CHAPTER I

GENERAL

Introducing the District

The name of the district needs some explanation. Boudh was a Feudatory State till 1st January, 1948 when the Raja transferred power to the Government of Orissa. Khondmals was an independent subdivision which was tagged on to different districts at different times. It has been with the present district since 1st January, 1948. Baligurha was a subdivision of Ganjam district till the last of March, 1949. Khonds have been the main population of the district. Even Boudh as a Feudatory State had a number of Khond villages who were so important that the Raja sent a telegram on 1st January, 1948 declaring that his Khond subjects would not be willing to submit to the Government of Orissa. They, however, willingly accepted the new Government.

The Khonds are a very important tribe. They are so hospitable that they will give shelter to an enemy who may come as their guest. They did not drink milk, but kill the cows for beef. They had the custom of human sacrifice which was stopped with great difficulty. Ultimately they agreed to stop the practice on being assured that they will pay no land tax. They, however, never sacrificed a Khond. They used to kidnap a non-Khond boy from the plains. The boy lived in the Khond village as a very honoured guest. He used to get plenty of wine, whatever food he wanted and had the company of any Khond girl he wanted. He naturally did not try to run away. On the day of the sacrifice he was so drunk that he was completely anaesthetised. Portions of his body could be cut away without feeling any pain. So far as his life was concerned it was not cruel, because he did not feel any pain. Instead of the Meria, as the sacrificial boy was called, they started sacrificing a buffalo which they purchase by running into debt. The buffalo sacrifice still continues.

During the British days they posted a selected officer to Khondmals and gave him all civil, criminal and revenue powers. He was left there for many years. He was the *de-facto* Maa-Baap of the Khonds. Having three subdivisions of different origin the revenue system is complicated.

Every Khond village has a few Pans who act as their moneylenders. They play such an important part in Khond life that it is said, 'the Khond is a king and the Pan is his minister',

Origin of the name of the district

The district of Boudh-Khondmals was created in the year 1948 with two subdivisions, viz., Boudh and Khondmals, with headquarters at Phulabani. The former subdivision was an ex- State which merged with Orissa on the 1st January, 1948 and the latter had formerly formed a part of the district of Ganjam. Unlike most of the districts of Orissa it does not derive its name from the name of its headquarters town although it is popularly known as Phulabani district. To some, it is even known as Boudh-Phulabani district. In many of the Government publications the district is also wrongly identified. But actually the district is named after the names of its two subdivisions, Boudh and Khondmals. Even after the reorganisation of the district in 1949 with the addition of a third subdivision, namely, Baligurha, its nomenclature remains intact.

To trace the origin of its component parts, the ex-State of Boudh was named after its headquarters town, Boudh, a place located on the Mahanadi. But the Khondmals (Khond or Kandha- a hill tribe, Mals-in Oriya signify a hilly tract) which imply a hilly habitat of the Khonds, seems to have derived its name from this particular hill tribe who are predominant in the area. Thus the name of the district which is merely a derivative of the names of two of its constituent subdivisions is devoid of any significance.

Location, General boundaries, Total area and Population

One of the centrally located districts of Orissa, Boudh-Khondmals, lies between 19°34′N and 20°54′ N latitudes and between 83°30′ E and 84°48′E longitudes. It is bounded on the north by the districts of Balangir and Dhenkanal, on the east by Ganjam and Puri, on the south by Ganjam and Koraput and on the west by Kalahandi, Balangir and Koraput. Thus it is encircled by six of the districts of Orissa. The district extends over a territory of 11,070·0 sq. km (Surveyor General, India) and was inhabited by 621,675 souls (Male 310,233, Female 311,442) in 1971. It represents 2·10 and 7·83 per cents of the State's area and population respectively. It ranks 6th in size and 13th in population among the thirteen districts of Orissa.

History of the district as an administrative unit and changes in its parts

The Boudh-Khondmals region was occupied by the Marathas in 1,800 A. D. and it remained under the rule of the Bhonsla Raja of Nagpur. In November 1803 when the British occupied Cuttack after defeating the Marathas, the latter led by Shankar Bapu took shelter in the territory of the Raja of Boudh. But when a British detachment appeared at Barmul, the Raja hastened to offer solicitation to the British and extended his protection to them by which they occupied Boudh in 1804. In 1810 the Bhonsla Raja of Nagpur claimed Boudh and subsequently in 1818 he got jurisdiction over that State. Boudh was finally ceded to the British Government by Madhoji Bhonsla in

1826. The Raja of Boudh had jurisdiction over Athmallik till 1819. But that year the British made a separate Kabuliyat with the *samant* of Athmallik. After the death of Raja Chandra Sekhar Deva of Boudh in 1852, Athmallik became practically independent of Boudh. The Raja of Boudh had suzerainty over Khondmals from early times. But in the middle of the 19th century when the Khonds rose in rebellion under Chakra Bisoyee the Raja failed to bring order in that territory and later the Khondmals were brought under the administration of the British in February 1835. The Khondmals were made a subdivision of the district of Angul in 1891 and in 1904 Phulabani was made the subdivisional headquarters.

During the rule of Raja Pitambar Deva of Boudh the British Government recognised his hereditary title of Raja and a Sanad was granted to him in 1875. He was succeeded by Jogendra Deva in 1879 and the new ruler received another Sanad in 1894 and had his tribute fixed in perpetuity. He died in 1913 and was succeeded by Narayan Deva during whose rule the State of Boudh merged with Orissa on 1st January, 1948.

When Orissa was made a separate province on 1st April, 1936 the Khondmals subdivision was incorporated in the district of Ganjam. On the 1st January, 1948 the district of Boudh-Khondmals was constituted with the ex-State of Boudh and the Khondmals subdivision. Subsequently in 1949 (1-4-49) the Baligurha subdivision of Ganjam Agency consisting of the Taluks of G. Udayagiri and Baligurha was transferred to this district. In the same year, 51 villages of Dahia police out-post, an enclave in Boudh area of Sonepur subdivision of Balangir district, were added to the jurisdiction of Boudh subdivision. These villages originally formed a part of Boudh. They were transferred to Sonepur as dowry and became a Zamindari under the Ruling Chief and continued to remain so for sometime. Later they became an integral part of Sonepur State till ultimately they were transferred again to Boudh in 1949.

Subdivisions, Tahsils and Thanas

The district is divided into three subdivisions, five Tahsils and fourteen police stations*. Khondmals subdivision is coterminous with Khondmals Tahsil while Baligurha and Boudh subdivisions are each divided into two Tahsils, namely, Baligurha and G. Udayagiri; Boudh and Kantamal Tahsils respectively.

In the following table are given the area (in sq. km.) and population of the respective subdivisions and Tahsils of the district and names of the police stations comprising them. The population figure of each police station is given in Chapter III.

* Subsequently, after 1.1,80, 3 more Police Stations, viz., Phulabani Town P. S., Gochhaparha P. S., and Sarangarh P. S., have been created.

Subdivision (1)	Tahsil (2)	Police-station (3)
Khondmals	Khondmals	Phulabani
A—2,017·61	A—2,017·61	Khajuriparha
P—111,001	P—111,001	Phiringia
Boudh	Boudh	Boudh Sadar
A—3,444·70	A—2,002·07	Harabhanga
P—227,902	P—130,535	
	Kantamal	Ghantaparha
	A—1,442·63	Manamunda
	P—97,367	
Baligurha	Baligurha	Baligurha
A—5,628.07	A—4,333·07	Belaghar
P—282,772	P—160,149	Kotagarh
	G. Udayagiri	Bamunigan
	A—1,295·00	Daringbarhi
	P—122,623	G. Udayagiri, Raikia

The district has only two towns, Phulabani, the headquarters of the district; and Boudh. These are very smll towns having a population of 10,677 and 8,891 respectively according to 1971 Census. Each of the towns is managed by a Notified Area Council.

Topography

The district may be broadly divided into two distinct physical divisions; the plain region in the north and the highlands in the south.

Between the high mountain ranges of the Khondmals in the south and the river Mahanadi in the north forming the northern boundary of the district lie the fertile plains of Boudh. The country consists of a long strip of level land running parallel to the Mahanadi with gradual undulating rises to the hill ranges which form the Khondmals. The natural features of the country lend themselves to irrigation, the

hills of the southern border forming a natural watershed from which many small streams find their way to the Mahanadi. The hills on the southern border and the country along their foot are thickly covered with forests.

To the south of the plains of Boudh subdivision, the Khondmals subdivision form a broken plateau about 518 metres above the sea level girdled almost continuously by high ranges which cut it off from the surrounding country. On the north, east, and west these ranges quite perceptibly rise abruptly from the plains of Boudh while on the south they merge in the outliers of the Eastern Ghats in Baligurha subdivision. The high plateu lying within these ranges is broken up by numearous smaller ranges, which form an endless series of valleys varying in size from two to twentyfive square kilometres. Primeval forest still covers much of this tract, and the villages lie in scattered clearings on the hill sides and in the valleys below, while some are in almost inaccessible places on the topmost summits of the hills. The whole of this is, in fact, a network of hills and forest, interspersed here and there with the small hamlets of the Kandhas (Khonds).

The western portion of the Khondmals subdivision and also its north-eastern corner form a compact block of rugged hills, range after range being visible for miles around. The valleys shut in by these hills are small, but some of these form tablelands at fairly high elevations. A lofty unbroken range runs down the eastern boundary but on the south the ranges are not so close together, the valleys are more open, and the general level is higher than in other parts. There is a stretch of fairly open country to the north before the boundary line is reached, and again at the south-eastern corner more open land is found. The subdivision may thus be said to comprise two distinct parts, one, a mass of dense hills occupying the whole of the west and south and a great portion of the interior, and the other, which is much the smaller portion, containing more open valleys and smaller and more broken ranges.

Taken as a whole, however, Khondmals subdivision is a wild hilly tract intersected in all directions by streams and torrents, which run dry after the cessation of the rains. The area of cultivated land is small. The uplands and the slopes leading down from the foot of the hills are periodically cleared for raising dry crops and the low paddy lands have been permanently cleared and cultivated every year. The rest of the country is covered with thick forest. Kalinga Ghat is the main gateway to Baligurha and Khondmals subdivisions from the Ganjam side. After climbing continuously for about eleven kilometres one arrives at Kalinga, a height of 701 metres, from where a road leads to Phulabani and a second road branches off to Baligurha through G. Udayagiri.

The entire subdivision of Baligurha is a plateau and lies at a height varying from 300 metres to 1,100 metres above the sea level. The eastern side of this subdivision i. e, to the east of Raikia, consists of wide well cultivated valleys separated by hills covered with poor jungle. The western and southern portion comprising the Baligurha, Daringbarhi, Kotagarh and Belaghar police-stations are mountainous, covered with dense sal (*Shorea robusta*) forest infested with wild animals. The subdivision is separated from Ganjam plains by the well known Kalinga Ghat which is eleven km. from Durgaprasad on Berhampur-Phulabani road. The highest point of this Ghat road is at Kalinga 729 metres above the sea level. The southern portion is a belt of high lands varying from about 600 metres to 1,100 metres above sea level. The hills of the subdivision are a part of the Eastern Ghats.

Hills

The Mahanadi-Tel river valley separates the northern plateau which is the extension of the Chota Nagpur plateau of Bihar and the hill ranges of the Eastern Ghats to the south. The Eastern Ghats group tending in ESE-WNW direction in the northern part and NW-SE in the southern part extends into the Ganjam and Puri districts in the south and east and to Kalahandi district in the north and west. Gondwana rocks occur with ESE-WNW trend in the Mahanadi basin in the northern part of the district.

The hills on the southern border of the Boudh subdivision and the country along their foot are thickly covered with forests, in which sal (*Shorea robusta*) largely predominates. The country excepting the tract in the close proximity of the Mahanadi, is unhealthy.

The hills in the Khondmals subdivision run down in broken ranges, gradually decreasing in height, up to the northern limits of the subdivision, where the open plains of Boudh subdivision begin. Their general direction is from south to north, but there are numerous short ranges of varying length and height running in all directions. The tops of these ranges are flat; there are few isolated hills detached from the main ranges; and they nowhere present sharp jagged edges and conical peaks with the exception of one peak, Siananga, at the extreme south-eastern end of the subdivision.

The name and height of the principal hills in the district are furnished in the following table.

Name of peak (1)	Height in metre (2)
Majhi	863
Pen Soru	890
Kindu	824
Bandri Soru	898

(1)	(2)
Pulung Soru	923
Budha Parbat	839
Nagabudha	499
Bankmundi	650
Gedibuda	770
Sulia Parbat	584
Mundesar	713
Sunda Parbat	843
Patdei Parbat	754
Sunakania	932
Murali Soru	1,223
Patali Soru	1,026
Domedi Parbat	937
Tali Soru	1,118
Chompaghorono	1,257
Mukki Soru	1,132
Rangedi Soru	890
Danda Soru	972
Saudi Parbat	1,043
Mardabadi Soru	871
Papkedi Parbat	1,036
Doda Soru	1,157
Pisijiri Soru	1,136
Parende Soru	737
Ukuradu	819
Pria Soru	938

Besides the above hills, there occurs in the district many unnamed hills of considerable heights.

Plateaus and Plains

The district is gradually elevated towards eastern and southern borders which form a natural watershed and from which a number of streams run into the Mahanadi. The riverine plains of Boudh are drained by the tributaries of the Mahanadi while the southern and the western regions are drained by the tributaries of the Tel. The whole of Khondmals subdivision consisting of a plateau with about 520 metres in height is intersected by circular ranges of hills. Baligurha consists of a confused mass of wooded hills intersected by deep ravines and averages about 915 metres in elevation

River system and Water resources

Among the principal rivers in the district mention may be made of the Bagh, the Salki, the Rushikulya, and the Loharakhandi. These are mostly hill streams which form the affluents of larger rivers like the

Mahanadi and the Tel. The last two rivers, i. e., the Mahanadi and the Tel do not trace their course within the district, but only form its northern and north-western boundaries respectively.

Bagh

The Bagh rises in the hills near Bandhagarh to the extreme south of the Khondmals subdivision and then pursues a westerly course till some distance north of Sadingia where it turns abruptly at right angle and flows due north through the hills, eventually falling into the Mahanadi in Boudh after flowing for about 64 km.

This river has two tributaries, namely, Sunamundi and Odakhiyanala. The former, a perennial hill stream, rises in the hills near Phiringia and after a course of nearly 28 km. joins the Bagh. The Odakhiyanala starts from Ukuradu Parbat and is also a perennial stream. After a tortuous rocky course of about 27 km. it joins the Bagh.

Salki

The Salki rises in the great table-land around Udayagiri in Baligurha subdivision (near the hills of Rajkia) and flows due north almost straight across the Khondmals and Boudh subdivisions, which it divides into nearly two equal parts, and joins the Mahanadi in Boudh subdivision. The length of the river is about 51 km.

The Bagh and the Salki do not dry up completely in the summer. But after rains almost all of their feeders become dry. None of these streams are fit for navigation. In the rains they are swollen and rapid, and at other times they are either too shallow or quite dry in places. Their beds are tortuous and rocky and in many places consist of solid sheets of rock covered with only a few inches of water. Here and there, however, there are deep pools which never dry up and fish swarm in them in dry season. The streams are usually shut in by high banks which normally precludes the chances of an overflow and if the banks are over topped after unusually heavy rain, the water cannot spread far owing to the hills and slopes running down to the waters edge. When full, these streams are too rapid to divert and when irrigation is needed, they are dry. Some of the smaller feeder streams, however, retain water for two or three months after the rainy season and could be utilised, for they are capable of being harnessed at no great cost, and the water could be carried over a fairly large extent of country if diverted sufficiently high up at the foot of the hills.

Rushikulya

The Rushikulya takes its origin in the Rusimal hill (from which it takes its name) near Daringbarhi. It flows for some distance within Baligurha subdivision and then passes into the Ganjam district. Its total length is about 185 km. The origin of this river is a sacred place for the Hindus. Here they offer Pinda in the month of Chaitra (March-April).

Loharakandi

The Loharakandi has its origin at Kalinga Ghat. After flowing for a few kilometers within the Baligurha subdivision it crosses into the Ganjam district.

Among the less important rivers in the district mention may be made of the Meherani, the Ganduni, the Hinamanda, the Sagdia, the Bara Jhor, all of which flow within the Boudh subdivision. These form the tributaries of the Mahanadi. The Kodogo and the Raul with its tributary the Burakusma Nala, take their origin in the Baligurha subdivision and almost travel in a north-westerly direction to join the river Tel in the neighbouring district. The rivers of Baligurha subdivision pass through rocky surface and so have little chances of changing their course. Though they are perennial in nature the volume of water during the winter and summer is considerably small. Flood is unknown to the subdivision. Among the hill streams of Khondmals subdivision the Sunanadi and Pila Salki deserve mention. These two rivers together with their feeders become dry after the rains are over.

Lakes and Tanks

No lake occurs in the district. There are a large number of tanks. The Government tanks have been transferred to the control of the Grama Panchayats for taking up pisciculture. Besides, they too are used for bathing and irrigation purposes.

Springs and spring-heads

Khondmals and Baligurha subdivisions being hilly tracts springs occur abundantly in these areas. They are generally used for bathing and constitute the chief source of drinking water for the villagers.

GEOLOGY

The lithostratigraphic units of this district are khondalite, charnockite, leptynite, biotite granite gneiss, pegmatite, vein quartz, cataclasite, sandstone, shale, laterite, alluvium and soil. On the basis of their lithology, mode of occurrence, and inter-relationship the following stratigraphic sequence has been arrived at.

Recent			Alluvium and soil
Recent to Pleistocene			Laterite
Jurassic to Permo-Carboniferous	Gondwana Sequence	Talchirs	Shale and Sandstone
	Intrusives	..	Pegmatite and Quartz vein Biotite granite and Gneiss.
Pre-Riphean Super Group	Eastern Ghats Group		Cataclasites Charnockite suite Leptynite ? Khondalite suite

Base is not seen

The distribution and petrographic description of individual rock units are as follows :

Eastern Ghat Group Khondalite suite

The khondalite suite includes khondalite, quartzite and calc-granulite.

Khondalite

The khondalite is a medium to fine grained, pink coloured rock consisting of quartz-sillimanite schist, quartz-sillimanite garnet schist, and quartz-sillimanite-graphite-garnet schist. Good exposures of khondalite occur at Sulia Parbat (20°29′ 30″: 83°35′15″), Badaranga (19°59′00″ : 84°14′15″), and Degalmunda (20°28′15″ : 83°43′00″).

Quartzite

The quartzite member of the khondalite suite of rocks, occurs as thin bands and lenses within the khondalite conspicuous exposures of which are noticed at Badapadar ((20°29′30″ : 83°15′00″), Mutabali (20°24′20″ : 83°42′50″), Ranjhabali (20°23′ : 83° 43′) south of the Tel river near Patharkandi and at Sulia Parbat. The rock is light grey to white in colour and medium grained in texture. It contains interlocking grains of quartz and sillimanite with accessory magnetite.

Calc-granulite

The calc-granulite is a light green to green coloured medium grained rock with well marked foliations and consists of plagioclase diopside, scapolite, calcite and wollastonite. Discontinuous bands and lensoid bodies of calc-granulite occur within the knondalite and were noticed between Kapasia (20°16′30″ : 83°58′30″) and Deuli (20°18′30″: 83°53′45″); at Ambagan (20°30′ : 83°40′); Taparna (20°15′45″ : 83°51′) ; Pangali ghat (20°16′10″ : 83°50′) ; Daringbarhi (19°54′35″ : 84°07′); Ruda; Kaisladi (20°44′30″ : 84°3′45″) ; Borapadar (20°29′30″; 83°15′); and Ammunda (20°15′10″;83°45′30″) The rock bears characteristic marks of weathering like grooves and ribs.

Leptynite

The leptynite is a leucocratic medium grained, quartzofeldspathic rock having gneissose and granulitic texture and occurs as conformable bands within the charno-kite and khondalite along their contact. It is garnetiferous and is often sheared resulting in elongated quartz.

The geological set up of this rock is controversial because of its uncertain field relations with the other rocks. From the available evidences, it can be placed as a transition rock between the khondalite and charnockite suites of rock.

Charnockite suite

The charnockite suite consists of acid, intermediate, basic and ultrabasic types. The ultrabasic charnockite comprises metapyroxenite, a dark coloured rock consisting of diopside and hypersthene with few grains of plagioclase. Biotite and hornblende are secondary after the pyroxene. It occurs as small and discontinuous exposures near Uma village. Basic charnockite comprises pyroxene-granulite. It is hard,

massive and fine grained, greyish to black coloured rock consisting of pyroxene and plagioclase. This member of the charnockite suite is well exposed on the hills near Mutabali (20°24′20″ : 83°42′50″); Taliparha (20°23′15″ : 83°43′00″); etc. In the valleys its distribution is sporadic. Xenoliths of pyroxene granulite were seen to occur in the porphyroblastic garnetiferous biotite gneisses. It has both diffused and sharp contacts with the enclosing charnockite and leptynite. Acid to intermediate charnockite is represented by charnockite gneiss. It is a dark grey, fine to medium grained rock consisting of quartz, potash felspar, microcline, biotite, amphibole hypersthene and garnet. It occurs prominently near the villages Damanmunda, (20°28′ : 83°44″) Patheria (20°27′35″ : 83°43′15″), Barakuthuli (20°39′ : 84°1′15″). Red porphyroblasts of garnet are common.

Cataclastics

Impersistent but continuous silicified and brecciated chert zones running parallel to the course of the river Mahanadi in the northern part of the district intersects all the lithostratigraphic units of the Eastern Ghats. As such the cataclastics have been placed above the Eastern Ghat Group of rocks. Conspicuous exposures of chert breccia and mylonites are seen at Tilaimal (20°18′00″ : 83°58′15′); Padampara (20°16′30″ : 83°49′) and between Tilkamat (20°8′45″ : 84°10′30″) to Lambasari (20°40′ : 84°16′); suggesting a major fault along the present Mahanadi and Tel rivers, that affected the rocks of the Eastern Ghats Group.

Biotite Granite Gneiss

The biotite granite gneiss is coarse grained, porphyroblastic and gneissose in texture and consists of quartz, augen shaped and void felspars as phenocrysts, biotite and garnet. Biotite bearing gneissose bands are contorted with irregularly distributed garnet. Where contacted with khondalite, it has needles of sillimanite clustering around perphyroblasts of feldspars, which in turn have been encircled by biotite flakes. It has gradational contact with the khondalites. This is the major rock type of the district and is exposed in both the physiographic units, often enclosing the charnockites and khondalites. The prominent exposures of this rock occur in the river beds of the Mahanadi and the Tel, in Subarnagiri area, and between Thinkipani (20°16″30″ ; 83°50′), and Tilaimal (20°18′ : 83°58′15″).

Pegmatite and Vein quartz

Thin veins of quartz and pegmatite traverse the biotite granite gneiss across and along its foliations. The pegmatite is composed of quartz, perthite, microcline and albite with minor amounts of biotite, muscovite, beryl and tourmaline. The quartz veins have been sheared and fractured at places and in such zones dissemination of graphite and pyrite is observed.

Gondwana Group

The representative members of the Gondwana Group of rocks in Boudh-Khondmals are Talchir shale and sandstone. They rest unconformably on the Archean rocks. The basal shale is green in colour, highly friable and brittle. It is unconformably overlain by medium to coarse grained, well bedded, yellow coloured sandstone containing bands of conglomerate. The thickness of the sandstone varies from 10m to 50 m. It consists of angular fragments of quartz, pebbles of vein quartz, khondalite and quartzite and has sedimentary structures like current bedding and graded bedding. The constituent pebbles of the sandstone are usually 1.50 cm×2cm×1·4 cm in size. The trend of the strata is NE-SW with dip of 10°to 30°to the east.

Laterite

Porous, pitted laterite caps almost all the hills of the district, khondalites being less lateritised than all other rock types. This may range between pleistocene and recent in age.

Alluvium and Soil

Residual soil of this district varies in colour from light grey to brown and is a product of disintegration and weathering of khondalite, charnockite and biotite gneiss.

Tectonic and Metamorphic history of the district

During the Archean time, the Eastern Ghats Group of rocks in Boudh-Khondmals district have undergone at least two phases of deformation as evidenced by the presence of large scale, steeply plunging superimposed cross folds and zones of mylonite parallel to the Mahanadi valley. In the main orogenic cycle, arenaceous, argillaceous and calc magnesian sediments were deposited, It was followed by cycle of metamorphism and emplacement of the Charnockite Groups of rocks on large scale and granitic and pegmatitic activity. Anhydrous metamorphic mineral assemblages like quartz, sillimanite in khondalite, diopside-wollastonite-scapolite-quartz-plagioclase in calc granulites hypersthene-diopside-plagioclase in pyroxene granulite and charnockite indicate that these rocks have reached the pyroxene granulite sub-facies of granulite facies of metamorphism. Hornblende and biotite of these rocks suggest retrograde metamorphism at a later date. There are periods of fracturing and shearing, and formation of mylonites, related to a younger tectonic activity that brought in cross folding in them. During the Gondwana period the north-eastern part of the district subsided due to faulting and the sediments were laid down. After the uplift of Gondwana rock, the district remained practically stable.

Mineral Resources

Systematic geological mapping on 1: 50000 scale in Boudh-Khondmals district is yet to be completed and as such the information regarding the occurrences of economic minerals in this district is incomplete. A number of mineral occurrences, though less promising, have been reported by the workers of the Geological Survey some of which are also being exploited.

Mineral Deposits

Beryl

Disseminated crystals of beryl are found in the mica bearing pegmatites traversing khondalite gneiss. It is bluish green to greenish blue in colour with well developed hexagonal faces. The size of the crystals varies from 3 cm. × 2 cm. to 30 cm. × 15 cm. the average size being 5 cm. × 2 cm. The important places where beryl occurs are Barakuthuli (20°38′ : 84°00′) and Gopalpur (20°43′30″ ; 83°57′00″).

Clay

Clay occurs as beds within the Gondwana sediments. Horizontal beds of clay varying in thickness from 0·15 to 0·30 m. occur on the right bank of the Tel river, about 4 km. north-west of Ratakandi (20°36′ : 83°55′). The clay is light porous and shows high absorbing and cleansing properties. In the plains around Penala (20°36′20″ : 84°00′00″) and Badimunda (20°05′00″ : 84°04′00″), black and sticky clay suitable for potteries and roofing occurs as small pockets. Reddish to brown coloured clay useful for pigments occurs in pockets to the south of Putnalpalli (20°39′50″ : 84°05′ 05″). Similar occurrences were also noticed near Ranaba (20°30′50″ : 83°57′10″).

Graphite

Graphite occurs as lenses and veins in khondalitic rock over a belt of 38 km. long and 8 km. wide near Tumdibandha (19°57′30″ : 83°42′30″). Specks of graphite of crystalline habit occur near Panikhandi (19°59′ : 83°44′) and in nearby area within the Khondalite suite of rocks. They occur along the foliation planes of partially biotitised and feldspathised metasediments.

Manganese

Manganese occurs as conformable bands in kodurite within the khondalite, near Sitalpani of Boudh subdivision. It is of low grade. The manganese bearing horizon is 185 m. long and 26m. wide. The ores of manganese include pyrolusite and psilomilane.

Mica

Mica occurs within the pegmatite traversing the khondalite. Ruby mica, ranging in size from 1 cm.×1 cm. to 35 cm.×25 cm., occurs in 1 m. to 50 m. wide zones continuing to a depth of more than 2·5 metres. The quality of mica improves with the depth and the grade appears to range between III and IV. The quality is equivalent to V-4 "Good stained" type of mica of American standard testing material. It is usually free from cross grain. It has structural strain and hence poor in grade. Isolated exposures of mica bearing (mostly biotite) pegmatite are noticed 1·2 km. East-South-East of Tikrasahi (20°38′15″ : 83°59′), 2·4 km. east of Bhuktapara (20°39′00″ : 84°01′15″), 0·60 km. 340° E of Bhuktapara (20°39′ : 84°15′), Talhabal (20°46′30″: 84°18′00′), Landibandh (20°41′00″: 84°15′30″) and 0·8 km. south-west of Shyamsunderpur (20°40′30″ : 84°14′00″).

Rock Crystals

Rock crystals are found within the pegmatite traversing khondalite and gneiss. They measure 5·0—7·5X2·5 cm. and are also found in small pits

0·8 km. south-west of Tarbha (20°44'00" : 84°09'30"). Several crystals are exceptionally large, semi-transparent, measuring up to 12·5 cm. × 3·8 cm. × 1·5 cm.

Road metal and Building materials

Pyroxene granulite and charnockite serve as good road metal and building material due to their hard and compact character and are quarried near the Bagh and the Salki rivers.

FLORA

Botanical Divisions and Vegetation and Rare type of Flora

In Sir J. D. Hooker's sketch of the Flora of British India (1904) the Gangetic plain area and the low country of Orissa north of the Mahanadi lies in his Gangetic plain Province and the remainder, i. e., the area south of the Mahanadi is included into his large Deccan Province. The separation made, was based largely upon topography and climate.

Haines (1924) in his works, 'Botany of Bihar and Orissa', recorded that both Bihar and Orissa are characterised by complete absence of *Cupuliferae*, general scarcity of *Lauraceae* and *Murtaceae* and by few, or very few *Ranunculaceae*, *Magnoliaceae*, *Cruciferae*, *Guttiferaceae*, *Rossceae*, *Umbelliferae* and comparatively few orchids. Further, except for the genus *Ficus*, the region represents comparatively few of the Urticales. On the other hand, it possesses marked positive features in the presence, practically throughout, of the Sal tree (but no other Diptercarp) which forms excellent plant community with the association of the species of *Terminalia*, *Anogeissus*, *Bassia*, *Butea*, *Sclelchera*, *Gardenia* and *Wendlandia* of *Rubiaceae*, *Acanthaceae*, *Bauhinia*, *Diospyros*, *Ziziphus*, *Cleistanthus*, *Nyctanthes*, *Dendrocalamus strictus* (bamboo, cultivar), *Ischaemum angustifolium* (sabai grass), *Heteropogon contortus* (spear grass) and *Annonaceae*.

Phytogeographically, the vegetation of Boudh-Khondmals district comes under two major divisions, northern tropical semi-evergreen forest and northern tropical moist deciduous forest.

1. Northern tropical semi evergreen forest:—This type of vegetation and forest is found in moist valleys of the Baligurha Forest Division. The important species met with are, *Mangifera indica* (Mango), *Diospyros embryopteris* (Makar kendu) *Michelia champaca* (Champa), *Dillenia pentagyna* (Rai), *Macaranga peltata* (Manda), *Mesua ferrea* (Nageswar) and *Saraca Indica* (Asoka), *Calamus* (canes) are found growing in shady moist places. Teak plantations have been raised with success and are being commercially exploited.

2. Northern tropical moist deciduous forest:—This type of vegetation occours in Phulabani Forest Division alongwith semi-evergreen type. The important species typical of moist deciduous forest are *Shorea robusta* (Sal), *Terminalia tomentosa* (Asan), *Pterocarpus marsupium* (Bija), *Adina cordifolia* (Kurum), *Xylia xylocarpa* (Kangada), *Anogeissus latifolia* (Dhaura), *Dalbergia latifolia* (Sisoo) and *Gmelina arborea* (Gambhar).

These forests are economically most valuable forests of the State. Sal in this type is usually of better quality. In this type of forest, moist bamboo brakes are seen.

Among other economic plants occurring in the district, the following need mention:

(*a*) *Terminalia chebula*:—The fruits of the plant commonly called myrobalan yield a good percentage of tannin which is used in tanneries, one of them being located at Boudh.

(*b*) Bamboos:— Four species of bamboos, *Bambusa arundinacea* (Dabe bamboo), *Dendrocalamus strictus* (Salia bamboo), *Bambusa tulda* and *B. nutens* grow profusely in the district that are supplied as raw material for paper industry. The species grow abundantly in the forests of Boudh, Phulabani and Baligurha.

(*c*) *Diospyros melanoxylon*:— Its leaf, known as Kendu leaf is used for manufacturing *biri*. It grows abundantly in Boudh area.

(*d*) Broom grass:)— It occurs both in Phulubani and Baligurha Forest Divisions.

(*e*) *Rauwolfia serpentina* (Patal garud or Sarpagandha):— An important medicinal plant, occurs in both the Forest Divisions.

(*f*) *Tamarindus indica* (Tamarind):— It grows in Phulabani Forest Division.

Many cash crops and economic plants have been introduced in the district. There are some experimental stations like Kalinga, Baligurha and Daringbarhi. From nursery beds of these experimental stations, the saplings are planted in forest areas and, of late, the exotic plants have adapted well to the soil and environs and have been naturalised. Among the exotics are *Pinus insularis*, *P. carribae*, *P. khasiana*, *Eucalyptus toreliana*, *Melocana bambusoides* and *Coffea arabica*.

Rauwolfia serpentina, *Atropa belladona*, *Derris elliptica*, *Ammi majus*, *Ocimum kilimandshericum*, *Mentha arvensis*, *M. piperata*, *Cymbopogon martini* (palm rose oilgrass), *C. flexuosus* (lemon grass), *C. winternus* (Java variety) and *C. nardus* (Srilanka variety) are among the medicinal and oil yielding plants introduced in the forest areas.

Pinus khasiana plantation has been started in the plateau of Baliguraa division. It has been naturalised in the area. In view of increasing demands of bamboos as raw material for paper mills, plantation of *Dendrocalamus strictus* has been extensively taken up in the forest. *Gmelina arborea* (Gambhar or Gumna) commonly known as white teak, is also planted in the forest.

According to Mooney (1950) the following plants commonly occur in the district in addition to those mentioned above.

Clematis smilacifolia, Bergia ammanioides, Cleisthanthus patulus, Impatiens kleinii, Allophyllus serratus, Galactia longifolia, Combretum ovalifolium, Jussieua reprens, Peucedanum dhana, Blumea oxydonta, Pulicaria foliolosa, Wahlenbergia gracilis, Linociera intermedia, Alstonia venenatus, Vallaris solanacea, Centaurium roxburghii, Stemodia viscosa, Limnophila conferta, Cardanthera uliginosa, C.balsamica, Strobilanthes scaber, Rungia repens, Rhinacanthus nasuta, Coleus forskohlii, Dysophylla cruciata, Desmostachya bipinnata, Urginea indica and *Alpinia malaccensis.*

Of the plants, *Bergia ammanioides* had not been collected by Haines during the twenties in the district and *Galactia longifolia* is a new record in the State and rare in occurrence.

Forest Belts and Area covered

The forests extend over an area of about 7,336 sq. km. which is above 66 per cent of the geographical area of the district. For administrative purposes these forests are divided into two territorial divisions, the Phulabani and the Baligurha Forest Divisions with their headquarters respectively at Phulabani and G. Udayagiri. Besides, there are also two Kendu-leaf Divisions in the district The Phulabani Forest Division extends over the civil subdivisions of Boudh and Khondmals while the Baligurha Forest Division is within the Baligurha subdivision. The Phulabani Division was earlier known as Udayagiri Division and was renamed as such only in the year 1954. Prior to the merger in 1948, the forests of Boudh ex-state were controlled by the State Forest Officer under the supervision of the Forest Adviser, Eastern States. Thereafter in 1959 the forest divisions were reorganised and accordingly G. Udayagiri range was transferred to Baligurha Division and the entire Boudh Division which was until then directly under the Berhampur circle was included in the Phulabani Division.

In the following table is given the forest area of both the Divisions separately under different classes as stood on 31st March 1978.

Classification	Area (in sq. km.)		
	Phulabani Division	Baligurha Division	Total
Reserved Forest	1,603	1,035	2,638
Demarcated Protected Forest	719	2,438	3,157
Undemarcated Protected Forest and Unreserved forest.	1,536	..	1,536
Unclassified Forest	1	4	5
Total	3,859	3,477	7,336

Each of the above forest divisions is under the control of a Divisional Forest Officer. The office of the Divisional Forest Officer, Phulbani, was created in 1945 while that of Baligurha was created in 1938. The Divisional Forest Officers are assisted by a number of subordinate staff for the smooth and efficient management of the forests.

Character and vegetation

As stated earlier, there are two forest divisions in the district. The Phulabani Forest Division extends over the two civil subdivisions of Boudh and Khondmals. The forest vegetation of both the subdivisions differs in character from each other. The forests of Bouh, according to Champion's classifications, may be broadly classified as (1) northern Tropical Moist Deciduous forests and (2) northern Tropical Dry Deciduous forests. The former type of forests generally occur in the eastern part and the latter in the western side of the subdivision, the road between Ranipathar and Sitalpani almost forming the dividing line. The forests of Khondmals subdivision are broadly classified as (1) northern Tropical Moist Deciduous forests (moist sal) and (2) northern Tropical Moist Deciduous forest (dry sal). The moist type Sal (*Shorea robusta*) is found along the northern border and the dry type along the southern border of the subdivision. Mixed forests occur in pockets within the moist and dry Sal forests.

A large area of the forests in the northern part of Khondmals just along the Boudh border, from the Bagh in the west to Donga Bilabadi in the east, are covered with bamboos chiefly Salia (*Dendrocalamus strictus*). It is generally found on the slopes of the hills. Mixed forests are also found in pockets both in Moist and Dry Sal forests. Sal (*Shorea robusta*) occurs throughout the Khondmals either in pure or mixed with other species. The crops may therefore be divided into (1) Sal (*Shorea robusta*) with its usual associates and (2) Mixed forests.

The reserved forests of Boudh subdivision in Phulabani Forest Division which comprise of about 965 sq. km. may be chiefly divided into the following four categories :

(1) Sal Forest (Moist peninsular low level Sal)

(2) Riverain Forests

(3) Teak Forests (southern tropical dry teak forests) and

(4) Mixed Forests (northern dry mixed deciduous forests)

The Sal forests, Riverain forests and the mixed forests exist in no well-defined tracts. One gradually merges with the other and the intermediate types can well be recognised. But the teak forests can be distinctly delineated from other forests.

Quality of Sal (*Shorea robusta*) varies over a wide range in such forest blocks as Subarnagiri, Matakupa and Padmatola. Sal (*Shorea robusta*) is generally confined to the lower slopes of the hills and valleys except in Matidhara, Central Mundeswar and Arakhapadar where it attains higher slopes and even in some cases reaches the summits of the hills. The common associates of Sal (*Shorea robusta*) are Asan (*Terminalia tomentosa*), Harida (*Terminalia chebula*), Bahada (*T. belerica*), Mahul (*Madhuca indica*), Jamun (*Eugenia jambolana*), Kendu (*Deospyros melanoxylon*), Piasal (*Pterocarpus marsupium*), Kasi (*Bridelia retusa*), Anla (*Phyllanthus emblica*), Mahi (*Wodier ougeinia*), Kumbhi (*Careya arborea*), Mundi, Sunari (*Cassia fistuala*), Mitikinia, Tentera, Salai, Dhaura (*Anogeissus latifolia*), Sidha (*Lagerstroemia parviflora*), Arjuna (*Terminalia arjuna*), Char (*Buchanania latifolia*), Bandhan (*Ougeinia dalbergioides*), Karada (*Helicteres isora*), Dhaman (*Grewia tiliaefolia*) and Bheru (*Chloroxylon swietenia*). Sal of quality III is found in the eastern part of Boudh such as Mundeswar, Podhal and Matidhara ; quality IV in Purunakatak range and in some locality of Subarnagiri ; and quality V in most of the forests of Boudh subdivision and Manamunda range and in some parts of Purunakatak range such as Padmatola, Mundeswar, Podhal and Aragarh.

Riverain type of forests generallay occur along the Mahanadi and some of the important streams. In most cases they extend for only a short distance up the streams and constitute a narrow fringe. The characteristic species generally occurring in these forests are Phasi, Arjuna (*Terminalia arjuna*), Pani-gambhari (*Trewia nudiflora*), Kalchi (*Diospyros sylvatica*), Kuchilla (*Strychnos nuxvomica*) and rarely, *Patuli*. Climbers and scramblers like *Capparis*, *Jasminum* and *Dioscoreas* abound these forests, especially in the east towards Sitalpani and Marda where this type attains its optimum.

Teak (*Tectona grandis*) forest occurs in small patches over an area of about 102 hectares only along the river Tel in Manamunda range. It is generally branchy and of low quality (quality IV). But excepting a few patches in Udayapur block it attains high density. The common associate of teak here is Palas (*Butea frondosa*).

Mixed forests occur extensively throughout the Boudh subdivision which tend to become moist in the eastern and dry in the western regions. They may be classified into two distinct categories, viz., (*a*) Valuable mixed forests with Piasal (*Ptrocarpas marsupium*), Kasi (*Bridelia retusa*), Dha, Kurum (*Adina cordifolia*, Mitikinia and Asan (*Terminalia tomentosa*) and (*b*) Poor mixed forests with Salai, Mahi (*Wodier ougeinia*), Kendu (*Diospyros melanoxylon*), Simili (*Bombax malabaricum*) and Barabakalia.

The predominant species in the entire forest division of Baligurha is Sal (*Shorea robusta*) which occur along with its common associates.

Effects of Government Forest policy

With the object of consolidation and scientific management, afforestation of barren land, enrichment of the existing forests of low value by replacement, where necessary ; intensification of management and development of communication in the forest, conservation of nature and wild life for scientific study of flora and fauna and various other measures have been undertaken. The progress achieved up to the end of 1977-78 under important programmes and schemes are described below. Owing to the policies adopted for protection and afforestation, a tendency towards improvement in density and quality of forest crops are generally recorded.

The following table indicates separately the total area covered by plantation in both the forest divisions under different schemes.

Name of Scheme/Programme	Phulabani Division (From 1974-75 to 1977-78)	Baligurha Division
(1)	(2)	(3)
Drought-prone Area Programme ..	1,160 hectares	532 hectares
Drought-prone Avenue Plantation ..	25 km.	20 km.
Integrated Tribal Development Programme	100 hectares	101 hectares
Farm Forestry ..	6 hectares	Nil
Tribal Development Agency Scheme ..	Nil	240 hectare

Usually the economic species like teak, Gambhari, Sisoo, Simul and bamboo and quick growing species like eucalyptus and fruit trees are planted in Podu ravaged areas to restore the poor quality forests.

With a view to improving communication facilities within the forest area more than 500 km. of roads have been constructed in both the forest divisions. The provision of the Orissa Forest Act, 1972 and the rules made thereunder are strictly followed by the executive staff for the protection of the forests.

Sanctuaries

No sanctuary exists in Baligurha Forest Division. But the Satkosia Gorge Sanctuary meant for the preservation of wild life includes a portion of the Phulabani Forest Division. Recently under the development of Gharial Scheme 137 yearlings have been released to nature.

Game laws and measures for preservation of wild life

The shooting and hunting of wild animals and birds in the district used to be regulated under the provisions of the Wild Birds and Animals Protection Act, 1912, and the Orissa Government Reserved Forests Rules, 1938. The Orissa Forest Shooting Rules, 1973, framed under the Orissa Forest Act, 1972, apply to all the reserved and protected forests of the State. The various provisions embodied in the above statutes are strictly enforced for the protection of the wild life in the district.

FAUNA

The forests of Khondmals were once very rich in wild animals, so much so that it was rightly called the paradise for the lovers of wild life and the Shikaris. But due to the destruction of forests and adverse biotic factors their number has greatly declined. It is apprehended that at this rate of fall in their number the forests may, in very near future, turn into wild life deserts unless adequate and effective steps are taken to control the situation.

There occur wild elephants and bisons in the deeper forests ; and tigers, leopards, deer and wild pigs in the lighter jungles. The carnivorous animals include tiger, leopard, bear, hyaena, wolf and wild dog besides other smaller species such as fox, jackal, weasel and otter. The ungulate usually met with are Sambar (*Cervus unicolor*), Chital or spotted deer (*Cervus axis*), bison (*Bos gaurus*), Nilgai (*Boselaphus tragocamelus*), barking deer (*Muntiacus muntjak*), mouse deer (*Tragulus meminna*), wild pigs and elephants. Elephants (*Elephas maximus indicus*) abound in the forests. They wander about in herds ranging from 10 to 60 animals, doing incalculable damage to the forests by uprooting young saplings and stripping off the bark of valuable trees. They also cause great loss to the villagers by walking through their paddy crops, and destroying them wholesale. They are a regular scourge to the villagers living within and on the outskirts of the jungle. In some localities, in fact, the cultivators in despair have given up all attempts to sow any crops except in the immediate vicinity of their huts.

In the Khondmals, tigers (*Panthera tigris*) frequented the wilder portion to the west of the subdivision where the villages are far apart and the population sparce; they were seldom heard of in the more thickly peopled areas to the east. Tigers used to destroy cattle grazing in the forest in the former tract. Man-eaters were scarce. The number of tigers in the district is getting diminished. According to the Census held in 1972 there were only 18 tigers in the district, 10 in Baligurha and 8 in Phulabani forest division. With a view to save them from total extinction they are declared protected throughout the year, unless considered dangerous by the competant authority.

The panther or leopard (*Panthera pardus*) is found in considerable number. In the Khondmals they are seen in the vicinity of every village. Goats, sheep and dogs are frequently destroyed by them. Children are often carried away from their houses; and a story is told of a leopard who made a dash at a roll of matting in front of a doorway, mistaking it for a sleeping child. There are several cases on record of leopards having become man-eaters in the Khondmals. A young man was once taken away from a busy market, but old women and children are more frequently attacked. Within the two years ending in 1905, 58 persons and 227 cattle were reported to have been killed in the Khondmals by tigers and 18 persons and 172 cattle by leopards, but many of the deaths ascribed to tigers were probably due to leopards as usually all cases in which pugmarks were not visible were attributed to tigers. Only 19 leopards were destroyed during these two years. They were mostly trapped in wooden cages and then shot. These animals are great climbers. They find no difficulty in ascending 7 to 10 metres up a smooth bark after monkeys and are found putting away the remains of a kill on a high branch for a second meal or for their young ones whom they bring with them on the following night. The number of leopards is gradually declining these days.

The bears (*Melursus ursinus*) are plentiful in all parts of the forests. They come out of the jungle in large numbers when the fig and jack-fruit trees are in fruit and the *Mahua* (*Bassia latifolia*) in flowers. They are all tempted to visit the interior of villages by the paddy husks thrown out of the houses after the winter harvest and do great damage to the villagers' sugarcane and maize. When these crops are ready for harvesting, watchmen sit up the whole night beating empty tins and keeping large fires alive to scare them away.

Hyaenas (*Hyaena hyaena*) are common in the vicinity of villages where they live principally on carrion. The village dogs are frequently carried off by them, and to this reason is ascribed the comparatively small number of *pariahs* or mongrels to be seen in most villages.

Wolves are few; they are of grey species, and usually haunt certain localities. They are very destructive to goats and sheep, but in no instance have they been known to molest human beings.

Wild dog (*Cuon alpinus*) is common in almost all the forests. In the north and west of Khondmals they are usually found in small packs, in which they systematically hunt game; the camparative scantiness of deer, etc., in certain localities, it is believed, is due more to these dogs than to the illicit shooting which was formerly common. When hunting their prey they are quite fearless and have reaptedly been known to follow up and kill *sambar* within a village clearing.

Jackals (*Canis aureus*) and fox (*Vulpes bengalensis*) usually prowl about the villages of which they may be said to be the scavengers. They also take off a number of poultry during the rains when the jungle is high.

Sambars (*Cervus unicolor niger*) are found but cannot be said to be plentiful. It is most difficult to get at them owing to the density of the forests and also because they usually resort to the hill tops from where they can watch the approach of danger. They are extremely destructive to crops and special precautions have to be taken to protect the fields against their inroads by erecting strong bamboo fencing, posting watchmen and burning bonfires. Numbers are killed every year by tigers and wild dogs and not a few fall to the gun of the poacher, who usually shoots them over a water-hole in the summer or salt-lick in the rains.

Chital or spotted deer (*Axis axis*) are plentiful only in certain localities where the forest is open and undergrowth scanty; like *sambar* they do great damage to the winter crops and also to the young paddy.

Bison (*Bos gaurus*) commonly known as *gayal* are found in small herds in the reserved forests in several well wooded localities where there is good pasturage. In rains they are prone to retire to the hills during the day to avoid the flies and come down at night to feed on the young grass. A very retiring animal, it lives in small herds with generally a fine bull in charge.

Nilgai (*Boselaphus tragocamelus*) are scarce and are only to be found on the slopes of hills and in the country round Kumbharkhol in the Khondmals.

Barking deer (*Muntiacus muntjac*) are plentiful everywhere in the hills.

Mouse deer (*Tragulus meminna*) occur in the forests. Larger herds of them formerly found in the Khondmals are not to be seen at present. They are now found only in the south-western corner of the subdivision.

Wild pigs (*Susscrofa cristatus*) swarm in the forest tract and wander about in large herds doing great damage both to the young growth in the forest as well as to the crops in the fields, which they usually invade at night and from which it is well-nigh impossible to drive them once they effect an entry.

Hares (*Lepus nigricollis*) are plentiful and are found chiefly in scrub jungles. They are shot on dark nights during the monsoon when they come out on the dry ridges above the fields. The usual practice is for two men to go out together one carrying a jar on his head with a fire alight in it, which attracts the hares and gives the companion an easy shot.

Porcupines (*Hystrix indica*) are common and are very destructive to young trees, which they girdle with their sharp teeth.

Squirrel, both brown and red, are seen in the forests. The large brown squirrel is seen usually in pairs; it is hunted and eaten with great relish by the aborigines. Squirrels are kept as pets by the Kandhas in whose houses they make a nest under the thatch.

Two species of monkey are met with, the black faced Hanuman (*Presbytes entellus*), and in certain localities close to villages, the ordinary brown species. The former, which is more common, avoids all settlements and villages. It is hunted by a wandering tribe called Sabakhias who consider its flesh a great delicacy.

Among other wild animals met with may be mentioned the jungle cat, pangolines, mongoose, wild buffaloes (*Bubalus bubalis*) Indian badger, civet cat, wild boar, four-horned antelope (*Tetracerus quadricornis*). The four-horned antelope, black-buck (*Antilope cervicapra*) and wild buffaloes are rarely met with. The number of black-buck, Chita or leopard, golden cat, tiger and Indian wolf is steadily dwindling. Other rare species of wild animals declared protected throughout the year are wild buffalo, Indian pangolin, black-buck and four-horned antelope.

Game birds

There are plenty of game birds in the district. In the forests of Khondmals snipe (*Capella gallinago*), quail (*Coturnix coturnix*) and green pigeons (*Treron phoenicoptera*) are common, but larger varieties are scarce, with the exception of pea and jungle fowl. Presumably owing to the absence of large rivers and disused tanks, geese, duck and teal are not found. The common pea-fowl (*Pavo cristatus*) are plentiful, but owing to the account of cover they can find, are difficult to beat out. They were frequently shot under cover of a coloured screen, on which a large peacock is drawn, which the birds presumably mistake for a live one as it flutters in the breeze. Being the national bird of India it is declared protected by law throughout the year. Red jungle fowl (*Gallus gallus*) and red spur fowl (*Galloperdix spadicea*) also occur in the forests. The white-winged wood-duck is gradually vanishing.

Fish

In the Mahanadi, Rohi (*Labeo rohita*), Bhakur (*Catla catla*) and Chital (*Notopterus chitala*) are found, and the Magur (*Clarius batrachus*) and other smaller varieties are reared in tanks. The Rohi and Bhakur are also found in the Bagh, Suna and Salki rivers and other hill streams in Khondmals.

Amphibians and Reptiles

The *Boa constrictor*, cobra, Chiti or krait (*Bungarus caeruleus*) and Russells-viper, whip-snake and ordinary grass snakes are found.

Mortality from Reptiles and Wild Animals

The Gharials (*Gavialis gangeticus*) are rarely found. The crocodiles, being a rare species, are protected under law and a scheme is undertaken for their development.

The wild animals and reptiles claimed fairly a large toll of human lives in the past. But in recent years their incidence has considerably declined. The following table indicates separately the figures of mortality from reptiles and wild animals during the period from 1968 to 1977.

Year	Death due to Snake bite	Death due to attack of wild animals				Total
		Elephant	Tiger/ Leopard	Bear and Wolve	Other wild animals	
1968	4	1	4	3	4	16
1969	5	2	..	1	2	10
1970	7	2	..	1	..	10
1971	7	2	..	3	..	12
1972	6	1	..	3	..	10
1973	5	3	..	4	1	13
1974	4	2	2	2	1	11
1975	7	2	1	2	..	12
1976	7	2	..	1	..	10
1977	3	3	4	..	..	10

Source : Superintendent of Police, Phulabani

Climate

The district lies within the Deccan plateau to the west of the Eastern Ghats. Its climate is therefore largely akin to the Deccan region. But owing to its situation in higher latitude the climate is tempered to a considerable degree. The year may be divided into four seasons. The hot season is from March to May; June to September is the rainy season; October and November constitute the post-monsoon season, and the winter endures from December to February.

Rainfall

Records of rainfall are available for nine stations for a sufficiently long period. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1591·5 mm. It tends to decrease from the north-west to the south-east and the region around Balandaparha gets the highest rainfall. No large variation is recorded in the annual rainfall of the district. During the period from 1901 to 1949 the highest annual rainfall occurred in 1933 which amounted to 147 per cent of the normal. Similarly the lowest rainfall which was 65 per cent of the normal was recorded in 1948. In only three of the above 49 years the annual rainfall was less than 80 per cent of the normal. Table 2 shows that the rainfall in 35 out of 49 years in the district was between 1,300 and 1,800 mm.

On an average there are 77 rainy days (i. e., days with rainfall of 2·5 mm.-10 cents or more) in a year. This number varies from 66 at Boudh to 81 at Khajuriparha.

The heaviest rainfall in 24 hours recorded at any station in the district was 395·0 mm. at Balandaparha on the 15th June, 1936.

Temperature

The only meteorological observatory in the district is at Phulabani which started functioning in February 1959. The account of the climate that follows is mainly based on the records of this observatory supplemented by data for the stations from neighbouring districts. The hot season commences by about the beginning of March when temperatures rise rapidly. The month of May is the hottest month when the mean daily maximum temperature is 39° C. On individual days the maximum temperature may reach 44° C. With the onset of monsoon by about the second week of June, day temperatures drop appreciably and throughout the south-west monsoon season the weather is generally cool. After the withdrawal of the monsoon by the first week of October, both day and night temperatures begin to drop gradually. December is usually the coldest month of the year when the mean daily minimum temperature is 8·7° C. In the cold season short spells of colder weather occur in association with the passage of western disturbances and the minimum temperature drops down to about 3° C. The highest temperature ever recorded at Phulabani is 44·6° C. on the 10th May, 1973 whereas minimum temperature ever recorded is 1·5° C. on the 2nd January 1971.

Humidity

The humidity of the air is generally high especially in the South-west monsoon and post-monsoon months. April is the driest month. Afternoons are comparatively drier and more so from March to May.

Cloudiness

During the South-west monsoon season skies are generally clouded to overcast. In the summer and the post-monsoon months there is moderate cloudiness. In other months skies are generally clear or lightly clouded.

Winds

Winds are generally light to moderate with some increase in force in the South-west monsoon period. Winds are mostly from the directions between south-west and north-west in the monsoon season. In the post-monsoon and cold seasons they are between west and north-east. In the summer months the winds become variable in direction.

Special weather phenomena

The district is affected by storms and depressions in the monsoon season and in October causing stronger winds and widespread heavy rain. Thunderstorms, mostly in the afternoons, occur in the summer months and in October. Rain, during the south-west monsoon season, is also often associated with thunder. Occasionally fog occurs in the cold season.

TABLE 1

Normals and Extremes of Rainfall

Station	No. of years of data		January	February	March	April
(1)	(2)		(3)	(4)	(5)	(6)
Phulabani ..	48	a	16·8	28·2	24·1	30·0
		b	1·1	1·9	1·8	2·4
Balandaparha ..	46	a	16·3	25·1	23·4	24·1
		b	0·9	1·6	1·7	1·7
Khajuriparha ..	22	a	13·5	38·3	31·7	37·6
		b	1·2	2·5	2·0	2·8
Phiringia ..	19	a	9·1	30·0	22·6	27·2
		b	0·9	1·9	1·8	2·6
Boudhgarh ..	46	a	14·5	24·6	17·5	20·1
		b	0·9	1·4	1·5	1·6
G. Udayagiri .	50	a	11·9	23·9	27·4	57·9
		b	1·0	1·7	1·9	3·9
Baligurha ..	49	a	10·9	17·8	16·8	38·6
		b	0·8	1·3	1·4	2·5
Daringbarhi ..	50	a	7·9	18·0	20·6	38·6
		b	0·6	1·5	1·6	3·5
Posara ..	26	a	16·0	42·4	41·4	34·3
		b	1·3	2·3	2·4	2·8
Boudh-Khondmals		a	13·0	27·6	25·1	34·3
District		b	1·0	1·8	1·8	2·6

TABLE 1—*Contd.*

Normals and Extremes of Rainfal

Station	No. of years of data		May	June	July	August
(1)	(2)		(7)	(8)	(9)	(10)
Phulabani ..	48	a	61·7	233·2	390·9	361·7
		b	4·1	10·9	17·4	17·3
Balandaparha ..	46	a	42·7	336·5	595·9	588·0
		b	3·1	11·5	19·7	19·8
Khajuriparha ..	22	a	71·6	227·1	354·3	334·8
		b	4·5	10·9	17·2	17·5
Phiringia ..	19	a	54·1	283·0	439·4	392·9
		b	4·1	10·8	18·6	17·8
Boudhgarh ..	46	a	38·3	229·6	419·6	371·1
		b	2·6	10·0	16·9	16·0
G. Udayagiri ..	50	a	104·7	190·3	273·6	277·6
		b	6·3	9·9	14·9	14·5
Baligurha ..	49	a	54·6	245·4	428·2	402·8
		b	4·1	9·9	19·1	17·6
Daringbarhi ..	50	a	54·6	199·1	286·3	301·5
		b	6·1	10·2	15·5	15·3
Posara ..	26	a	73·4	207·5	328·7	334·0
		b	4·7	9·7	15·0	15·4
Boudh-Khondmals		a	61·7	239·1	390·8	373·8
District		b	4·4	10·4	17·1	16·8

TABLE 1—*Contd.*

Normals and Extremes of Rainfall

Station	No. of years of data		September	October	November	December	Annual
(1)	(2)		(11)	(12)	(13)	(14)	(15)
Phulabani	48	a	229·9	102·4	21·8	6·9	1,507·6
		b	12·7	5·5	1·7	0·6	77·4
Balandaparha	46	a	338·3	118·4	25·7	4·8	2,139·2
		b	13·4	5·5	1·4	0·4	80·7
Khajuriparha	22	a	258·8	142·0	40·4	5·8	1,555·9
		b	13·6	6·9	1·7	0·6	81·4
Phiringia	19	a	262·4	110·2	26·9	5·8	1,663·6
		b	13·1	6·4	1·8	0·4	80·2
Boudhgarh	46	a	213·4	80·5	16·5	3·3	1,449·0
		b	10·0	4·0	1·0	0·3	66·2
G. Udayagiri	50	a	247·9	157·5	45·0	8·6	1,426·3
		b	13·6	7·2	2·6	0·6	78·1
Baligurha	49	a	268·7	99·3	18·3	6·3	1,607·7
		b	13·8	5·5	1·5	0·4	77·9
Daring barhi	50	a	239·3	153·4	40·9	9·1	1,418·4
		b	13·1	7·0	2·2	0·7	77·3
Posara	26	a	284·2	181·4	50·2	11·7	1,605·2
		b	13·5	7·8	2·4	0·8	78·1
Boudh-Khondmals		a	260·3	127·2	31·7	6·9	1,591·5
District		b	13·0	6·2	1·8	0·5	77·4

TABLE 1—*Contd.*

Normals and extremes of Rainfall

Station	No. of years of data		Highest annual rainfall as % of normal and year**	Lowest annual rainfall as % of normal and year**	Heaviest rainfall in 24* hours	
					Amount (mm)	Date
(1)	(2)		(16)	(17)	(18)	(19)
Phulabani	48	a	171	67	323·3	1925
		b	(1933)	(1916)		June 28
Balandaparha	46	a	168	59	395·0	1936
		b	(1936)	(1924)		June 15
Khajuriparha	22	a	160	70	218·4	1943
		b	(1933)	(1930)		July 26
Phiringia	19	a	149	75	254·0	1944
		b	(1933)	(1948)		Aug. 20
Boudhgarh	46	a	155	56	315·0	1934
		b	(1936)	(1948)		Aug.22
G. Udayagiri	50	a	148	60	276·9	1900
		b	(1933)	(1935)		Oct. 7
Baligurha	49	a	141	65	266·7	1910
		b	(1933)	(1931)		July 4
Daringbarhi	50	a	146	61	243·8	1900
		b	(1933)	(1920)		Oct. 6
Posara	26	a	165	65	250·4	1933
		b	(1933)	(1935)		Sept. 14
Boudh-Khondmals		a	147	65		
District		b	(1933)	(1948)		

(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 1970

** Years given in brackets

TABLE 2

Frequency of Annual Rainfall in the District

(Data 1901—1950)*

Range in mm.		No. of years
1001—1100	..	1
1101—1200	..	0
1201—1300	..	4
1301—1400	..	10
1401—1500	..	5
1501—1600	..	6
1601—1700	..	10
1701—1800	..	4
1801—1900	..	4
1901—2000	..	0
2001—2100	..	3
2101—2200	..	1
2201—2300	..	0
2301—2400	..	1

* Based on 49 years data

TABLE 3

Normals of Temperature and Relative Humidity

(Phulbani) Boudh-Khondmals

Month	Mean Daily Maximum Temperature @	Mean Daily Minimum Temperature @	Highest ever	Maximum recorded**	Lowest ever	Minimum recorded**	Relative Humidity @	
							0830	1730*
	°C	°C	°C	Date	°C	Date		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
January ..	26·2	9·3	31·5	8-1-1973	1·5	2-1-1971	79	58
February ..	30·2	11·7	31·0	28-2-1969	3·3	2-2-1967	71	47
March ..	33·9	15·6	40·0	29-3-1971	6·0	5-3-1965	63	37
April ..	36·6	20·7	42·5	14-4-1973	7·7	18-4-1976	54	33
May ..	39·0	23·8	44·6	10-5-1973	12·0	4-5-1976	56	40
June ..	34·1	24·1	43·0	3-6-1972	15·2	14-6-1976	70	61
July ..	29·5	23·1	35·7	6-7-1966	15·2	11-7-1976	82	79
August ..	29·1	22·9	35·5	9-8-1970	14·2	14-8-1974	83	82
September ..	29·9	22·4	34·0	8-9-1974	14·7	27-9-1976	83	80
October ..	29·7	19·1	34·6	10-10-1976	9·2	29-10-1976	82	71
November ..	27·9	13·4	32·7	9-11-1976	2·7	30-11-1970	79	63
December ..	25·9	8·7	30·6	1-12-1963	1·7	31-12-1970	78	59
Annual ..	31·0	17·9	44·6	10-5-1973	1·5	2-1-1971	73	59

* Hours I. S. T.

** Based on all available data upto 1976

@ Normals are updated upto 1970

TABLE 4

Mean Wind Speed in km/hr.

Boudh-Khondmals (Phulabani)

Janu-ary	Febru-ary	March	April	May	June	July	August	Septe-mber	Octo-ber	Nove-mber	Dece-mber	Annual
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1·8	2·6	3·0	3·8	4·2	5·0	5·3	4·9	3·4	2·1	1·7	1·5	3·3