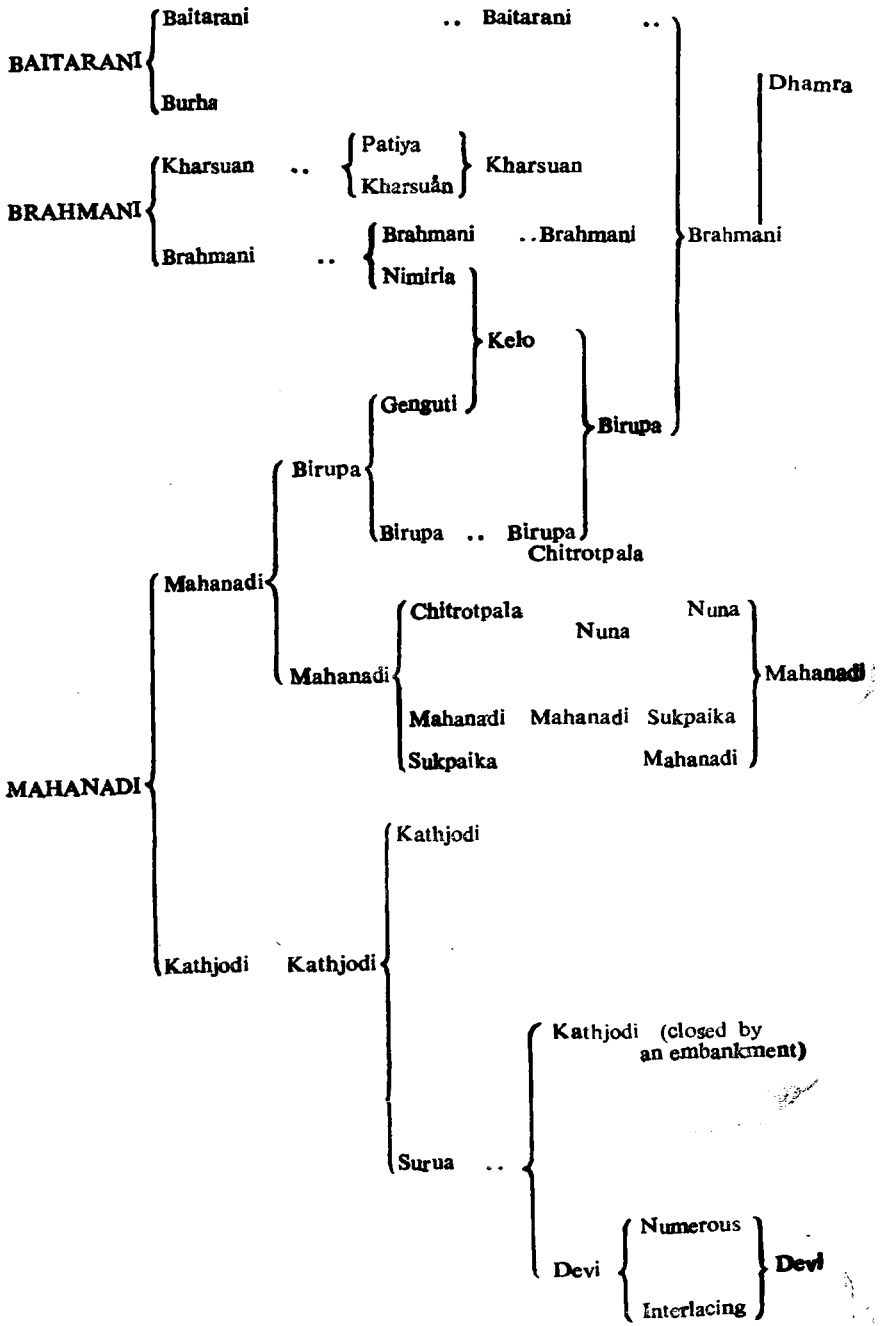
The most conspicuous feature in the general aspect of the district is its river system. The district is webbed by a network of rivers. The system of rivers issues in three magnificent streams through three great

gorges in the mountainous country to the west. To the south, the Mahanadi debouches upon the plains just above Naraj, 112 km. from the sea, on the extreme north of the district; the sacred Baitarani emerging from a more open country forms the boundary between the district of Cuttack and Baleshwar, and the Brahmani flows in the central part of the district. The plains of the district have been divided into two parts, one lying between the great rivers Baitarani and Brahmani and the other between the Brahmani and the Mahanadi.

In summer, the upper channels of these rivers dry and reduce to insignificant streams dotted here and there with stagnant pools. But during rains they bring down an enormous mass of water from the high table-land in which they take their rise. Towards the coast the Baitarani converges with the Brahmani and the joint river namely Dhamara comes up and enters the Bay of Bengal. All these three great rivers, viz., the Mahanadi, the Baitarani and the Brahmani used to pour down their accumulated waters upon the plains, breach over their banks and sweep across the country in spite of a well-planned embankment system. But since mid-fifties of this century some relief has been provided by partial control of flood water of the Mahanadi at the dam at Hirakud. These rivers drain in a vast area measuring more than 1,69,000 sq. km. and the rapidity of the current gained among the mountains brings down a heavy silt in suspension. However, as soon as the river reaches the plains and leaves the hilly region its current slackens. Further it goes, the more sluggish does the stream become and the river, being unable to carry down the sand with which it is charged, deposits it in its bed and on the banks. Therefore, the bed is raised by degrees and the river flows at a higher level than the surrounding area. The central portion is rising more rapidly than the banks. The channel of the river becomes gradually shallower. The distributaries of the main rivers have their beds raised in the same way. As a result, the rivers and their various channels become less and less able to carry off the water-supply to the sea, and frequently prove inadequate to provide an outlet for the vast volume of water poured in at their heads during the rainy season. The velocity which these three rivers obtain in descending from the interior table-land is thus checked and the result is that they break up into a hundred distributaries radiating across the level plains.

The distributaries, struggling in thousand contortions and convolutions towards the coast, form a network of rivers, which joining here and separating there ultimately reunite with one or the other of the three parent rivers as they approach the sea.

The following table shows the main points in the system of rivers in the district



Kuakhai (drains in Puri district and after many bifurcations finds its way into the Chilika lake)

Mahanadi and some of its branches

The Mahanadi, so aptly named, is the largest river in Orissa having a drainage basin of nearly 1,41,600 square kilometres. The river originates from a small pool, 6 km. from Pharsiya village in Raipur district in the Amarkantak plateau of Madhya Pradesh and enters Orissa near Padigan. It passes through the districts of Sambalpur, Balangir and Phulabani. From Boudh (Phulabani district) the Mahanadi takes a north-west-north to south-east-south course and touches the district of Cuttack in Narsinghapur Tahasil of Athagarh subdivision to form the boundary between Cuttack and Puri for some distance. Finally the river enters the district near Baidyeshwar of Banki subdivision. Emerging from the hilly areas of the district it pours down upon the delta at Naraj nearly twelve kilometres west of the city of Cuttack. The Mahanadi traverses the district from west to east and throwing off numerous branches on its way falls into the Bay of Bengal by several channels near False Point, in 20°18′ N and 86°43′ E after a course of around 851 km.

The river forms a series of rapids till it reaches Dholpur where the river enters into the Eastern Ghats mountain ranges by forming a grand gorge about 23 km. long popularly known as Satkosia. At village Barmul the gorge ends. For about fifteen kilometres below the village of Tikarparha, the bed of the river is quite rocky and often takes irregular shape. Below Tikarparha, over a course of nearly 75 km., the river channel opens out to an average width of three kilometres. For a length of 20 km. below Baidyeshwar up to Naraj the banks are defined by rocks. A weir has been constructed across the river Mahanadi at Mundali 5 km. upstream of Naraj whence a large canal system (Puri main canal) emanates. The river further contracts in width to 1 km. between Siddheswar and Debikot hills.

While flowing down the rugged hilly region of the district the Mahanadi receives numerous streams and tributaries from the high land on either bank, but as soon as it reaches the plains its character changes. Now in the plains it forms a great delta head and instead of inviting confluents it shoots out a number of distributaries, forming many river islands from Naraj downwards upto Hukitola islands off Jambu. The biggest of these islands is the Bayalishi Mouza which literally means forty-two revenue villages (actually 31 revenue villages) surrounded on all sides by the river Kathjodi and its tributary Serua. From Naraj it bifurcates, the southern branch being known as the Kathjodi, while the northern retains the name of the parent stream. The city of Cuttack is built on the apex of the delta which separates the two rivers and opposite the city the Mahanadi

proper throws off a large branch known as the Birupa. Just below the bifurcation of the Mahanadi and the Birupa, both the rivers are dammed by anicuts. These anicuts control the supply of water to the head sluices of the High Level Kendraparha, Taladanda and Machhagan canals. All the delta irrigation canals begin from these anicuts. Mahanadi has a total length of 851 km. of which 494 km. falls in Orissa.

After passing Cuttack, the Mahanadi divides into three branches—the Chitrotpala to the north, the Mahanadi in the centre and the Sukhpaika to the south. The Sukhpaika starts at Aitpur, 15 km. below the Mahanadi Anicut. Forming a loop it joins the main stream again at Kulasahi, 30 km. lower down. The mouth of the Sukhpaika was closed in 1951 by a cross bundh for providing irrigation into its island. The Chitrotpala branch leaves the parent stream about 15 km. below the Birupa mouth, and soon bifurcates into the Chitrotpala and Nuna. These streams unite after flowing for a course of about 30 km. and under the name of Nuna fall into the Mahanadi estuary near Paradeep. The Baranadi is a branch of Nuna. About 5 km. below the out fall of Sukhpaika, the Mahanadi bifurcates again into Paika. The Paika reunites with the parent stream nearly opposite Marshaghai, a few kilometres about the point where the Nuna meets the Mahanadi. The Pankpal is the last escape from the right bank of the Mahanadi. From Taladanda the Mahanadi flows eastward and falls into the sea below the False Point.

Kathjodi and Devi

As stated earlier, the river Kathjodi is an arm of the Mahanadi and it branches off at Naraj and then immediately it is bifurcated, the southern branch, known as Kuakhai which means crow's pool, flows into the district of Puri, its mouth is closed by a bar, so that little water flows into it except at flood times. It is practically a spill channel of the Kathjodi. About 5 km. below Cuttack at Jhinkiria, the mainstream throws off the Surua, which however rejoins it at Barada after a course of 16 kilometres. A little lower down at Gobindpur the Kathjodi is bifurcated. The right branch is known as the Devi and the left branch as the Biluakhai. The Devi in which the main body of water of the river passes, takes an easterly direction and rejoins with Biluakhai. On its way to the sea the river Devi gives off a number of branches, the Kandal, the Khandia, the Daikhai, the Puruna Devi and many other minor channels which all eventually reunite and flow, under the name of the Devi, through the neighbouring district of Puri into the Bay of Bengal.

Flowing in the northerly direction, the Kathjodi again divides into the Alaka and Kathjodi proper which have been cut off at their head by the Devi left embankment. The water originally carried by them has been diverted into the Devi and Tampua. The Kathjodi is said to have been originally a comparatively small stream. Its name implies that it could at one time be crossed by a plank. During the last century the volume of water passing down its channel increased considerably and the head of the river became too enlarge to carry off the enormous volume of water poured into it by the Mahanadi. A weir and training embankment were, therefore, constructed at Naraj between 1860 to 1865, in order to regulate the flow and direct some of the water to the Mahanadi channels.

During rains the river and its branches carry great volume of water in them and at the time of high floods they overflow their banks. To safeguard people from the ravages of flood, embankments have been erected on their banks where necessary. In dry months the streams are almost flowless.

Birupa

As mentioned above, the Mahanadi throws off to Birupa opposite the city of Cuttack.Some 20 km. down a branch called the Chhota Genguti and further down another branch called the Bada Genguti fall out of the Birupa. The head of the Chhota Genguti has been closed. The Bada Genguti flows 30 km. to join the Kimiria, a branch of the Brahmani and about 3 km. further down it joins the parent stream, the Birupa. The Birupa thus increased in volume meets the main stream of the Brahmani, a little above Indupur. The two streams flow together being joined lower down by the Kharsuan, and finally debauch into the Dhamara estuary.

Brahmani and its branches

The Brahmani, which has a catchment basin of nearly 35,620 sq. km. originates in Bihar and enters Orissa in the district of Sundargarh. The river is formed by the junction of the South Koel and the Sankh rivers at Vedavyas, a pilgrim centre near Rourkela. The main trunk stream of the Brahmani flows down and passes through Dhenkanal district and enters Cuttack district near Jenapur where it is crossed by an anicut. It then flows a winding easterly course, and reaches the Bay of Bengal by two mouths, the Dhamara estuary and the Maipara river, in 20° 47′ N and 86° 58′ E, 416 km. from its source. The principal branches of the Brahmani are the Kharsuan and Kimiria.

On its left bank near Jenapur, the Brahmani throws off the Kharsuan which again divides into Kharsuan and Patia but the two channels reunite a little lower down and fall into the Dhamara. The Kimiria takes off on the right bank of the Brahmani opposite village Rajendrapur. After meeting the Genguti, Kela and Birupa it again falls into the parent stream near Indupur under the name Birupa. As the river Brahmani approaches the sea, its flow is joined by that of the Baitarani and the united stream forms an estuary known as the Dhamara river.

The delta of the Brahmani starts off near Jenapur. From the apex of the delta to the mouth, the Brahmani river is 149 km. in length. Its right bank distributary meets the Birupa, a left bank distributary of the Mahanadi, at Indupur. Thus to this extent the Mahanadi and the Brahmani have a common outlet for their flood water through Maipara and they have formed the Wheeler Island.

Baitarani and its branches

The Baitarani, rising in the Guptaganga Pahar in Kendujhar district, flows first in a south-westerly and then in an easterly direction, forming successively the boundary between the districts of Mayurbhanj and Kendujhar and Cuttack. It enters the district of Cuttack near the village Balipur. After flowing in a winding easterly course across the delta, where it marks the boundary line between Cuttack and Baleshwar districts, it joins its waters with the Brahmani and ultimately finds its way into the sea under the name Dhamara. The principal branches thrown off from the right bank of the Baitarani are cross streams connecting with the Kharsuan, the chief of which is the Burha, which takes off at Jakadia off Jajpur-Kendujhar road and falls into the Kharsuan after flowing for about 25 km. in one channel. It is navigable as far as Olekh, 24 km. from the mouth, but beyond this point it is not affected by the tide, and is fordable during the Summer season. The river is the styx of Hindu mythology and legend relates that Rama, when marching to Sri Lanka to rescue his wife Sita from Ravan, halted on its bank on the border of Kendujhar. In commemoration of this event a large crowd visit the river on Makar festival in mid-January every year. A historical town and a subdivisional headquarters, Jajpur (the district headquarters of the newly formed Jajpur district) stands on the bank of this river.

Estuaries

The rivers of the district find their way into the sea by four great estuaries. On the north, the Brahmani and the Baitarani debouch into the Bay of Bengal at Palmyra Point, by the two mouths known as the Dhamara and Maipara, and after numerous ramifications the Mahanadi forms two great estuaries, one generally known as the Devi, in the south-eastern corner of the district, while the other, bearing the name of the parent river, empties itself into the sea 5 km. east of the False Point, about half-way down the coast. An eternal war goes on between the rivers and the sea in the monsoon-beaten coast, the former struggling to find vent for their columns of water and silt, the latter repelling them with its sandladen currents. These forces have actions and their reactions. The sea deposits a bar outside the river mouth, while the river pushes out its delta to right and left inside. All the estuaries, therefore, have a bar of sand across the mouth which prevents the entrance of large vessels except at high tide. However, the sand bar at the mouth of the Mahanadi has been greatly subdued and the Paradeep port has been developed thereon.

Devi estuary—The Devi, with its channels forms the last part of the great network of rivers into which the Kathjodi branch of the Mahanadi bifurcates. It is a common feature of most of the streams of the Cuttack district that they reunite as they approach the sea, and the result is a broad estuary, known as the Devi which enters the Bay of Bengal a short distance to the south of the boundary between the districts of Cuttack and Puri. This is navigable upto Machhagan by small slopes. It is one of the best tidal channels in Orissa, but owing to the bar of sand at its mouth vessels of large size cannot enter it except at a high tide.

The Mahanadi estuary—The northern branches of the Mahanadi also join together while approaching the sea, and eventually fall into the Bay of Bengal under the name of the parent stream. The estuary has several mouths, but the principal one is that which debouches through the shoals to the south of the False Point lighthouse. For a considerable distance up the river, there is abundance of depth for ships of large burden, but unfortunately, as in the case of the Devi, and indeed of all other harbours of Orissa, a bar stretches across the mouth, which in addition to the perils of shoal water, adds to the dangerous incident to constant changes in the channels and sandbanks. The False Point harbour which lies a little north of the Mahanadi estuary, is a comparatively exposed anchorage and was, until the construction of the Hirakud Dam, rapidly silting up. Two separate

channels lead inland from the anchorage, on the north the river Jambu and on the south the Kharnasi creek, a short branch of the Mahanadi. At a later period the sandbar at the mouth has been improved in 1952 from 2½ to 3 metres (8′ to 10′) at low water thus causing the river water to pass through the shortest distance to empty itself straight into the sea instead of following a circuitous way as was done previously. Several foreign experts were invited by the Government of Orissa to give their advice for the improvement of the bar in connection with the development of the Paradeep port. All of them were of the opinion that Paradeep could be developed into an all-weather deep-sea-port by construction of estuarine or coastal harbour to accommodate vessels up to 32′ draft. Later on the major port of Paradeep developed, details of which are given in chapter VII (Communications).

Brahmani estuary—The river system on the north of the Mahanadi in the district consists of the network of channels formed by the Brahmani and the Baitarani, which after infinite windings, find their way into the sea by two great outlets at the Palmyra Point. The southern of these is the Maipara river with its tidal creeks the Bansgarh and Rana Hansua which run southward almost parallel to the coast till they join the sea nearly 29 km. north of the False Point. The mouth of the Maipara presents the usual obstacles of bars and high surf, and from its position on the south of the Palmyra promontory, it is inadequately protected from the monsoon. However, previously during the period from November to March small crafts from the Madras coast used to frequent it for purchase of rice.

The Dhamara, the northern exit of the united streams of the Brahmani and the Baitarani forms the boundary line between Cuttack and Baleshwar districts. The Dhamara, though navigable, is rendered dangerous by a bar across its mouth.

Lake

There is only one lake in the district which is Ansupa lake in Banki subdivision. This is a fresh water lake situated on the left bank of the river Mahanadi opposite Banki. Its distance is nearly 70 km. from Cuttack. The lake was formed due to meander shifting of the Mahanadi. It is a picturesque lake and it offers an ideal asylum to the migratory birds in the winter season. It is surrounded by bamboo and mango groves and the Saranda hill stands beside it. More about this lake will find place in Chapter XIX (Places of Interest).

GEOLOGY

Physiographically the district can be divided into three parts, i. e., (1) rugged hilly terrain (s) on the north and western extremes, (ii) relatively plain lateritic country around the periphery of hilly region to the south of Mahanadi near Banki, from Athagarh to Nirgundi and around Jajpur Road railway station and (iii) the vast expanse of alluvial and coastal plains. The western and northern extremes form highly undulatory topography with high hills. The district consists of a long tract of coastal plain and a wide stretch of alluvial plain formed by the deltaic deposition off the three river systems of the Mahanadi, the Brahmani and the Baitarani which meander through this district in an almost west to east course. Coastal and alluvial tract constitutes more than two-third of the total area of this district, thus concealing a large area of hard rock and its geological history.

Geological Set-up

The rock types occurring in the district from the oldest to youngest formations are Khondalite suits of rocks, charnockites and granite gneiss, rocks of the iron-ore series chromiferous ultra basics, dolerite, granite and granophyre belonging to proterozoic. The Jurassic or Upper Gondwanas are represented by Athagarh sandstones. The youngest formations belonging to recent/sub-recent are laterite and alluvium which cover vast areas in this district. The following stratigraphic section has been worked out tentatively for the district.

Recent	..	Alluvium, river terraces, beach sands
Pleistocene Recent	..	Laterite
Jurassic	..	Athagarh Sandstone (Upper Gondwana)
Proterozoic	..	Dolerite, Granophyre and Granite, Ultramafics, Iron-ore series.
Archaean	..	Granite gneiss (?) Charnockite and Khondalite.

The lithology and its distribution are discussed below, beginning with the eldest formation encountered in this area.

Archean (Khondalite and Charnockite)

The rock formations, south of the Baitarani river around Garh Madhupur, to the west of the National Highway, comprise the charnockite-khondalite suites with associated acid intrusions. The general strike of the rock varies from W.N.W.—E. S. E. in the east to E-W in the western part. The khondalite group of rocks consist of quart-sillimanite, graphite schists and gneisses, garnetiferous quartzite and rarely calc-silicate rocks. Khondalites are banded, brown to pinkish grey except calc-silicate which is greenish white in colour. All members of khondalite suites are garnetiferous. Charnockites occupy the low hillocks and mounds or as minor occurrences (intrusives) in khondalites. Charnockites can be, in simple term, hypersthene granite which is typically greasy green to greasy gray in colour and is composed of hypersthene, plagioclase, quartz, garnet and rarely biotite (diapthorite) medium to fine grained and devoid of foliation—a feature which is so prominent in khondalites. These rocks form a part of the Eastern Ghats Super Group which are considered to be thrust against the rocks of the Iron-ore Group and the shear zone can be traced from the hill 235' (20° 54' :86° 00') westwards through Bannaskar (20° 55' : 85° 50'). These rocks of the khondalite suites are seen around Narasinghapur at the western end of the district and can be traced up to the north of Banki and also from N. E. of Athagarh to Garh Madhupur (20° 47' : 86° 05'), confined to the west of the railway track. Charnockite is prominent in the area around Garh Madhupur, besides minor occurrences along with khondalites elsewhere.

Granite Gneiss

The metasediments (khondalites) were intruded by charnockite and the whole charnockite-khondalite suites were subjects to acid intrusion whereas the older rocks were partly assimilated by the intrusives. The intrusives are granite gneiss. A coarse grained gneiss, often passing into porphyroblastic type (sugen gneiss) and associated with aplitic varieties, is seen closely associated with the rocks of Eastern Ghats Super group. Owing to the coarse texture, the foliation is very crudely developed. Jointing in three different planes is common. Minerals composing this rock are felspar, quartz, biotite and garnet. Besides apatite, perthitic, antiperthitic and myrmekitic growths are commonly seen. It is seen along the valley north of the Mahanadi from Narasinghapur to eastward upto Tigiria (20° 27' :85° 32'). This apart, at Raj Athagarh railway station another patch of granite gneiss stretches upto around Haridaspur (20° 43' :86° 07').

Iron-ore Group

The rocks of Eastern Ghats Super Group are thrust up against that of the Iron-ore Group along the Brahmani thrust in the northern part of the district around Sukinda and Daitari hills. The Iron-ore Group is represented by banded megnetite chert, banded black chert, banded calcareous chert, shales and phyllite and quartzites. The banded chert formation being compact and resistant always stands out as hills and ridges surrounded mostly by a flat or gently undulating terrain. The individual rock units like banded magnetite chert, banded calcareous chert and banded black chert grade into one another along the strike and there appears to be no regularity in the presence of iron or calcareous material, which is probably due to the changing chemical conditions of precipitation within the basin of deposition.

The rocks of Iron-ore Group are exposed to the north of Sukinda and in the Daitary hill (954′) east of Patpur, near Salijunga, Bardagora, Garbandhjore, Barpada, north west of Patilo and near Pandua. Further, these formations are found north of Tungaisuni, Champajhar and the Tomka hill range.

Andalusite bearing schists and quartzites are noticed on the southern flank of the eastern part of Mahagiri hill range. These rocks are also noticed associated with fuchisite quartzite, in the eastern tip of the range.

The rock shows porphyroblastic texture with crystals of andalusite occurring in an aggregate of quartz and sericite in parallel orientation defining faint schistosity. These rocks are tentatively placed below the banded chert formations since its position in stratigraphic column is yet to be established.

The rocks in the Iron-ore Group form the following sequence:

Banded hematite quartzite
Porous ferruginous gritty rock (ash bed?)
Limonite jaspers
BANDED JASPERS
Banded (black and white) chalcedonic-quartzite, ferruginous shale grits sericite phyllite
Gritty phyllite (conglomeratic)
Gritty phyllite (conglomeratic)

——————————Unconformity——————————

Quartzite, quartzschist, micaceous quartzite, etc.

Ultramafics

The Iron-ore Group metasediments are intruded by (chromiferous) ultrabasic rocks, hornblende granite and granophyre as well as Newer dolerite dykes.

Ultramafics are now represented by talc-chlorite tremolite schist. Altered and serpentinised peridotite and pyroxenite are found as small exposures as these are very much susceptible to weathering. Ultramafics are intrusive into the banded cherty formations. Pyroxenite appears to be younger than the metamorphosed schistose rocks. These rocks are seen around Singadia and Ampur areas. Peridotite is the chief rock type in close association with chromite lodes.

Talc-chlorite-tremolite schists are composed mostly of tremolite with talc and chlorite sometimes incipient formations of asbestos is noticed within these rocks.

Serpentinite is intimately associated with crystalline chromite and is drawn into lenses and bands of chromite. It exhibits relict crystalline and hypidiomorphic granular texture indicating that the serpentinite has formed by the alteration of the dunite and peridotite. The peridotite occurrence near Ampur is very much altered and serpentinised. It is composed mainly of olivine and pyroxene with serpentine and talc as secondary minerals.

Granite/Granophyre

It is an intrusive which is younger to ultramafics. The rock is mesocratic, medium to fine grained in texture, shows streaks of dark coloured hornblende. The plagioclase is albite-oligoclase. Potash felspar includes both orthoclase and microcline. Hornblende and a little biotite is also present, the former gives rise to the latter. Small occurrences are seen south of Sukinda which extends westward up to the border of the district. Other occurrences are around Patpur and Kakudia.

Gondwanas/Athagarh Sandstone

The next younger formation in the district belongs to Jurassic period and are represented by the fresh water deposits of the Upper Gondwana stage. These fluviatile and fresh water sediments exhibit a rapid change of lithology and attitude of beds. Constituent rocks are conglomerates, coarse grits, ferruginous grits, ferruginous sandstone, white and red shales. Frequent changes in the condition of deposition are very well illustrated by features like current bedding and inter

mixture of rocks. Predominant rock type is sandstone and is identified as Athagarh sandstone, its area being Athagarh. It is fairly coarse grained rock varying from a friable loose variety to hard compact and tough types. The exposures are to some extent obscured by laterites and alluvial deposits.

Besides, its wide occurrences around Athagarh (20° 32′:86° 37′) and Ratagarh Mundia hill (263′) where the Athagarh sandstone directly overlie the rocks of charnockite suites, these are seen in the area south of Baranga bounded by the Kuakhai river on the east and south-east of Banki along the border of Cuttack district and occupying a longer area across the border in Puri district.

A few fossil plants have been discovered from the Athagarh sandstone which indicate that the beds are of about same age as that of Rajmahal stage of the Upper Gondwana Group.

Dolerite dykes

Dark coloured medium to fine grained, comparatively fresh, occurring mostly as bouldery outcrops, the dolerite dykes are seen intrusive into banded chert formation and granitic rocks. It is composed mainly of augite, labradorite with a little amount of ilmenite and magnetite. Augite is mostly euhedral to subhedral crystals altering to pale green amphibole, tremolite and uralite. Dolerite dykes are seen around Patpur and Singadia and along the northern border of the district.

Laterite

Laterite is the most abundant rock in this district. It covers extensive areas and at places attains a thickness of 10 to 15 metres. It is yellowish-red to brown grey and mottled colour. It is porous, pitted and at places clayey. It contains mainly the hydroxides of iron, alumina and manganese. Main sources of lateritisation being gneisses and sandstones. In case of Khondalites, lateritization is rather poor, as it gives rise to keolinic and lithomargic materials. The laterites out of granite and granite gneiss are also more or less lethomargic as seen in this district. Most of the laterite is evidently of detrital origin and consists of small pisolitic nodules of hematitic iron and coarse quartz and sand. Laterites derived from ultramafics and concentrated with nickel around Sukinda. In Sukinda area there are two types of laterite, i. e., (i) transported and (ii) *in situ*. The laterites around the southern flank of the western part of Mahagiri hill range and Kankudia are transported. The laterite around Singadia and Sukinda are *in situ* type.

Laterite occurs in the low level plains to the south of the river Mahanadi around Banki. Another stretch of laterite is recorded extending from Athagarh upto the gneissose hills north of Nirgundi. The area around Sukinda is lateritised in patches and is seen within the valleys amidst hills. Laterite along the South Eastern Railway tract is noticed almost at all places except to its east where it is concealed under the alluvium.

Alluvium

The youngest formations-alluvium-occupy the largest area in the district. And over two-third of the district is covered with thick piles of alluvium. Much of these is a recent deltaic deposit of the Mahanadi and the Brahmani river systems and occupy a flat tract of country extending some 50 km. from the sea with the exception of a belt of sandy tract along the coast. Almost the whole expanse of the district to the east of the railway tract (Howrah-Madras) is covered with alluvium and to the west of it these are confined to narrow stripes of valleys on either side of the rivers Mahanadi and Brahmani. In the north-western part some undulating land consists of an older alluvium containing Kankar and pisolitic ferruginous nodules with no well-defined boundary to separate it from the inland laterite or to distinguish it from the inland laterite or to distinguish it from the alluvium of the delta.

Economic Minerals

In the hard rock area which makes up about one-third of the total area (the rest two-third being under alluvium) important and rich deposits of iron, chromite and nickel are seen. Besides, clay, soapstone, ochre and building materials are also found.

Hematite (Iron-ore)

Hematite is the chief iron-ore. It forms the largest deposit among all the minerals occurring in the district. About 60 million tonnes of hematite with over 61·5 per cent iron content have been estimated, distributed broadly around two places, Daitari and Tomka. Other small occurrences at Tungaisuni (21° 03′ : 85° 53′) and Champajhar (21° 04′ : 85° 56′) are also confined within Sukinda Tahasil. Iron-ore is cherry red to iron black in colour, compact hard to porous. Other minerals associated are limonite, magnetite, geothite and laterite.

Iron-ore from Cuttack is shipped through Paradeep to abroad and the state earns a sizeable foreign exchange in return.

Chromite

Chrome occurs at the tri-junction of this district with Kendujhar and Dhenkanal. Orissa contributes more than 90 per cent of the chromite produced in India and the district contains major portion of the chromite deposit of Orissa, which has been estimated to 113 million tonnes. Chromite is grey to brown in colour, massive friable, hard and lumpy associated with weathered ultrabasic rocks in Sukinda Tahasil.

Chromite is used in the manufacture of stainless steel and sophisticated chrome-plated instruments. Refractory-bricks are also made from chromite for use as lining in blast furnace.

Nickel ore

Ultramafics around Sukinda on weathering have given rise to laterite which contains concentration of nickel. The nickeliferous limomite is light, highly porous, brownish-yellow to yellow ochreous material. The known occurrences are located around Kansa, Kamarda, Saruabil, Sukerangi, Kaliapani and Bhimtangar in Sukinda Tahasil. Total reserve of nickel ore estimated at Kansa and Sukerangi-Saruabil sectors is 31 million tonnes with an average nickel content of 1·15 per cent.

Its main use is nickel-plating. Nickel is also essential in the canning industry which is expected to boost up the export of sea-food which is another foreign exchange earning industry of the district.

Clay

Felspar on weathering gives Kaoline which is clay. Clay is a fine grained material used mainly in the making of potteries and insulators. The glass and ceramic industry at Barang (Orissa Industries Ltd.) of the district is the main consumer of clay deposits mined in Orissa. Occurrence of yellowish-white lithomargic clay are known from around Pimparia, Bandagan, Koilan and Sapanpada.

Ochre

Yellow and red ochres have been noticed from around Naraj (20° 28′ : 85° 46'), Taljar (20° 28' : 85° 45') and Ghasiput (20° 25' : 85· 37'). The deposits are small and used in the local area as colour wash.

Soapstone

Soapstone is a rock with soapy feel on the surface which is a weathered product of ultrabasic rocks. Soapstone occurrences have been recorded from Belgot and Kachuringa of Sukinda area. The rock is ideal for carving and thus has given rise to some cottage industries for carrying out sculptures, potteries, etc.

Building Material

There is no dearth of building material in the district. Laterite and sandstone in the north and north-west of Cuttack city are used as building stone. Khondalite and charnockite have been quarried from near Haridaspur for use as railway ballast. Charnockite outcrops west of Jenapur railway station can be chipped into road metals. The Athagarh SSL, khondalite, talc and chlorite have been used in the temple buildings.

FLORA

The flora of the district is very rich and varied. About 750 species of plants belonging to more than 120 families are found in the district. The widely represented families are: Leguminosae, the Mung-Arhar, Chakandi and Babul family ; Gramineae, the family of the grasses and bamboos: Euphorbiacea, the Siju family; Rubiaceae, the Kurum family and compositae, the sun flower family. The other important families are : Dipterocarpacea (Sal), Malvaceae (Bhendi, Mandar and Simuli), Meliaceae (Neem), Anacardiaceae (Mango and Cashewnut), Rhizophoreceae (Rai of the Mangrove forest), Cucurbitaceae (gourd and cucumber), Combretaceae (Asan and Atundi), Elenaceae (Kendu), Apocynaceae (Patalgarud, Chhation), Verbenaceae (Teak), Labiatae (Tulsi), Moraceae (Bara, Aswatha, Jhumpuri), Palmae (the palms) and Cyperaceae (Mutha).

The district can be divided into three distinct botanical zones, viz., (i) the deltaic zone , (ii) the cultivated plains and (iii) the western hilly region and adjoining forested plains.

(i)The Deltaic zone—The mangrove formation is the peculiarity of this zone. These formations are met within the swamps either always or periodically inundated by tidal water. The flora is of evergreen nature. The most common species in the new formations are Sonneratia (Kerua) and Avicennia species (Bani), the common shrub being Heritiera fomes (Sunderi). In the older formation, almost constantly inundated with tidal water, the species are Rhizophora species (Rai), Bruguiera species (Rasinia, Kekra), Lumnitzera racemosa (Tunda), Ceriops decandra (Garta, Goran),

Kendelia candel, etc. The gregarious fern Acrostichum aureum is found along the creeks. The more valuable species of the mangrove forests are found in the areas which are periodically inundated by tidal water. These species are Heritiera fomes (Sunderi) and H. Littorali (Lathi Sunderi), Xylocarpus granatum (Susambar or Sisumar), Xylocarpus gangeticus (Pitmari) and Excoecaria agallocha (Guan). The common shrubs are Hibiscus tiliaceus (Barvia) and Acanthus ilicifolius (Harkanch). Phoenix paludosa (Hental) is used in house building and fence. It is found in gregarious masses over considerable areas on the mud in shallow water.

Several species of mangrove families develop *pnenmatophores*, erect peg like projections from the root system, emerging from the ground, furnished with numerous stomata or lenticels which admit oxygen to the roots. These pnenmatophores are 6 to 18 inches high above surface and are often a serious impediment to walking. The other peculiarity of the mangrove forest is the phenomenon of vivipary, the germination of the seed while still on the tree. It is very marked in Rhizophora species with radicle often attaining a foot in length before falling into the mud.

The higher lands contain evergreen species common in the more inland forests, viz., Mimusops hexandra (Khira), Pongamia pinnata (Karanj), Strychnos nux-vomica (Kochila), Ficus species (Jari), mango and neem. The understory consists of Glycosmis arborea (Masu-very common in Bhitar Kanika), Erioglossum rubiginosum (Mahanga), Strellus asper (Sahada), Randia malabarica (Phirika), Carissa spinarum (Ankhu Koli), Mala luxifolia (Guakoli), Dodonaea viscosa, Zizyphus oenoplia (Kantei Koli), Caesalphinia nuga, etc. Bombax ceiba (Simulia deciduous tree) and Bambusa arundinacea (Kanta bans) are found in the Adi forests of Kanika.

The plants commonly met with on the open coastal sands are Ipomoea biloba (Kasari-nai), Leptadenia reticulata (Mendhi), Stylosanthes mucronata, Crotalaria striata, Canavalia lineata (Junjunka), Gymnosporia emerginata, Launea pinnatifida (Chahli), Pandanus odoratissimus (Kia), Spinifex squarrosus (Budhakanka), Panicum repens, Cyperus arenarius, Opuntia sp., Crinum asiaticum (Arsal), Crinum defixum, etc.

The flora of this deltaic zone has not been fully explored. Botanical excursions to this area have been few and short. Thorough inspections of this area may yield many new and interesting species.

(ii) The cultivated plains—A large variety of economically important plants are cultivated in the district. The usual rice-field weeds are Ammannia species, Lindernia parviflora, Dopatrium junceum, Utricularia coerulea, Utricularia reticulata, Sphenoclea zeylanica, Hygrophila species, Mimosa pudica, etc. The species generally found in wastelands away from villages are Jatropha gossypifolia (Gaba), Annona squamosa (Ata), Annona reticulata (Ramphal). Argemone mexicana (Odasamari), Aegle marmelos (Bel), Parkinsonia aculeata, Mimosa pudica (Lajkuli), Tridax procumbens, Martynia diandra (Baghakhi), Hyptis suaveolens (Gangatulasi), Datura metel (Dhutura), Alocasia macrorrhiza, Scoparia dulcis, Adhatoda vasica, etc.

The common orchard trees are mango, jack-fruit (Panas) and Guava. Less common are cashew, Dillenia indica (Aau), orange, lemon. In the coastal areas, the palms, Borassus flabellifer (the palmyra palm-Tal), Cocos nucifera (cocoanut) are extensively planted and Phoenix sylvestris (Khajuri) is commonly met with.

Among the hedge plants the most common are Nerium odorum (Kaniar), Duranta repens, Lawsonia inermis (Mehendi), Pithecollobium dulce, Dodonaea viscosa, Ipomoea carnea and Vitex negundo (Begunia). In the back-yards Moringa *pterygosperma* (Sajna) trees, Musa paradisiaca (green plantain), Musa sapientum (banana) are quite popular. A very large variety of species are planted in the gardens. The bamboos, Bambusa tulda and Bambusa nutans are widely planted along the fences.

The common shade trees along roads and on village wasteland are Ficus benghalensis (Bara) and Ficus religiosa (Aswatha).

The usual plants in the ponds are various species of beautiful lilies and lotus; all belonging to the family of Nymphaeaceae. The other common aquatics are Pistia, Trapa sp., Myriophyllum sp., Ludueigia adscendens, Nyphoides, Hydrilla verticillata, Hydrocharis sp., Ottelia sp., Ceratophyllum sp., Villisneria sp., etc. The water Hyacinth Eichhornia crassipes, spreads widely in the ponds, canals and other water sources.

(iii) The western hilly region and adjoining forested plains—This region contains the valuable forest of the district. Valuable tree species like Shorea robusta (Sal), Pterocarpus marsupium (Piasal), Ougeinia oogeineusis (Bandhan), Adina codifolia (Kurum), Xylia xylocarpa (Kangara Tangan), Terminalia tomentosa (Asan), Anogeissus latifolia, Bombax ceiba (Simuli), Chloroxylon swietenia (Bheru), Diospyros melanoxylon,

etc., are found naturally occurring in these forests. Small teak (Tectona grandis) plantations are raised throughout the plains. Besides, a very large number of other species like Dillenia pentagyna, Lannea coromandelica, Garuga pinnata, Protium serratum, Aphanamixis polystachya, Erythrina variegata (Paldhua), Fagara budrunga, Alstonia scholaris (Chhatian), Hymenodictyon otixense (Dhauranja), Anogeissus acuminata (Phasi), Pongamia pinnata (Karanja), Albizia species, Pterospermum heyneanum (Giringa), Miliusa velutina, Miliusa tomentosa, Lepisanthes tetraphylla, Putranjiva roxlurghil, Polyalthia cerasoides, Mallotus philippensis, Streblus taxoides (Jhumpuri) and a host of other species abound in this region. Among the more valuable herbs are Rauvolfia serpentina (Patal garud), Hemidesmus indicus (Ananta mul), Gymnema sylvestre (Gudamari), Asparagus racemosus (Satabani), etc.

Among bamboos the most common one is Bambusa arundinacea (Kanta bans) which forms extensive brakes throughout the area. These bamboos, particularly in parts of Narasinghapur and Badamba are of very good quality. Salia (Dendrocalanus strictua) bans also occurs in Narasinghapur and in a small part of Badamba. Balangi bans (Oxytenanthera nigrociliata) is also found in the upper reaches of the Haldiaseni hills of Badamba.

Rauvolfia serpentina, the world famous wonder drug 'Reserpine' is extracted from the root of this plant which is locally called Patal Garuda. This plant, though found in forests of this district is nowhere available in abundance. It is worthwhile carrying out large scale plantation of this herb as there is heavy demand on the roots of the plant.

FOREST

Except for the hilly region forming the western territory of the district and the marshy strip stretching along the coast the entire alluvial plains forming the major portion of the district is practically devoid of forest. The forest area of the district as given by the Principal Chief Conservator of Forests is 1,791·21 sq.km. including only 497·81 sq.km. of reserved forests. The percentage of forest area to the geographical area of the district is only 16 against the state average of 38·5 per cent. (But NRSA, the National Remote Sensing Agency reports that not more than 25·3 per cent of the geographical area of the state is now under forests). This is very much below the recommendation of the National Forest Policy of 1952 and 1988 which prescribes that there should be a minimum of $\frac{1}{3}$rd of the area under forest and tree cover; but in the hilly and mountainous regions the aim should be $\frac{2}{3}$rd area under such cover in order to prevent erosion and land degradation and to ensure stability of the fragile eco-system.

The *per capita* forest area comes to only 0.03 hectare against the state average of 0·22 hectare. (The *per capita* land area of the district is 0·20 hectare). Prior to merger of the four ex-states and abolition of zamindaris particularly the permanently settled estates which formed the Rajwara whose status was akin to that of the ruling chiefs of the Garhjats, there were much more forest areas which have been deforested since then for various reasons. The Principal Chief Conservator of Forests reports that between 1948 and 1990 an area of about 950 sq. km. including 125 sq. km. of reserved forests has been deforested. In the permanently settled estates like Sukinda, Madhupur, Darpan and Damparha bordering Garhjats and in the coastal ex-intermediary areas of Kanika, Kujang and Aul (Aali) forest areas were not very much insignificant. But some years before the advent of Independence the zamindars who had absolute right over the forest, leased out extensive forest areas to people even from outside the State. No doubt the Orissa Preservation of Private Forests Act, 1947 and also the Orissa Act I of 1948 prohibited leasing of forest land by zamindars without prior permission of the Collector, but this had no salutary effect as by then much damage had been done.

Forest Law

The Indian Forest Act, 1927 was in force in the entire district excluding the four ex-states of Athagarh subdivision. But no forest was notified as a reserved forest under the Indian Forest Act. Since no rules of management were framed under that Act, the zamindars were in full control over disposal of forest lands and forest produce. Only about 7 sq.miles (18·13 sq. km.) of Dalijora zamindari forests were managed by Government with the consent of the zamindars. With the abolition of zamindaris, the forests are vested in the State Government. But the management of the ex-zamindari forests continued to be under the Revenue Department till 14th November, 1957 when this was transferred to the control of the Forest Department. But the forests of Banki Khasmahal area were managed by the State Government under the Indian Forest Act from the beginning.

Each of the princely states of Athagarh, Narasinghapur, Badamba and Tigiria had its own system of forest management under the advice of late Dr. H. F. Monney, a well-known forest expert, who was forest advisor of the Eastern Agency. Forest plans and rules for management were drawn up and executed, as in case of most other ex-states, for reserved and unreserved forests under his expert guidance and advice. Generally speaking they were divided into 'A' class reserves where reservation was absolute and 'B' class reserves which were meant for

'Nistar' rights of the villagers, but were worked in coupe system. The village forests were known as Khesra forests. 'A' and 'B' class reserves were generally demarcated but village forests were not. All wastelands in the villages were included in the term 'village forest'. Nistar holders who were paying Nistar cess were entitled to take unreserve species free of charge for their own consumption but not for sale from village forests or from 'B' class reserves and not from 'A' class reserves. On merger, the Indian Forest Act, 1927 was extended to those areas by the Administration of Orissa States Order, 1948 with effect from 1st January, 1948. Later on the extension was enacted in the Merged State (Laws)Act, 1950. For effective management of the forests, the Indian Forest Act was amended in its application to the merged territories by the Orissa Amendment Act XI of 1954 which inserted section 20-A to that Act. Under this provision of law any forest land or wasteland in the merged territories which had been recognised by the Ruler as re served forest in pursuance of any law, custom, rule, order, working plan or register, etc. immediately before the merger shall be deemed as reserved forests under the Indian Forest Act. All other forests which were recognised in the merged territories as Khesra forest or village forest, etc. shall be deemed to be protected forest under the Indian Forest Act.

The Indian Forest Act, 1927 was repealed on enforcement of the Orissa Forest Act, 1972 which came into force w.e.f. 14th July, 1972. This Act follows the Indian Forest Act with minor variations here and there. Under section 81 of this Act forests recognised in the merged territories as Khesra forests, village forests or protected forests other than reserved forests by whatever name designated or locally known shall be deemed to be protected forest under this Act. Neither under the Indian Forest Act nor under the Orissa Forest Act any land in the district was declared as a "village forest" which is meant for the benefit of the village community, and so no statutory rules for management of any village forest was framed. Recently for effective management of social forestry schemes and for implementation of the internationally aided forest schemes like SIDA (Swedish International Development Agency) the Orissa Village Forest Rules, 1985 has been framed. After this a few areas have been declared as "village forests" to enable the Forest Department to take up Social Forestry schemes for the benefit of the villagers.

Forest Area

The different categories of forest area in the district such as the reserved forest, unreserved forest, protected forest, undemarcated protected forest, ex-zamindari and unclassed forest at different periods of time ranging from 1st April, 1936 to 31st March, 1990 are given in the Table 1.

Table 1

Statement showing the different categories of forest areas like, Reserved Forest, Demarcated Protected Forest, Undemarcated Protected Forest, ex-zamindari, Unclassed forest in the district as on 1·4·1936, 31·3·1947, 31·3·1957, 31·3·1962, 31·3·1968 and 31·3·1990.

Year	Reserved Forest	Reserved Forest (Private)	Demarcated protected Forest (RL &PRF)	Undemarcated protected Forest	Ex-zamindari	Unclassed	Total	Reference/Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1·4·1936	..	18·39	..	..	..	..	18·39	AAR*-1936, No forest area in the Central Government existed as on the 1st April, 1936. During 1936, 18·39 sq. km. of private owned forest of Dalijora R. F. belonging to Raja of Panchketa were taken over by the Government for management.
31·3·1947	603·47	18·39	305·62	98·42	..	0·62	1,026·52	AAR-1947
31·3·1957	482·18	18·39	856·60 (P) **	87·85 (P) **	..	0·62	1,445·04	AAR-1956-57, 575 hectares of R.F. diverted for cultivation and installation of transmission tower.
31·3·1962	498·45	18·39	29·01	60·84	444·57	0·57	1,051·80	AAR-1962-63
31·3·1968	498·45	18·39	36·88	51·98	443·77	0·57	1,050·04	AAR-1967-68
31·3·1990	497·81	..	765·68	527·68	..	0·59	1,791·21	AAR-1989-90

* AAR—Annual Administration Report.

** Area under the management of the State Government other than Forest Department, i.e., the management of ex-zamindari and ex-state forests which were vested in the Government and were under the control of the Board of Revenue.

The fluctuation in the areas of forest in the district at different times as discernible from the Table 1 is due to the merger of the forests of the ex-states, zamindari forests and Lakhraj forests. During the years 1948 to 1990 there had been a total loss of 949·56 sq. km. which included 124·67 sq. km. of reserved forests, 786·25 sq. km. of protected forests and 38·64 sq. km. of other forests. For sometime as in other parts of the state there had been a steady deforestation experienced in the district. The reason of deforestation may be ascribed to the conversion of the forest into land suitable for cultivation, illegal felling of trees by the unscrupulous contractors, installation of transmission lines, operation of various irrigation projects, opening of industries, construction of roads and buildings, railway lines, and above all, smuggling of timber and firewood. However, in recent years a number of steps have been taken for the development of forests at the government level and through private and local agencies. Forests in the district are now mostly met within Athagarh Division and in Sukinda area.

Forest divisions and area covered

For administrative convenience, the forestry functions of the state has been divided functionally and territorially into territorial, wildlife and kendu leaf divisions. Besides, there are Social Forestry, Forest Development Corporation, Cashew Development Corporation, etc. functioning in the district for specific forestry functions. The district is mainly formed into a single territorial division, namely, the Athagarh Forest Division with its headquarters at Athagarh which was created on the 3rd February, 1950. The division covers major portion of the Cuttack district except Sukinda, Rajnagar, Kanika and Banki Tahasils. The Sukinda portion lies in the Kendujhar Forest Division and the Banki area is placed under the Puri Forest Division. For conservation and preservation of wildlife the district has been divided into two wildlife divisions, namely, Rajnagar Mangrove (Wildlife) Division and the Chandaka Wildlife Division at Damparha. These forest divisions are managed by the Divisional Forest Officers. Other subordinate staff assist them. For development of social forestry there is a Deputy Director, Social Forestry Project at Cuttack. The operational works of the kendu leaf in the district are carried out by the Assistant Conservator of Forest at Cuttack and the Narasinghapur Kendu Leaf Range under the Anugul Kendu Leaf Division in the district of Dhenkanal. For developmental activities there is a Conservator of Forest Development Circle. The Plantation Manager, Afforestation, Cuttack, looks after the afforestation activities in the district.

As mentioned above the total forest area in the district is 1,791·21 sq. km. (as on 31st March, 1990). In the Table II is given the forest area of different divisions separately under different classes as stood on the 31st March, 1990.

Table II

Forest areas of different divisions

Name of the Division	Classification of Forest with area (Area in sq. km.)				
	Reserved Forests	Demarcated protected forest	Undemarcated protected forest	Unclassified forest	Total
(1)	(2)	(3)	(4)	(5)	(6)
Territorial D. F. Os.					
Athagarh ..	428·00	250·37	336·59	0·45	1,015·41
Kendujhar (Sukinda) ..	..	300·71	18·15	0·01	318·87
Puri (Banki) ..	..	2·63	3·00	0·01	5·64
Wildlife Division					
*Chandaka Wildlife (Damparha)	..	*61·14	*12·97	..	*74·11
Rajnagar Mangrove (Wildlife Division) ..	69·81	150·28	156·97	0·11	337·17
C. F. Working (Plan)	..	..	..	0·01	0·01
Total ..	497·81	765·13	527·68	0·59	1,791·21

*Data based on 1987 report.

Character of Vegetation

The forests of the district can be broadly classed as Moist Tropical Forests. The various types into which the forests can be divided are:

(a) Climatic dimax types—

(i) Orissa semi-evergreen

(ii) Moist Sal

(b) Subsidiary Edaphic type-Northern Moist bamboo brake

(c) Seral types—

(i) Beach forest

(ii) Tidal forest

(iii) Riverine froist deciduous

(iv) Coastal Sal

A brief account of the floristics of the various types of forests are given below:

(*a*) Climatic dimax type

(i) Orissa semi-evergreen—This type of forest is found mostly in the moist valleys and a representative patch can be seen in Dalijora forest areas.

The main tree species are Garuda, pinnata, Protenun serratum (Nembura Mai), Ailanthus excelsa (Malimba), Alstonia scholaris (Chhatian), Annogeisus accuminata (Phasi), Pongamia pinnata (Karanj), Hymenodictyon excelsum (Dhauran, Albizzia stipulata (Ghoda lenjia), Pterosperus hyeneanum (Giringa), Erythrina uariegata, Var, Orientalis (Paldhua), Sarca indica (Asok), etc.

In the understorey several evergreen species, e. g., Fagara budrunga, Lepisanthes tertraphylla, Putranjiva roxburaghii, Macaranga peltata, Amoora rehituka, Pelyalthea ceresoides, etc. are present.

Typical evergreen shrubs are Phylloclames spinesa (Jhumpuri), Glycesmis pentapylla and Clearodendron serratum.

(*ii*) Moist (penisular) Sal: This is by far the most valuable type of forest met within the district and constitutes the best part of the Narasinghapur-Badamba and Athagarh forests.

The principal species, as indicated by the name of the type is Sal (Shorea robusta). Good quality Sal is available in Narasinghapur.

Associated with Sal the following species are generally found:

In the valleys Terminalia tomentosa (Asan), Engenia jambelana (Jamu), Adina cordifolia (Halanda), Proteum serratum (Nembura mai), Lagerstroemia parviflora (Sidha), Pterocarpus marsupium (Piasal), Terminalia belerica (Bahada), Mangifera indica (Mango), Anthecaphadus cadamaba (Kadam) are the main associates. On the hill slopes the associates are Ougenia dalbergioides (Bandhan), Anogeissus latifolia (Dhaura), Schleicher trijuga (Kusum), Bridelia retusa (Kasi), Dalbergia latifolia (Sisoo), etc. In the forest Xylia xylocarpa (Kangada) is sometimes found in pure patches.

In the understorey the common species are Malletus philippinensis (Kamalagundi), Cassia fistula (Sunari), Polyalthea ceresoides (Potamassu), Casseria tomentosa, Ardisia solanacea, Cipadessa fruticosa, Holarrhena antidyscenterica (Kurhei), Kimenia acidessima, etc. The shrubs are Flimingia species, Desmedium species, Indegofera pulchella, etc. Common climbers are Milletia suriculata, Bauhinia vahli (Siali), Combretum decandrum, Zizyphus oenoplia (Kontai Koli) and Smilex macrophylla (Muturi).

Important herbs are Asparagus recemosus (Satabari), Rouvolfia serpentina (Patal Garud rare), Swertia angustifolia (Chiraita, Bhuinimba), Hemidesmus indicus (Ananta-mul), etc.

Sabai (Eulaliopsis binata) and Bhul baduni (Thysandena maxima) are found locally.

(*b*) Subsidiary Edaphic type

Northern moist bamboo brake—Along with the forests of Orissa semi-evergreen and the moist sal as discussed above, are also found pure extensive patches of bamboos, mostly Bambusa arundinacea (Kanta bans). These brakes are found throughout the western part of the district on level ground with deep soils. Bambusa arundinacea is, therefore, a good indicator for areas suitable for teak plantations.

(*c*) Seral type

(i) Beach forests—Beach forests are found in the deltaic zone on high lands not inundated by tidal water. Detail description of the plant community of this type has been discussed under Botany of the said zone.

(ii) Tidal forests—These are the mangrove formations in the deltaic zone. The plant communities of which have been discussed in detail previously in the chapter under the Botany of the said zone.

(iii) Riverine moist deciduous—Though this is of rare occurrence in this district, a very distinct patch can be seen along the river Baitarani (within the jurisdiction of this district) near Akhuapada. The main

species is Anogeissus accuminata (Phasi). Also found along with this species are Terminalia tomentosa (Asan), Terminalia arjun (Arjun), Lagerstroemia flerejinae (Patoli), Scheichera trijuga (Kusum), Strychnos nox-vomica (Kochila), Butea monosperma (Palas), etc.

(iv) Coastal Sal—This type is peculiar to Orissa only and is found in areas with greater humidity associated with the coastal climate. Sal is more mixed with miscellaneous species, and the undergrowth includes more and more varied evergreen small trees and shrubs than in the 'Moist Sal'. This is a stable subclimax type to semi-evergreen conditioned by burning, and with the introduction of fire protection, progression rapidly sets in connecting with the establishment of a dense evergreen undergrowth including tree species. Regeneration of Sal is usually deficient or absent in this type. This type of forests can be met within Dalijora forests.

Dillenia pentagyna, Terminalia tomentosa, Bridelia retuga and Ardina cardifolia are the main associates of Sal in the top canopy. Eugenia jambolana, Proptei serratum, Polyalthea ceresoides, Macaranga peltata and Cycas circinalis (Arguna—one of the most ancient plant in the world) are found in the second storey. The Kanta Bans is often met with. The shrubs are Webera, Psychotria, Ardisia humilis, Leca sp., Strobilanthes species. The grasses are Thysa nolessa maxima, Imperata cylindrica, Panicum species. Common climbers are Bauhinia vahli, Combretum decardrum, Butea superba (Nati-Palas) and Zizyphus oenoplia.

Forest Management

Only the forests of the ex-states of Narasinghapur, Badamba, Tigiria and Athagarh, and the Dalijora private forests were under regular management. But no comprehensive plan was drawn up for any forests. A working plan drawn up for the Narasinghapur forests by Dr. H. F. Mooney was in force even after the merger of the ex-state. The forests of Badamba and the Dalijora private forests were being worked under sanctioned working schemes. The Athagarh and the Tigiria forests were also working under schemes, which however, were not detailed and comprehensive. The working in the ex-zamindari forests, which were transferred to the Forest Department, was unregulated.

The forests were being worked mostly by selection and coppice systems. Annual coupes were laid out in the reserved forests. The coupes in the 'A' class reserved forests and those of the 'B' class reserved forests on which there was not much local demand were sold

by public auction every year. The local tenants were allowed to take their domestic requirements of forest produce from 'B' class coupes and protected / village forests.

The major portion of the bamboos of the district had been leased out to the Titagur Paper Mills. Now the bamboo coupes have been nationalised and are worked under the Orissa Forest Development Corporation Ltd.

The timber coupes of Athagarh are nationalised and are worked under the Orissa Forest Development Corporation Limited.

The timber coupes of Sukinda are exploited departmentally in Kansa and Daitari felling series.

No coupes are worked in Chandaka and Puri Division as the forests of the area are included in Elephant sanctuary

Forest Produce

Major Forest Produce—Timber is the most important forest produce. Before road transport was introduced timber from Narasinghapur had been floating down the Mahanadi and its branches to the remotest villages in the coastal plains. Sal is the most important timber. The other important timbers are Piasal, Teak, Bandhan, Kasi, Kangada, Siris, Sisoo, Asan, Kurum, Dhaura, Giringa, Phasi, etc. The mangrove forest of the coastal region meet the local needs of firewood, material for cottage-building and agricultural implements. Nowadays owing to the scarcity of timber all types of trees are used for house-building, furniture-making and making of small agricultural implements. Miscellaneous timber species are used for the purpose of firewood and charcoal making.

Minor Forest Produce—Firewood from those forests, particularly, those of Athagarh and ex-zamindari forests has a very good market in Cuttack and other urban areas in the district.

Bamboo is also an important produce from the forest of the district. The other important minor forest produce of the district are Harida, Anla, Karanj seeds, Char seeds, Genduli and other gums, Mahua flower, Mahua seeds, cashew, Sal seeds, Bana Tulsi, canes, barks, roots, Asoka, Dhatuki flowers, arrowroot, Siali and Sal leaves, Sal seeds, marking nuts (Bhalia), Gilo, Patal Garud, honey wax, resin, nux-vomica, Kamalagundi and above all, Kendu leaves for *bidi* making. Kendu leaves though very important in the interior districts of the state, is not so important here as in the coastal areas the leaves tend to become thick and less pliable.

Forest Development

The importance of forest lies in accelerating the economic growth and maintaining the ecology of the district as well as the country at large. In recent years the administration has become more conscious to check deforestation and develop forestry at various levels. That forests have an intrinsic right to land has now been felt deeply. Previously forest was permitted on residual land not required for any other purpose. For development of forests more emphasis has been laid on plantation and afforestation on a large scale. The afforestation works in the reserved forests are also taken up by the Orissa Plantation Development Corporation. Regular plantations are raised by the territorial forest divisions as per the working plans and working schemes. Under the State and the centrally sponsored plan schemes, plantation has been extended to roadside lands and marginal lands which are not suitable for agricultural purpose. These works are being undertaken under the Social Forestry, National Rural Employment Programme (N.R.E.P.), R. L. E. G. P. etc. schemes at different times. The Horticulture and the Soil Conservation Departments also undertake plantation and afforestation programmes. Some voluntary organizations, and the Yubak Sanghas at village level have also come up in the line. The coastal shelter belt plantations were raised under central assistance to protect the coastal districts from the ravages of cyclone and moving sand dunes.

The achievement and the expenditure incurred with regard to plantation / afforestation in the district under various schemes from the Fourth Plan period to Seventh Plan period (The figures for the First Plan to Third Plan period being reported as nil in the district) is given in Appendix I.

The statement shows that during the 4th to 7th Plan periods (1972-73 to 1989-90) 53,193 hectares of land including 2,703 hectares of reserved forests have been covered under various plantation schemes (includes replacement indegraded forests) by the Forest Department. Besides, 7 lakhs of seedlings have been distributed and 25,950 km. (row kilometre) and 390 km. of casuarina and avenue plantations respectively have been done at a total cost of about 10·64 crores of rupees and 87,750 quintals of foodgrains under Food for Work Programme. There has been no census on the survival rate of these plantations. With the destruction caused by the goat and cattle, frequent drought conditions and smuggling rampant in the district (so also in the State) it is doubtful whether any appreciable percentage of this achievement exists in the field. Most of the plantations done during 4th and 5th Plan periods in Khesra forest in the ex-state areas were either encroached upon by the villagers for cultivation or were leased out by the Tahasildars under the programme of "land to landless".

Coastal Shelter Belt Plantation

To protect the coastal areas from the ravages of cyclonic storms which are quite frequent and consequent tidal waves and spreading of coastal sand dunes, the State Government took up afforestation within one kilometre belt of the sea coast as an anti-cyclonic measure from the year 1974 onwards under the Coastal Shelter Belt Afforestation Division with headquarters at Cuttack. The division had jurisdiction over the coastal areas of Cuttack, Puri and Baleshwar districts. Apart from preventing the coastal areas from cyclone and sand casting, the afforestation work also aimed at supplying firewood to the people of the coastal zone as well as improving the social environment. Under this scheme casuarina, cashew and cocoanut plantations were raised all along the sea coast of the district and on the estuaries of the rivers Devi, Mahanadi, Brahmani and their branches. The scheme was abolished in the year 1984 by which time 7,880.59 hectares of sandy coast of the district had been covered with such plantation. The plantation works were undertaken upto 30th September, 1990 by the above division under the Orissa Plantation Development Corporation. Now this Afforestation Division is under the Orissa Forest Development Corporation. It is raising plantation in inland zone as well as coastal zone under centrally sponsored Fuel and Fodder Project to meet rural firewood and fodder requirements. The division is headed by the Divisional Plantation Manager. He is assisted by the Deputy Divisional Plantation Manager.

Social Forestry

The National Commission on Agriculture who had gone into the question of conflicting claims of agriculture, industries, etc. and the local needs for small timbers and fuel on the forest land had suggested in 1976 a pattern of forest policy and development which is known as Social Forestry or man-made forest. Keeping in view the recommendations of the National Commission on Agriculture, Social forestry was included as a centrally sponsored plan scheme in all the states of India. Some international agencies like SIDA (Swedish International Development Agency) also came up in a big way to assist the Centre and State Governments for raising Social Forestry in their respective areas. Social forestry Project, Phase-I was taken up in Orissa under SIDA Aid Programme from the year 1983-84. The social forestry activities in the district started from 1st April, 1984. The Forest Acts had also envisaged setting aside a part of the village land as forest by declaring such land as "village forest" either under section 30 of the Orissa Forest Act or under Sec. 28 of the Indian Forest Act

(since repealed by the Orissa Forest Act, 1972) for the benefit of the villagers to meet their social needs of small timber and fuel, etc. so that they do not encroach upon the reserved forests which are to be kept under permanent tree cover. The intention was to make statutory rules for management of the village forest by the local people and prescribe conditions and limitations for use of the forest products of village forests and their duties in respect of protection and improvement of such forests. The State Government of Orissa for the first time framed a set of rules called "Village Forest Rules" in 1985 with a view to involving the village community and for ensuring their co-operation and participation for successful implementation of the social forestry programmes. To facilitate implementation of the centrally sponsored and SIDA schemes of social forestry certain lands in the district have since been declared as "village forest" under Section 30 of the Orissa Forest Act in 1972, so that the plantations raised in those lands may be protected and managed for the benefit of the villagers. Between May 1989 and February 1992, 4480·25 hectares of government land in 563 villages in different Tahasils, particularly in Sukinda, Banki, Kendraparha, Badamba, Narasinghapur, Athagarh, Darpan, Dharmashala, Marshaghai, Barachana, Cuttack Sadar, and Kujanga which were recorded as 'Gramya Jungle' have been notified as "village forests" in which plantations have been taken up under SIDA aided-scheme for the benefit of the villagers. To protect and manage those plantations, Village Forest Committees have been formed under the Orissa Forest Rules, 1985.

Under SIDA , plantations are also taken up in the uncultivated marginal and fallow private lands to help the rural poor. The Deputy Director, Social Forestry Project Division, Cuttack is the administrative head in respect of the district who in turn is under the over all control of the Director, Social Forestry, Orissa, Bhubaneshwar. A brief note on different schemes under this project is given below.

(*i*) Village Wood lots—The scheme provides technical and planting stock support and organise the villagers to take up tree plantation in the—

(*a*) Government wasteland and community lands,
(*b*) degraded barren hills,
(*c*) road-side strips along village Panchayat roads, canals, fore shores of tanks, and
(*d*) institutional lands for raising fuel, fodder, fruit and minor forest produce and small timber generating species in these lands.

A total of 4,343 hectares have been covered under this scheme till 1990-91.

(*ii*) Reforestation and Rehabilitation—This scheme views to reforest and rehabilitate the already degraded and depleted forests and all protected forests where normal protection and reforestation activities have not been successful in the past. The local villagers are involved in the scheme to redevelop the existing growth through tending and clearing operation supplemented with sap planting work aiming at generation of fixed natural forests to meet local demand. A total of 4,568 hectares have been covered under this scheme till 1990-91.

(*iii*) Institutional Plantation—New forests are being created on the community, institutional and Government lands under the auspices of the voluntary organisations like Yubak Sanghas and public institutions so as to cater to the socio-religious and the recreational needs of the villagers as well as the young students. The plantations are being done without aiming at any production from such areas. A total of 42 hectares have been covered under this scheme till 1990-91.

(*iv*) Farm Forestry—Individual farmers, organisations and institutions are encouraged to plant trees for the purpose of fodder, firewood, small timber and fruit on the periphery and otherwise unproductive lands. This will also help increase the standard of living of a large number of small farmers. A total of 95,955 lakh seedlings have been distributed under this scheme till 1990-91.

(*v*) Forest Farming for the Rural Poor (FFRP) —Under this scheme some landless poor and the tribals are selected from the villages. They are allotted with individual plots of land and technical help, seeds, fertilisers, pesticides, etc. are provided to them with a view to give them temporary employment and improve their economic conditions. The beneficiaries are given usufructory rights over the growing stock raised by them under the agro-silvicultural practices where agricultural crops are raised by the selected beneficiaries. A total of 2,442 hectares have been covered under this scheme till 1990-91.

Till 1988-89, a total expenditure of Rs. 3·60 crores has been incurred under the above SIDA schemes.

Wildlife Protection and Game Laws

The north-west region of the district abounded in numerous games and birds in their forests. The rulers of the ex-states of Athagarh, Tigiria, Badamba and Narasinghapur had their own shooting rules for the preservation of the wildlife. The shooting and hunting of wild animals and birds used to be regulated under the provisions of the Wild Birds and Animals Protection Act, 1912, and the Orissa Government Reserved Forests Shooting Rules, 1938.

A similar set of rules was applicable to all the reserved and Khesra forests. Shooting in the forests of the ex-state areas was the prerogative of the ruling chiefs and their guests. This also applied to Rajwaras of Sukinda and Kanika. Common men were strictly prohibited from shooting in these forests. Shooting was an item of recreation of the royal families only. As a result, plenty of wild animals were preserved in the forests. After Independence and with the merger of the ex-states new Acts such as the Elephant Preservation Act, the Wild Birds and Animals Preservation Act, the Orissa Reserved Forests Shooting Rules and the Indian Arms Act were promulgated in place of the previous shooting rules. Despite these Acts and Rules, killing of wild animals were allowed for protection of crops. Poaching of wild animals became rampant in the name of crop protection for sale of their meat, hide, trophy, tusk, etc., which had very good price in the market. Gradually the population of the games decreased. There was wanton destruction of wildlife. In Kanika area which abounded in wild deer particularly in Bhitar Kanika and in its surrounding forests, indiscriminate poaching for their meat made these animals scarce after abolition of the zamindari.

The Orissa Forest Act, 1972 (Act 14 of 1972) and the Orissa Forest Shooting Rules, 1973 made thereunder, was enforced in the entire state and applied to all the reserved and protected forests. Inspite of these protective measures the pernicious practice of killing animals and birds continued. In recent years efforts have been made to afford protection to the fauna and check wanton destruction of wildlife. Issue of shooting licences has been prohibited and the State Wildlife Organisation is taking steps to create more sanctuaries. As per the Wildlife Protection Act, 1972 the Territorial Divisio nal Forest Officers of Athagarh, Kendujhar (controlling for Sukinda area) and Puri (controlling for Banki) have been declared "Wildlife Wardens" to deal with the application of the Act and Rules, and prosecution of cases registered under these Rules. They also control the movement, trade and commercial activities, issue of shooting permits so far as the wild animals and birds, and their products, derivatives are concerned.

There are two Wildlife Divisions in the district, they are the Rajnagar Mangrove Forest Division at Rajnagar and the Chandaka Wildlife Division at Chandaka. The former was functioning as Chandbali Wildlife Division with headquarters at Chandbali in the district of Baleshwar till 1990 and since January 1991 it has been renamed as the Rajnagar Mangrove Division with headquarters at

Rajnagar. Bhitar Kanika National Park, world famous Gahirmatha sea-turtle breeding ground, Dangamala crocodile breeding and rearing centre are situated in this division.

Rights and Concessions

The system of forest management and rights of tenants over forest was not uniform throughout the district. Although technically the Indian Forest Act was extended to the entire district excluding the ex-state areas, it had very little application in the district as most of the areas consisted of zamindaris either permanently settled or temporarily settled and practically no forest area was declared as reserved forest under the Indian Forest Act. The Killa zamindars who held permanently settled estates more or less enjoyed the same rights over forest as their counterparts in the ex-state areas. So they managed or mismanaged the forests as they liked over which Government had very little control. A brief resume of the rights and concessions that existed in the different permanently settled estates and within the ex-states is given in the following paragraphs.

The same rights and concessions are also being allowed even today except that the schedule of rates for forest produce have been revised upwards slightly by the Forest Department, with effect from 9th December, 1978.

Killa Kanika

The system of forest mangement in this ex-estate underwent frequent changes. Under the court of wards a forest cess of 8 annas (Re. 0.50) was charged on those who took wood. In the earlier part of this century the Raja introduced the system of charging 6 paise per rupee of rent which was collected from each raiyat indiscriminately along with the rent. The maximum quantity of fuel wood allowed to be taken was 100 maunds and in addition timber for agriculture and house building were taken. As the tenants expressed great dissatisfaction over this system the Raja went back to the system of levying a cess of 8 annas in 1928 which was charged on each hearth. The maximum quantity was cut down to 50 maunds and wood for house building was not allowed. The printed form of pass which specified the kinds of trees which were permitted to be taken for fuel and agricultural implements defined the maximum quantity as follows :

Fuel wood	..	50 maunds
Langal	..	2 pieces
Kanti	..	2 pieces
Isha	..	2 pieces
Juali	..	1 piece
Maigar	..	1 piece

The zamindar reserved the right to close any portion of the forest at will. The forest was divided into blocks some of which were protected and some reserved. The protected blocks were closed and the reserved ones were opened in rotation. Where the tenants lived far from the nearest open forest they had to take their boats through a creek in the forest for which they were charged a fee.

The Forest Enquiry Committee in their report published in 1959 have recorded the rights and concessions of the tenants of Kanika as follows :

"Reserved species Nil

Cesses Nil

In zamindari Zapti-no rights or concessions

In open forests :—

(1) The tenants can get firewood, thatching materials, agricultural implements, etc. from Char jungle, for their personal use on obtaining permits within the period 1st October to the 31st December on payment of Rs. 1-0-6 and for permits after the said period at Rs. 2-0-0.

(2) The Kumbhar, Kamar and Bania tenants for their profession can remove firewood for preparing charcoal on payment of Re.0-2-0 (Re. 0•12) per maund and charcoal on payment of Re. 0-2-0 per maund with special permits. Others may also get the above commodities on payment of the above fees.

(3) The 'pahi' tenants who require for their 'pahi' cultivation, can be allowed firewood, thatching materials, agricultural implements etc. on obtaining permits within 30th June on payment of fee Re. 0-12-6 (Re. 0'77). After this period they shall have to pay Rs. 1-9-0 (Rs.1.56) for each permit.

(4) Outsiders of the estate who come for cultivation purpose in the estate can be allowed firewood for their own use on payment of annual permit fee of Rs. 2·00 Those who are boat merchants can be allowed firewood and certain boat materials for their profession on payment of annual fee of Rs. 4-0-0 for each boat from Char jungle".

Killa Kujang

The resident tenants were allowed to take wood from the jungles on payment of a fee of Re. 0-4-0 (Re. 0.25) per annum for each hearth. On payment of Re. 0-4-0 the tenant obtained a permit which entitled him to take 20 maunds of dry fuel and certain amount of wood

for agricultural implements, as well as some creepers for thatching. Some classess of Jagirdars were exempted from the fees. The landlord reserved portions of the jungle from time to time. The Kharinasi, Gourapada- Pitachela and Barakolitola jungles were being created as reserved. Also certain trees were prohibited from being cut, a list of which entered on the back of the permits. The list appeared to vary slightly from time to time. If a tenant wanted more than 20 maunds he was charged for the excess at certain fixed rates. Six pice per maund was charged for dry fuel. Outsiders were charged at double the scheduled rates. Timber for house building was obtained by the resident tenants at certain fixed rates.

The Forest Enquiry Committee have recorded the rights and concessions in Kujang as follows :

"A cess called Banakar at the rate of Re. 0-4-0 per family is realised. Villagers paying Banakar are allowed to remove free 30 maunds of firewood and other timber required for agricultural improvements per annum. The Jagirdars are allowed with permits (Char) the forest materials for their domestic use from Raj jungles (Reserved forest not allowed) in lieu of services rendered to the Raja. Any woodcutter living in the estate is allowed jungle materials on payment of double the schedule of rates for his profession".

Sukinda

In this ex-estate the raiyats were allowed to take wood from jungle for fuel and other agricultural purpose free in return for their services which were also given free for the car festival, for thatching and for ploughing landlord's Nij-chas land for one day. As per the report of the Forest Enquiry Committee, the rights and concessions of Sukinda was as follows :

"The following privileges are enjoyed by the tenants for own use free of royalty—

(1) Plough, plough handles, Isha, yoke of unreserved species from unreserved area.

(2) Firewood and Jhatas of unreserved species from unreserved area for their domestic use, fencing and burning dead bodies.

(3) The tenants get house building materials free of royalty or at a concessional rates if their houses are burnt by accidental fire in consideration of their condition.

(4) For constructing irrigation Bundha in the hill streams the cultivators are allowed to take Jhata and unreserved species poles free of royalty.

(5) The hill people are allowed to take for their domestic use as well as for sale of minor forest produce such as Mohua and Kusum. Grazing fees are realised only from outsiders."

Killa Harishpur

The right to cut jungle was not exercised by the raiyats free of charge. Permits were issued by the estate for taking fuel with a charge of one rupee for boat load or 8 annas (Re 0.50) for 8 head load.

Marichpur

This estate was situated in Puri district but thirty-one villages of this estate lying to the left of the river Devi have been transferred to Jagatsinghapur Tahasil in 1969. In this estate the raiyats were allowed to take wood for domestic and agricultural purposes from the estate jungle on payment of a Banakar which was assessed on the number of married men in each family. The rate was 2 annas for each married man up to 5. Thereafter 6 paise up to 11 and above that one anna for each. Brahmins paid at half the rates and the fishermen were exempted. No jungle was kept reserved. Bamboos and palm trees however, could not be cut without permission nor could valuable trees such as mango etc. The landlord also did not allow Hentals to be taken. But in actual practice the raiyats were found to take small quantity of Hental without objection. The Raja of Aul who purchased a share in this ex-estate imposed a charge of one rupee to 2 rupees for 100 pieces of Hental of quality.

Panchikot ex-estate

The reserved species were the same as in Sukinda and there were no forest cess as in Sukinda as the tenants were required to render certain free service to the Raja. Firewood for domestic purpose and other ceremonial purposes were allowed to be taken on payment of fixed royalty from unreserved species. But fuel for burning dead bodies was taken free. Minor forest produce were allowed to be taken on payment of fixed royalty.

Dompada Ex-estate

1. "The tenants were entitled to remove unreserved species free of charge for their personal use with permission.

2. The Kamaras, Thataries and Sunnaries who render services to the Raja and temples are entitled to manufacture charcoal free of charge from the dry and useless species of unreserves and reserves.

3. The Kansaries are entitled to do charcoal business on payment of annual fee of Rs. 2-0-0.

4. The Kumbharas are entitled to remove firewood for their business on payment of schedule of rate in return of service to the Raja".

No rights and concessions existed in other ex-zamindari forests.

The rights and concessions in the ex-states were as follows:

Athagarh

Forests were divided into two classes, reserved and protected, by rules in 1924. Protected forests were all areas apart from reserved forests and alienated areas if any, and homestead lands. Rules applying to protected forests thus applied to practically all forest growth. By the proclamation of 1940, it was promised that Khesra or village forest would be allotted to every village as close as possible, and fuel, wood for agricultural implements, etc. would be allowed free, and the use of such forest would be regulated by the village Panchayat. There were 28 classes of protected trees but this number was later reduced to 14. There was a fuel cess of half anna (Re. 0·03) per rupee of land revenue. Holders of rent free grants did not pay this cess. Persons, paying fuel cess, were allowed to remove unreserved trees from protected forests after taking permits which were issued free. A special cess of one rupee used to be levied on washermen, blacksmith and others who need large quantities of fuel, but this was abolished by the proclamation of 1940. The same proclamation also abolished grazing fees except for outsiders.

Badamba

Forest Rules were framed in 1933. There was no working plan but instructions in Mooney's notes were followed.

There were 'A' and 'B' class reserved and village forests. In 'B' class forests Nistar cess payers were allowed to take their requirements. The rate of 'nistar cess' was 3/4 anna per rupee of land revenue. All waste lands not included in A or B class forests were included in village forest; and amendment of the definition prescribed that individual trees and groups

of trees were deemed to be village forest. There were seven B blocks; only 4 blocks were divided into 20 coupes and each block was divided into two felling series annually and out of them one coupe in each was opened for Nistar. All villages paid Nistar cess. The maximum distance of a village from the forest was 6 to 8 kilometres. Option was given to the villagers to pay or not to pay the forest cess if they did not wish to take forest produce.

Unreserved species below 5′ girth could be cut without permission. If the tree was of reserved species it could be felled and sold by auction if permission was applied for, by the department. There were 15 reserved species. Trees of reserved species on village lands were allowed at half the normal royalty, for agricultural implements materials were supplied free from coupes; for other purposes reserved species could be taken at half royalty. If sufficient materials were not available in B class, A class forests could be opened for such materials to Nistar paying raiyats and two coupes were so opened in 1937. No grazing fees were charged except on professional graziers.

Boundary lines were cleared by the tenants at the rate of Rs.3 per mile (1·6 km.). Boundary lines of B class forests were cleared free by the raiyats.

Narasinghapur

Forests were divided into 3 classes, A, B and Khesra under rules framed in 1933. The Khesra forest included all wasteland not included in reserve or B class forest. The first working plan was prepared in 1941. There were 7·5 sq.miles of B class forest which was divided into 2 blocks of 20 coupes each. One in each block was thrown open every year. Traders could take timber or forest produce from Khesra forest on permits issued by the ex-state under the rules.

There were nineteen reserved species of trees and forest rule 32 declared them reserved in Khesra forest. In practice the reservation was extended to cultivated holdings also.

Nistar cess is paid at one anna(Re.0·06)per acre of wet lands and half anna per acre of other lands. Non-agriculturists paid four annas per house. Nistar payers were entitled to take wood for their personal use from the Khesra or B class forests trees of unreserved species provided they did not exceed 5 ft. in girth or standing on the bank of any stream or tank. Kandhas were exempted from Nistar cess. The Nistar cess was imposed for the first time in 1918.

Raiyats could graze ten heads of cattle free (seven extra cattle for every ten acres/over ten acres of land cultivated) and fees were charged for excess cattle at four annas per buffalo and two annas per cow. The settlement report of 1919 records that out of 211 villages in the ex-state there was no forest within village boundaries in 98, and in 87 there was no grazing ground even. In the remaining Mouzas there were bushy jungles or bare hills not even fit to meet the fuel need of the village. At the time of the last settlement there was no grazing fee except on professional graziers.

Maintenance of forest boundary lines is divided among the villagers and Rs.3 per mile is paid.

Tigiria

There were no A class reserves after 1940. There were B class reserves and village forest. All wasteland and scrub jungle were included in village forest. There were nine reserved species including bamboos. The reservation extended to trees on cultivated holdings. There were 3 blocks of B class forests. Each block was divided into 30 coupes one of which was opened every year. In 1940, fifty acres of village forests were included under B class reserve, and this caused some dissatisfaction among the raiyats.

Nistar cess payers took unreserved species from village forests free and for reserved species they paid half the usual royalty. In B class forests the same rights were exercised by Nistar payers. But no large trees of any species were allowed to be taken. People of all villages paid Nistar cess even if some villagers got no benefit out of it. It was one pice (1/4 anna) per rupee of land revenue whereas non-agriculturists paid 12 annas (Re. 0·75) to two rupees per house.

Free grazing was allowed throughout the forests except coupes less than 8 years old. Even non-Nistar payers did not pay grazing fees and there were no professional graziers in respect of whom grazing fee could be charged.

On non-agriculturists who followed professions like basket making, sweetmeat manufacture, etc. a fee per house of 12 annas to Rs.2 was levied.

FAUNA

Wild animals are no longer plentiful in the forests of the district. Extension of cultivation, mining and above all unrestricted shooting, particularly after the merger of the ex-states and abolition of zamindaris, have contiributed towards this perceptible diminution in

the number of varied games of the district. In the district, forest is mostly confined to the areas of Narasinghapur, Badamba, Tigiria and Athagarh (the four ex-states of the district) and the ex-estates of Sukinda and Dalijora and to some extent Kanika. The north-west region of the district was full of wild animals such as tiger (Pantera tigris), bear (Melur sursinus), panther (Panthera pardus), bison (Bibous quarus), Sambar (Rusa unicolor), spotted deer (Axis axis), barking deer (Muntiacus mantjak), mouse deer (Moschiola menin), percupine (Hystix leucura), wild pig (Sue christatus), wild dog (Cuon alpinus), squirrel (Ratufa indica), mongoose (herpestes) and others Their number has considerably gone down in recent years.

Elephants occasionally visit the forest of the district from the adjoining reserved forests of Dhenkanal. Wild dogs are met at times but the number of wolves (Canis lupus) are gradually vanishing from these areas. Depredations of man-eaters are not infrequent although those of rogue elephants are rare. The hilly areas of Banki, Damparha, Madhupur, Darpan, Kalkal, Balarampur and others are practically barren and contain no animal of importance except probably a few panthers, hyaena (Hyaena hyaena), jackals (Canis aureus), foxes (Vulpes bengalensis), hares (Lepus reficandatus), wild cats (Folis chaus), civet cats and Indian ant eater (Bajrakapta).

The forest of the low-lying land near the sea, although not rich in variety of games, contain herds of spotted deer, wild pigs, etc. Black bucks (Antilope cervicapra) are rarely found in the coastal sands of the district.

The black-faced monkey (Presbytes entellus) and the red-faced rhesus monkey (Macca mulatta) are usually found in the towns as well as in the rural areas.

Birds

Among the important birds found in the district the following deserve mention.

Peafowl (Pave cristatus) confined to the hilly areas of the west and the north-west. Red jungle-fowl (Gallus gullus), red spurfowl (Galloperdix spadicca), black patridge (Francolinus francolinus), grey patridge (Francolinus pondicerianus) found in the shrub jungles of the coastal areas. Grey hornbil (Tockus birostis), green pigeon, royal pigeon, imperial pigeon, the common and fantail spine

(capella gallinago) and painted snipe (Rostratula benghalensis) are found in the coastal region. Seasonal ducks of many varieties are also found in this region.

Reptiles

Crocodiles and alligators, tortoises and turtles are found in large number in numerous rivulets, nallhas and creeks of the district. Bhitara Kanika abounds in crocodiles while Gahiramatha is very famous for sea-turtles.

Godhi or monitor lizard (Varanus mojutor) though rare are found in the bushes in the villages. Because of the commercial use of its skin Godhis are slaughtered by the people. The Pohala Endua or chameleon (Chamaeleon zeylanicus) is a very common reptile found in wooded areas almost everywhere. The largest Indian lizard-water monitor lizard (Varanus salvator) and also the land monitor (V. flavescens) are seen in large number in the Bhitar Kanika National Park.

Different varieties of snakes are found in the district. Among the poisonous snakes mention may be made of the king cobra or Ahiraj (Naja hannah) and Naga or Gokhara (Naja naja), that are quite common. Vipers (Boda) are also seen in the hilly areas of the district. The other poisonous snakes are the banded krait (Rana) and common krait (Chiti). The non-poisonous snakes such as python or Ajagara (Python Pmolurus), Dhamana (Ptyas mucosus) and Dhanda (Natrix piscator) are usually met with. Python, though non-poisonous, often appears to be dangerous in the forest. It can swallow calf and kids. Human life is also not safe from its powerful coils. Some venomous and non-venomous sea-snakes and water snakes are found in Bhitar Kanika area. Death due to snake bite is not negligible.

National Park/Sanctuary

Gahiramatha under the Rajnagar Mangrove Division of the district occupies a unique place in the country for its sea-turtles. It is one of the largest breeding grounds of "Olive ridly" sea-turtles that come in lakhs every year during the months from December to April from the distant Pacific Ocean to lay their eggs in the Ekakulanasi, the Gahiramatha beach of the Bay of Bengal near the river mouths of Mahanadi, Brahmani and Baitarani. The proposed fish landing centre at Talchua,

on the southern side of Kalibhanja reserved forest about 15 km. to the west of this Gahiramatha beach for which a World Bank funded jetty is being constructed at an estimated cost of 84·94 lakhs of rupees with 50 per cent assistance by the Government of India for operation and servicing of about 90 trawlers and mechanised boats is apprehended to be a threat to this turtle nesting centre. The State Government in Fisheries Department notification No. 22781/FARD, dated the 27th December, 1993 and No. 7463/FARD, dated the 11th April, 1994 have also prohibited fishing within a seaward radius of 20 km. of Gahiramatha Wildlife Sanctuary. A public interest litigation is subjudice in the High Court of Orissa for restraining the State Government from operating this jetty and the road from Rajnagar to Talchua now under construction, to prevent further damage to the ecology of this sanctuary. The Indian Navy and the coast guard render valuable assistance in protecting lakhs of sea-turtles which come to breed in Ekakula and Gahiramatha area, from the poacher's nets and egg collectors, mostly coming by sea from West Bengal.

In the midst of the numerous rivulets, nallhas and creeks of this region lies the salt-water-crocodile breeding centre at Dangamala adjacent to Bhitar Kanika Wildlife Sanctuary. In the year 1972, Bhitar Kanika forests were declared a sanctuary and from the year 1975-76 the two research projects for salt-water-crocodiles and Olive Ridly sea-turtles were taken up at Dangamala and Ekakula with the assistance from the World Wildlife Fund and the United Nations Organisation. Till March 1991 as many as 1972 crocodiles have been hatched, reared in the rearing ponds at Dangamala and released to be rehabilitated in nature in the numerous creeks of this zone.

Dangamala has at present (1990) in captivity at its research ponds and rearing ponds 435 crocodiles from 15 year-old to hatchlings. It has the unique distinction of having reared the world's second white crocodile (Sankua) in captivity in the country.

The Bhitara Kanika Sanctuary was declared a National Park on the 3rd October, 1988 for its ecological, faunal, floral, geomorphological and zoological association and importance, and for the purpose of protecting, propagating and developing wildlife therein and its environment. It is famous for its mangrove trees which are a rare species in India.

The National Park extends over an area of 650 sq. km. To open up this sanctuary area to tourists and others a road is under construction from Rajnagar to Talchua along with three bridges on the way. It is apprehended by the environmentalists that this road will have adverse effect on the Bhitara Kanika sanctuary. Besides, an area of 100 acres in Sunei-Rupei forest block within the Bhitara Kanika Wildlife Sanctuary has been selected for dereservation and rehabilitation of 395 families of Satbhaya and Kahnupur villages which are in imminent danger of being eroded by wave action of the Bay of Bengal. Government of India have been moved for environmental clearance under the Forest (Conservation) Act, 1980. The State Government have sanctioned Rs. 94·25 lakhs in March 1991 for this rehabilitation scheme. There is strong opposition by the environmentalists for implementing this scheme by dereserving this sanctuary area.

Apart from crocodiles and sea turtles, the park accommodates a variety of reptiles, birds and mammals, on which conservation, research and management programmes are now in progress. The important mammalian fauna of the erstwhile sanctuary and the present National Park include leopard, jungle cat, fishing cat, sambar, barking deer, black buck, hyena, percupine, wild bear, cobra, Naga, otters, etc. More than 150 varieties of birds are found in the National Park which include water birds such as painted stork, open billed stork, Darter, cormorant, Herens, egrets, plovers, sand pipers, curlew, kingfisher, stink, stilt and while ibis, etc., in addition to a number of resident and migratory birds like bar-beaded greese, whistling teal, common teal, Brahminy duck, garganey flamingoes, craues, etc. Dolphins are also found. Different variety of fresh and salt waterfish abound in the water channels here.

A portion of the Chandaka Elephant Sanctuary is located in this district covering an area of 75 sq. km. of the Damparha Wildlife Range under the Chandaka Wildlife Division. This sanctuary spreads over an area of 230 sq. km. and it is adjacent to Nandankanan Biological Park and Lion Safari. It is now engaged in preserving and protecting Wild Elephant habitat.

The fringe of Satkosia gorge sanctuary on the river Mahanadi also comes within the district on Narasinghapur side where the fresh water crocodile or Magger are being released to nature by the Crocodile Breeding Centre at Tikarparha of Dhenkanal district on the banks of the river Mahanadi.

Fish

A large variety of fish are found in the sea, rivers and tanks of the district. However, the district is rich in marine fish while compared to the fresh water fish. The prawns from paradeep port area are famous for their size and delicacy and help the State earn a handsome foreign exchange. Hilsa, which gives a very good taste, are caught in season. Fish, preserved by drying in the sun called *Sukhua* is a favourite dish being particularly popular with boatmen, carters, etc. The varieties of fish found in the district can be categoriesed into three parts, ie., (i) fresh water, (ii) brackish water and (iii) marine according to their habitation.

(i) Fresh Water Fish—The most common fresh water fish are the Rohi (Labeo rohita), Bhakur (Catla catla), Mirkali (Cirrhinus mrigala), Kalabainsi (Labeo calbasu), Bilati Rohi (Cyprinus carpio), Grass carp. (Ctenopharyngodon idella), silver carp. (Hypophthatmichthyes molitrix), Pohala (Labeo bata), Kau (Anabas testudineus), Magur (Clarias batrachus, Seula (Channa striatus), Chital (Natopterus chitala), Jalanga (Silonia silondia), Balia (Wallago attu.) and Chungudi (Machrobrachium rosen bergoi, Machrobrachium malcomsonni),.

(ii) Brackish water Fish—The brackish water fish available in the district are the Khainga (Mugil cephalus), Mengia (Mugil speigleri), Bhekti (Lates calcarifer), Khuranti (Sparus sarba), Kundala (Etroplus suratensis), Kantia (Arius-coillatus), Sahala (Eleutheronama tetradactylun), Patus (Kewala covla), Ilishi (Hilsa illisha), Bagda (Panaeus monodon, Penaeua semisulcatus), Chapda (Pengalsius indious), Chungudi (Metapenaeus sapp.) and Jalanga (Pangasius pangasius).

(iii) Marine fish—In the district quite abundant are the marine fishes which mostly include Ilishi (Hilsa illisha), Dhama (Hilsa toli), Kala Chandi (Parastromateus niger), Dhala Chandi (Pampus chinensis), Bhekti (Lates calcarifer), Paniakhia (Magalops cyprinoides), Sahalo (Eleutheronama tetradectylum), Borei (Johnius dussumieri), Kokili (Anchoviella indica), Kantia (Arius arius), Rupapatia (Trichicurus haumela), Champa (Scomberomorus commerson), Magura (Carcherhinus gangeticus), Khanda (Chirocentrus doval), Bagda (Penaeus monodon), Chapda (Penacus indicus), Khopra (Metapenaeus sapp.), Chungudi (Acetes indicus) and Newa or Bumnalo (Harpodon neherus).

Mortality from reptiles and wild animals

Mortality from snake bites and attack of wild animals occurring in the district during the years from 1986 to 1990 is given in the following table :

Year	Death due to Snake bites	Death due to attack of wild animals				Total
		Elephant	Tiger, Leopard and others	Bear and wolves	Other wild animals	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1986 ..	52	..	..	..	1	53
1987 ..	62	1	..	..	2	65
1988 ..	70	..	..	..	14	84
1989 ..	50	1	..	..	9	60
1990 ..	33	..	..	..	5	38

CLIMATE

A hot summer, high humidity almost all the year round and good seasonal rainfall are the main features of the climate of the district. The cold season from December to February is followed by the hot months of March, April and May. The period from June to September constitutes the south-west monsoon and the next two months, i.e., October and November, the post-monsoon season.

Rainfall

Records of rainfall in the district are available from a good network of 21 rain gauge stations. A detailed account of the rainfall at these stations based on all available data upto 1980 as given by the Additional Director General, Meteorology (Research), Pune is given in Appendix-II. Frequency of annual rainfall based on the data from 1901-1980 is given in Appendix III of this chapter. The average annual rainfall in the district is 1,510·8 mm. The rainfall during the south-west monsoon months, i.e., from June to September constitutes nearly 75 per cent of the annual rainfall. The heaviest rainfall is in the month of July. Some rainfall, mostly as thunderstorm, is experienced in May and October. The variation in the annual rainfall from year to year is not large. In a period of eighty years from 1901 to 1980 the highest rainfall amounting to 148 per cent of the normal occurred in 1925. The lowest annual rainfall which was sixty-four per cent of the normal was received in 1957. During this eighty-year period the annual rainfall was less than eighty per cent of the normal in five years only and none of them were consecutive. It may be seen from Appendix III that in forty-eight years out of seventy eighty years rainfall in the district was between 1,300 mm. and 1,800 mm.

On an average there are seventy-two rainy days (i. e. days with rainfall of 2·5 mm. or more) a year in the district. This number varies from sixty-five at Korei, Paradeep and Salepur to eighty-one at Sukinda.

The heaviest rainfall in twenty-four hours recorded in the district was 498·6 mm. at Jagatsinghapur on the 20th of July, 1889.

A statement showing monthly annual rainfall in the district from 1981 to 1992 is given in Appendix II (A).

Temperature

There are two meteorological observatories in the district. The one at Cuttack is having sufficiently long period of data which may be taken as the representative of the climatic conditions of the district as a whole. The hilly areas of the district have slightly colder temperature during winter and hotter during summer. But in the coastal regions the climate particularly in summer is milder than in the interior. The district is not directly on the tract of the cyclonic storms which frequently cross Orissa during the monsoon season and the extremes of climate are more marked than in most other parts of the neighbouring state of Bihar. There is steady rise in temperature from the period March to May. With March the heat approaches, and by April the hot weather has fairly set in. May is usually the hottest month with the mean daily maximum temperature at 38·8° C and the mean daily minimum at 26·9°C. On some days the maximum temperature rises upto about 47°C in May and June; while the mean temperature falls from 31. 4°C in the hot weather months to 30·8° C in the monsoon season and to 24·7°C in February. It is one of the hottest districts in the state. The account of William Bruton, one of the small band of Englishmen, who first visited Cuttack in 1633, shows how intensely they felt the heat. On the 28th of April he writes. "At the hours of between eleven and twelve of the clock, it was so excessively hot that we could not travel, and the wind blew with such a sultry scalding heat as if it had comeforth of an oven of furnace, such a suffocating fume did I never feel before or since". During these hot months due to the prevailing high humidity, days are oppressive. However, in the coastal parts of the district though the heat is excessive in the day time, there is some relief due to the setting in of the sea breeze in the afternoons. During March and April and frequently in May there are occasional showers of rain accompanied by strong north-western wind which brings down temperature. With the onset of the monsoon early in June, day temperatures drop appreciably, but the night temperature continues to be as in the summer season. With the withdrawal of the monsoon, both day and night temperatures begin to decrease, the drop in the night temperature being more marked. The cold weather commences in the beginning

of November and the mornings and the evenings are chilly. December is the coldest month with the mean daily minimum of 15·5°C. Occasionally cold waves affect the district in the wake of western disturbances passing across north India and the night temperatures may then drop down to about 8°C.

The highest maximum temperature recorded at Cuttack was 47.7°C on the 2nd May. 1957 and the lowest minimum was 7.8°C on the 4th January, 1923.

Humidity

Relative humidity is generally high about 75 per cent throughout the year. Humidity in the coastal area of the district is comparatively more than in the interior parts. The driest part of the year is the cold and summer seasons when the afternoon relative humidity ranges between 40 and 60 per cent. Owing to the excessive humidity, the dew formation is at its maximum in the beginning of the cold weather season. Appendix IV shows the normals of temperature and relative humidity of the district.

Cloudiness

Sky is overcast or heavily clouded in the south-west monsoon season. In the later half of the summer season and in October, sky is moderately clouded. In the rest of the year sky is mostly clear or slightly clouded.

Wind

Winds are generally light. The winds in the coastal region are stronger than in the interior. In the south-west monsoon season, winds are mainly from south-west or west. In the post-monsoon or cold seasons, winds are calm or light and variable in direction. In summer, winds blow from directions between south and west. Appendix V gives the mean wind speed of the district.

Special Weather Phenomena

Most of the depressions and storms originating in the Bay of Bengal in the monsoon season cross the coast of Orissa and move in a westerly to north-west direction. These affect the district causing wide-spread heavy rain and dusty winds. Similarly the post-monsoon storms also affect the district occasionally. Thunderstorms are common during the period from March to October. During the cold season fog is experienced occasionally. Mist or *Kuhudi* as locally known, are also common features during the months of January and February which affects the mango blossoms in some years.

Frequency of special weather phenomena in respect of the district is given in Appendix VI.

APPENDIX I

Plantation Achievement

a. Reserved Forests 2703 hectares

b. Outside Reserved Forests 50,490 hectares

Name of the Division/Organisation	Period			
	4th Plan (1972-73 to 1974-75)		5th Plan (1975-76 to 1979-80)	
	Phy. Achi.	Fy. Achi.	Phy. Achi.	Fy. Achi.
(1)	(2)	(3)	(4)	(5)
Orissa Forest Development Corporation (Previously Orissa Plantation Development Corporation/Coastal Shelter Belt Afforestation Division)	1,203·00	8,43,300·70	1,979·21 ha. 17,520 Rkm. 19 km.	1,11,568,19·21
Social Forestry Project, Cuttack (SIDA)	..	..	..	..
Kendujhar (Territorial Division Sukinda Range only)	..	..	348·00 ha.	279,230·00
Athagarh (Territorial Division)	..	..	..	..
Rajnagar (Mangrove)	..	..	..	..
Puri, Damparha (Banki)	560·00 ha.	107,910·00	18 ha.	18,450·00
Total	1,763·00 ha.	9,51,210·79	24,345·21 17520 R.km. 19 km.	11,454,499·21

(*Contd.*)

Phy. Achi.—Physical Achievement

Fy. Achievement—Financial Achievement

ha.— Hectare

Rkm.—Row Kilometre

Name of the Division/Organisation	6th Plan (1980-81 to 1984-85)		7th Plan (1985-86 to 1989-90)	
	Phy. Achi.	Fy. Achi.	Phy. Achi.	Fy. Achi.
(1)	(6)	(7)	(8)	(9)
Orissa Forest Development Corporation (previously Orissa Plantation Development Corporation Coastal Shelter Belt Afforestation Division) ..	4,698·38 ha. 8,365 Rkm. 19.21 46·41 km.	1,84,8218·19	6,569.·50 ha. 150.50 km. 69·802 lakh no seedlings	314,60,385·36
Social Forestry Project, Cuttack (SIDA), Kendujhar.	793·00 ha.	2,138,569·96	7,878·00 ha.	36,070,616·75
Kendujhar Territorial Division (Sukinda Range only) ..	110·00	90,570·00	1772,00 ha. 8 km,	82,209·00 Rice-865.69 Qtl., Wheat-1,182·44 Qtl.
Athagarh (Territorial Division) ..	1,715·50 ha. 27 Rkm.	1,466,794·00	2,770·80 ha. 38 Rkm.	6,306,087.25
Rajnagar (Mangrove) ..	258·45 ha.	179,611·00	230·00 ha. 140 km.	414,560·00
Puri, Damparha (Banki) ..	218 ha.	173,943·00	44·20 ha.	48,546·00
Total ..	7,793·33 ha. 8,392 Rkm. 46·41 km.	18,897,706·15	19,291·50 ha. 38 Rkm. 306·50 69·802 No. of seedling	75,122,404·36 Rice-86,568 Qtl. Wheat 1,182 ·44 Qtl.

Phy. Achi—Physical Achievement
Fy. Achi—Financial Achievement
ha.—Hectare
Rkm.—Row Kilometre

(Concld.)

APPENDIX II

NORMALS AND EXTREMES OF RAINFALL

Station	No. of years of data	Jan.	Feb.	Mar.	Apr.	May
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Aul (Aali) ..	44 a	10·5	26·0	21·7	36·8	110·6
	b	0·7	1·6	1·5	2·4	5·0
Cuttack (Observatory)..	79 a	11·4	25·5	22·6	29·6	78·5
	b	0·7	1·6	1·4	2·1	4·7
Badamba ..	55 a	11·9	30·2	24·8	36·9	67·1
	b	1·0	1·8	1·9	2·9	4·9
Barachana ..	37 a	17·9	21·2	21·6	43·1	100·6
	b	0·9	1·1	1·4	2·4	4·7
Baramul (Hydro) ..	22 a	11·4	22·1	30·0	26·7	47·5
	b	0·9	1·0	1·9	2·5	3·6
Binjharpur ..	39 a	15·1	25·9	24·2	34·6	97·9
	b	0·7	1·2	1·3	2·1	4·9
Cuttack ..	55 a	10·5	28·6	18·9	28·8	77·2
	b	0·9	1·6	1·2	2·0	4·6
Jagatsinghapur ..	52 a	13·8	20·2	20·3	31·2	87·2
	b	0·9	1·4	1·1	1·8	4·3
Jajpur ..	58 a	12·9	23·1	24·1	43·0	87·8
	b	0·9	1·5	1·9	2·8	5·4
Kendraparha ..	52 a	13·2	28·5	19·3	37·4	82·3
	b	0·8	1·5	1·2	2·0	4·2
Salepur ..	53 a	10·5	31·1	15·8	21·9	78·9
	b	0·7	1·6	0·9	1·3	4·4
Sukinda ..	36 a	17·6	24·7	20·0	35·4	91·7
	b	0·9	1·6	1·4	2·7	6·1

Station	No. of years of data	Jun.	Jul.	Aug.	Sep.	Oct.
(1)	(2)	(8)	(9)	(10)	(11)	(12)
Aul (Aali) ..	44 a	201·4	354·5	291·0	258·5	191·8
	b	9·8	14·4	13·8	11·7	7·4
Cuttack (Observatory) ..	79 a	220·3	343·8	351·2	246·5	151·6
	b	11·1	15·8	15·9	12·9	7·4
Badamba ..	55 a	211·0	333·8	322·5	253·6	135·5
	b	11·1	15·7	15·0	12·6	6·7
Barachana ..	37 a	245·4	366·7	333·3	216·8	150·2
	b	10·1	15·0	15·7	11·5	6·9
Baramul (Hydro) ..	22 a	224·0	358·0	328·0	264·7	145·1
	b	11·2	16·9	17·3	13·6	7·1
Binjharpur ..	39 a	233·5	365·2	301·5	241·3	153·0
	b	10·0	14·3	13·9	11·6	6·6
Cuttack ..	55 a	229·3	346·2	364·4	241·5	152·8
	b	11·2	15·0	15·6	12·8	7·1
Jagatsinghapur ..	52 a	230·3	397·7	367·0	265·6	199·6
	b	10·1	15·2	14·7	12·9	7·2
Jajpur ..	58 a	226·0	334·4	321·0	246·8	145·6
	b	11·2	14·8	15·0	12·4	6·5
Kendraparha ..	52 a	218·6	326·3	289·5	222·5	156·2
	b	9·7	14·1	14·0	11·9	6·5
Salepur ..	53 a	201·0	292·5	292·2	223·4	151·3
	b	9·2	13·4	13·4	11·6	6·5
Sukinda ..	36 a	201·9	378·2	352·2	256·8	126·2
	b	10·7	18·0	17·0	13·7	7·3

Station	No. of years of data	Nov.	Dec.	Annual	Highest annual rainfall as % of normal & year **	Lowest annual rainfall as % of normal & year **
(1)	(2)	(13)	(14)	(15)	(16)	(17)
Aul (Aali) ..	44 a	66·3	6.6	1,575·8	161 (1925)	63 (1921)
	b	2·0	0·4	70·8	..	..
Cuttack (Observatory) ..	79 a	34·7	4·9	1,520·6	155 (1956)	58 (1957)
	b	1·5	0·3	75·4	..	..
Badamba ..	55 a	38·3	6·4	1,472·1	134 (1933)	74 (1918)
	b	1·5	0·4	75·5	..	..
Barachana ..	37 a	47·2	1·5	1,565·6	151 (1944)	46 (1939)
	b	1·6	0·1	71·5	..	..
Baramul (Hydro) ..	22 a	17·0	0·9	1,475·4	130 (1956)	72 (1957)
	b	1·3	0·1	77·4	..	..
Binjharpur ..	39 a	51·0	2·1	1,545·3	166 (1925)	63 (1918)
	b	1·5	0·3	68·3	..	..
Cuttack ..	55 a	63·9	6·3	1,548·3	158 (1936)	61 (1918)
	b	1·6	0·4	73·9	..	..
Jagatsinghapur ..	52 a	67·7	6·9	1,707·6	156 (1936)	68 (1935)
	b	1·7	0·3	71·7	..	..
Jajpur ..	58 a	43·8	6·2	1,514·6	161 (1925)	73 (1927)
	b	1·4	0·4	74·0	..	..
Kendraparha ..	52 a	51·1	6·1	1,450·9	174 (1925)	67 (1918)
	b	1·5	0·4	68·1	..	..
Salepur ..	53 a	44·0	5·8	1,368·5	168 (1925)	57 (1939)
	b	1·2	0·3	64·6	..	..
Sukinda ..	36 a	33·5	3·8	1,542·0	140 (1946)	65 (1935)
	b	1·6	0·2	81·3	..	..

Station		No. of year of data	Heaviest Rainfall in 24 hours*			
			Amount (mm)		Date	
(1)		(2)	(18)		(19)	
Aul (Aali)	..	44 a	381·0	1967	Sep.	02
		b	..		..	
Cuttack (Observatory)	..	79 a	320·8	1933	Aug.	04
		b	..		..	
Badamba	..	55 a	219·7	1947	Aug.	27
		b	..		..	
Barachana	..	37 a	236·2	1922	Jul.	08
		b	..		..	
Baramul (Hydro)	..	22 a	218·6	1961	Sep.	07
		b	..		..	
Binjharpur	..	39 a	279·4	1925	Jun.	28
		b	..		..	
Cuttack	..	55 a	416·8	1934	Aug.	10
		b	..		..	
Jagatsinghapur	..	52 a	498·6	1889	Jul.	20
		b	..		..	
Jajpur	..	58 a	303·5	1907	Aug.	29
		b	..		..	
Kendraparha	..	52 a	401·8	1925	Jun.	27
		b	..		..	
Salepur	..	53 a	317·5	1925	Jun.	27
		b	..		..	
Sukinda	..	36 a	227·8	1940	Jul.	08
		b	..		..	

Station		No. of years of data	Jan.	Feb.	Mar.	Apr.	May
(1)		(2)	(3)	(4)	(5)	(6)	(7)
Tigiria	..	22 a	11·8	36·0	13·2	17·1	69·7
		b	0·76	1·7	1·1	1·4	3·5
Dharmashala	..	49 a	13·1	25·8	22·9	54·7	100·4
		b	0·9	1·7	1·6	3·3	5·9
Korei	..	35 a	12·3	20·2	21·5	37·9	91·8
		b	0·9	1.4	1·6	2·2	5·2
Rajkanika	..	43 a	13·0	23·9	23·1	35·6	88·3
		b	0·8	1·3	1·5	2·1	4·2
Pattamundai	..	32 a	14·8	35·6	23·6	33·8	103·4
		b	0·8	1·8	1·2	2·1	4·5
Athagarh	..	48 a	12·0	27·8	16·0	27·5	72·1
		b	0·9	2·0	1·2	1·9	4·9
Narasinghapur	..	53 a	13·3	28·9	20·8	36·1	71·2
		b	0·8	1·7	1·7	2·5	4·6
Banki (Bankiya)	..	57 a	11·8	29·7	18·6	26·3	64·1
		b	0·7	1·7	1·3	2·0	4·2
Paradeep Port (Observatory)		15 a	17·6	6·5	26·7	23·5	54·3
		b	1·0	0·5	1·4	1·4	2·6
Cuttack (District)	..	a	13·2	25·8	21·4	33·2	82·0
		b	0·8	1·5	1·4	2·2	4·6

Station		No. of years of data	Jun.	Jul.	Aug.	Sep.	Oct.
(1)		(2)	(8)	(9)	(10)	(11)	(12)
Tigiria	..	22 a	247·4	310·7	292·9	213·3	135·5
		b	9·5	14·7	14·9	11·3	6·1
Dharmashala	..	49 a	228·6	376·2	338·9	229·6	143·3
		b	10·8	15·9	16·2	12·2	6·4
Korei	..	35 a	208·2	340·0	285·2	199·7	125·3
		b	10·6	13·5	13·0	10·1	5·5
Raj Kanika	..	43 a	212·2	319·8	305·0	264·6	213·7
		b	9·6	13·7	13·0	11·7	7·3
Pattamundai	..	32 a	210·4	378·7	313·8	226·6	185·3
		b	9·5	14·1	13·9	10·8	7·3
Athagarh	..	48 a	215·1	346·8	335·7	217·1	121·9
		b	11·4	16·5	16·4	13·5	6·4
Narasinghapur	..	53 a	225·9	367·9	308·6	217·3	111·6
		b	10·7	16·4	15·1	11·7	5·8
Banki (Bankiya)	..	57 a	227·6	329·0	323·1	242·3	140·5
		b	10·8	14·9	14·6	12·2	6·9
Paradeep Port (Observatory)		15 a	225·7	329·3	345·9	242·9	206·3
		b	8·8	13·8	13·8	10·8	7·2
Cuttack (District)	..	a	221·1	347·4	322·0	237·7	154·4
		b	10·3	15·1	14·9	12·1	6·8

Station	No. of years of data	Nov.	Dec.	Annual	Highest annual rainfall as % of normal & year **	Lowest annual rainfall as % of normal & year **
(1)	(2)	(13)	(14)	(15)	(16)	(17)
Tigiria ..	22 a	25·3	4·9	1,377·7	189 (1955)	68 (1934)
	b	1·2	0·3	66·5	..	..
Dharmashala ..	49 a	34·0	4·5	1,572·0	180 (1925)	67 (1911)
	b	1·3	0·3	76·5	..	..
Korei ..	35 a	32·7	1·8	1,376·5	150 (1925)	67 (1927)
	b	1·2	0·1	65·3	..	..
Raj Kanika ..	43 a	82·0	5·7	1,586·9	209 (1946)	65 (1918)
	b	2·0	0·3	67·4	..	..
Pattamundai ..	32 a	55·0	7·1	1,588·1	143 (1925)	62 (1921)
	b	1·5	0·3	67·8	..	..
Athagarh ..	48 a	42·6	3·6	1,438·1	144 (1936)	68 (1921)
	b	1·7	0·3	77·1	..	..
Narasinghapur ..	53 a	30·5	3·6	1,435·7	171 (1922)	61 (1902)
	b	1·2	0·3	72·5	..	..
Banki (Bankiya) ..	57 a	39·6	5·8	1,458·4	157 (1936)	62 (1918)
	b	1·6	0·4	71·4	..	..
Paradeep Port (Observatory)	15 a	108·7	21·7	1,609·1	134 (1971)	77 (1967)
	b	3·3	0·4	65·0	..	..
Cuttack (District) ..	a	47·1	5·5	1,510·8	148 (1925)	64 (1957)
	b	1·6	0·3	71·6	..	..

Station		No. of years of data	Heaviest Rainfall in 24 hours*			
			Amount (mm.)	Date		
(1)		(2)	(18)	(19)		
Tigiria	..	22 a	228·9	1936	June	13
		b	..		..	
Dharmashala	..	49 a	279·4	1944	July	31
		b	..		..	
Korei	..	35 a	223·5	1925	June	28
		b	..		..	
Raj Kanika	..	43 a	279·4	1946	Aug.	21
		b	..		..	
Pattamundai	..	32 a	280·9	1936	June	13
		b	..		..	
Athagarh	..	48 a	262·4	1936	June	13
		b	..		..	
Narasinghapur	..	53 a	317·5	1899	Oct.	15
		b	..		..	
Banki (Bankiya)	..	57 a	295·4	1936	June	14
		b	..		..	
Paradeep Port (observatory)	..	15 a	22?·6	1963	Aug.	I0
		b	..		..	

(a) Normal rainfall in mm.

(b) Average number of rainy days (days with rain of 2·5 mm. or more).

*Based on all available data upto 1980.

**Years of occurrence given in brackets in Appendix II. Normals based on all available data from 1901—1980.

Source:—Additional Director-General, Meteorology (Research), Pune.

APPENDIX II-A

Monthly Annual Rainfall for the Cuttack District from 1981 to 1992.
(Rainfall in mm.)

Sl. No.	Month	Normal	1981	1982	1983	1984	1985
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	January ..	13.7	3.0	10.5	7.3	0.4	7.6
2.	February ..	27.5	9.1	50.7	65.5	..	74.1
3.	March ..	20.8	36.2	86.2	30.7	..	5.9
4.	April ..	34.2	14.7	34.8	26.1	11.9	27.7
5.	May ..	86.5	97.2	33.6	63.5	10.1	50.8
6.	June ..	222.3	140.3	249.5	152.6	198.9	162.4
7.	July ..	351.8	182.2	129.3	217.8	368.2	244.2
8.	August ..	315.8	314.6	388.5	459.6	569.2	515.6
9.	September	229.2	275.8	157.8	266.6	137.5	308.0
10.	October ..	147.4	28.9	23.7	128.5	80.2	298.7
11.	November	46.7	1.4	2.9	1.9	..	..
12,	December ..	5.4	11.1	..	2.0	..	..
	ANNUAL	1,501.3	1,114.5	1,167.5	1,422.1	1,376·4	1,655.0

Sl. (1)	Month (2)	1986 (9)	1987 (10)	1988 (11)	1989 (12)	1990 (13)	1991 (14)	1992 (15)
1	January ..	18.2	3.8	..	..	..	31.8	16.5
2	February ..	14.5	0.6	29.0	0.1	63.5	3.4	60.4
3	March ..	5·9	42.4	15.8	10.4	159.0	26.9	0.1
4	April ..	34.4	20.7	39.7	5.3	84.9	27.3	8.1
5	May ..	98.6	53.2	75.9	84·1	130.3	33.9	141.4
6	June :	247.9	149.0	322.7	336.8	242.1	148.2	157.2
7	July ..	297.9	378.8	254.3	270.9	225.8	538.9	390.1
8	August ..	322.2	228.1	243.1	352.9	241.7	408.1	322.5
9	September ..	252.1	118.4	366.8	168.1	216.9	207.1	225.2
10	October ..	177.2	93.2	99.2	31.9	213.2	177.8	123.8
11	November ..	222.5	109.3	1.7	0.2	268.4	45.9	NA
12	December ..	11.3	0.9	..	1.6	..	0.3	NA
	ANNUAL	1,702.7	1,198.4	1,448.2	1,272.2	1,845.8	1,649.6	NA

N. B (. .) the mark may be treated as nil.

Source: Office of the Special Relief Commissioner, Board of Revenue, Orissa, Cuttack.

APPENDIX III

Frequency of Annual Rainfall in the District

(Data 1901—80)

CUTTACK

Range in mm.	No. of Years	Range in mm.	No .of years
(1)	(2)	(3)	(4)
901—1000 ..	1	1601—1700	3
1001—1100 ..	2	1701—1800	5
1101—1200 ..	2	1801—1900	3
1201—1300 ..	13	1901—2000	3
1301—1400 ..	14	2001—2100	2
1401—1500 ..	13	2101—2200	1
1501—1600 ..	15	2201—2300	1

(Data available only for 78 years)

APPENDIX IV

Normals of Temperature and Relative Humidity

CUTTACK

Month	Mean Daily Maximum Temperature °C	Mean daily Minimum Temperature °C	Highest Maximum ever recorded °C	Date
(1)	(2)	(3)	(4)	(5)
January ..	28·9	15·7	39·0	1971 Jan. 25
February ..	31·5	18·2	39·1	1969 Feb. 28
March ..	35·9	22·1	42·8	1962 March 30
April ..	38·3	25·3	45·0	1903 April 23
May ..	38·8	26·9	47·7	1957 May 02
June ..	35·8	26·5	47·2	1948 June 06
July ..	31·6	25·6	41·6	1982 July 04
August ..	31·6	25·6	37·2	1880 August 16
September ..	32·2	25·5	37·6	1966 September 19
October ..	32·0	23·7	40·0	1972 October 13
November ..	30·1	18·8	35·5	1965 November 04
December ..	28·4	15·5	36·1	1979 December 28 31
Annual	32·9	22·5		

(Contd.)

Source:—Appendices III & IV-Additional Director General, Meteorology, (Research), Pune.

Month	Lowest Minimum ever recorded			Relative Humidity	
				08·30*	17·30*
	°C	Date		Per cent	Per cent
(1)	(6)	(7)		(8)	(9)
January ..	7·8	1923 January	04	80	48
February ..	9·5	1988 February	04	76	43
March ..	10·5	1987 March	01	73	41
April ..	14·9	1966 April	19	71	50
May ..	16·5	1987 May	01	71	58
		1988 May	14		
June	17·0	1988 June	01	76	69
July ..	18·5	1988 July	09	83	81
August ..	19·1	1977 August	31	83	81
September ..	18·5	1985 September	21	83	80
October ..	14·0	1985 October	22	79	72
November ..	10·0	1987 November	30	74	59
December ..	8·5	1987 December	28	77	52
Annual				77	61

*Hours I. S. T.

(Concld.)

Source : Appendices III & IV-Additional Director General, Meteorology (Research), Pune.

APPENDIX V

Mean Wind Speed in km./h.

CUTTACK

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
2.9	3·8	5·6	7·7	9·1	7·2	6·7	6·1	4·8	4·3	3·3	2·6	5·6

APPENDIX VI

Special Weather Phenomena

CUTTACK

Mean No. of days with*	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Thunder	0.1	1.0	2	4	7	9	5	7	7	7	0.5	0.1	48
Hail	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0·2
Dust-storm	0.0	0.2	0.2	3	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	5
Fog	3	3	1.0	3	0.0	0.0	0.0	0.0	0.0	0.0	3	0.5	13

*No. of days two and above are given in whole numbers.

‡Appendices IV, V & VI—Normals extracted from "Climatological Tables of Observatories in India (1931—1960)

Source: Appendices V & VI—Additional Director General, Meteorology (Research), Pune.