

CHAPTER I.

GENERAL.

INTRODUCTORY.

Origin of the name.—The name Shahabad is probably associated with the Emperor Babar who had pitched his camp in Arrah in 1529 A.D., after his victory over the Afghan rulers of the province. The last District Gazetteer (1924) mentions that in commemoration of this event, the place was called Shahabad, or the city of the Emperor; and this name was applied subsequently to the *Sarkar* within which the town was included.

It is rather peculiar that there should be an inscription on an image at village Masar near Arrah, the area referred to as *Karusha desa* of the *Puranas* while the town of Arrah appears as Aram Nagar. This record is of 1819 A.D. This has particular interest because Buchanan Hamilton who visited the district in 1812-13 has mentioned the name of Shahabad. A more ancient name of the area is not probably forthcoming as Shahabad was included in Magadha and did not have a separate entity. *Sarkar* Shahabad was a later creation in Mughal age.

GENERAL DESCRIPTION.

The district of Shahabad which forms the western portion of the Patna Division, is situated between $24^{\circ}31'$ and $25^{\circ}46'$ north latitude, and between $83^{\circ}19'$ and $84^{\circ}51'$ * east longitude. It contains a total area of 4,392.0† square miles with a population of 32,18,017. The principal civil station, which is also the most populous town in the district is Arrah situated in $25^{\circ}34'$ north latitude and $84^{\circ}40'$ east longitude.

BOUNDARY.

The district is bounded on the north by Ghazipur and Ballia in the Uttar Pradesh and by Saran in Bihar; on the east by the districts of Patna and Gaya; on the south by Palamau; and, on the west by the districts of Mirzapur and Ghazipur in the Uttar Pradesh. On the north the boundary is marked by the Ganga and on the east by the Son, the two rivers uniting in the north-eastern corner of the district. The Karamnasa is the boundary with the Uttar Pradesh on the west, from near its source to its junction with the Ganga near Chausa;

* *District Census Handbook, Shahabad, 1951*, mentions $84^{\circ}15'$ which appears to be misprint.

† *Census of India, 1961, Volume IV, Bihar, Part II-A, General Population Tables*, page 29.

while the Son separates it from Palamau on the south. This district is bounded by rivers almost for the whole length of its perimeter, and only for a small distance of about 39 miles out of its whole perimeter of over 860 miles. Shahabad does not possess a natural barrier.

THE HISTORY OF THE DISTRICT AS AN ADMINISTRATIVE UNIT.

The existing district of Shahabad (except Chausa) formed, in 1685, part of the district of Shahabad and Rohtas. *Sarkar* Shahabad included the northern *Parganas* of the present district with the addition of the three *Parganas* on the west, Ratan, Kotha and Mangror, which were acquired at a later date by Bahwant Singh of Benaras* and annexed to *Sarkar* Chunar. The southern *Parganas* of the district, Chainpur, Sasaram and Rohtas were in *Sarkar* Rohtas which then included also Siris-Kutumba, Japla and Belaunja on the eastern bank of the Son.

In 1784, Rohtas district was separated. The new district of Rohtas included Chainpur and Sasaram *Parganas* while the *Parganas* west of them across the Son up to and including the Tikari *zamindari* were formed into a separate district with headquarters at Gaya. Early in 1787, the Government of Lord Cornwallis decided to divide the country into collectorships of moderate size and proposed that the collections of a single district should not exceed Rs. 5 lakhs. Zilla Rohtas was split up, its eastern portion forming part of the new district of Bihar while the western portion fell into Shahabad district with William Augustus Brooke as the first Collector. Shahabad district was then constituted of the area now included in the Shahabad district, without Chausa and with the addition of the Doaba *Pargana* on the northern bank of the Ganga. The new arrangement came into effect in July, 1787. Chausa *Pargana* became a part of the Shahabad district in 1818. Further details of the history of the district as an administrative unit have been given elsewhere.

The district has always formed a unit of the Patna Division. For administrative purposes the district is divided into four subdivisions, viz., Arrah Sadar, Sasaram, Buxar and Bhabua. There are 11 revenue thanas within the district.

NATURAL DIVISION.

As mentioned in the last *District Gazetteer of Shahabad* (1924) the district has three distinct regions.† The first consists of an extensive low-lying alluvial plain, forming the north of the district and lying between the river Ganga and the embankment of the main line of the Eastern Railway. This extends to the boundaries of the district on the east and west, and has been formed by the recession

* Now known as Varanasi.

† *Shahabad District Gazetteer* (1924), p. 2.

of the Ganga from its ancient course in a straight line from Arrah to Buxar. The low-lying lands lying along the Ganga are frequently flooded. This riparian tract well fertilised by the silt of the receding waters is one of the principal wheat-growing areas of Bihar.

The second region is a large tract that extends south of the railway to the foot of the plateau. This tract comprises an area of about three thousand square miles. This is also a flat country of tertiary and alluvial origin. It is for the most part very fertile, highly cultivated and densely populated. Its soil is generally a very tenacious clay intermixed with coarse sand; but on the east the soil is considerably lighter, and in the south towards the hills mould inter-mixed with ash is met with. This large tract is irrigated by an elaborate system of canals.

The third region is the hilly country, called the Kaimur plateau, which comprises about 800 square miles and extends along the southern boundary of the district in an undulating table-land, which at Rohtasgarh attains the height of 1,490 feet above the sea. Much of this tract is covered with rock and jungle and there is very little of cultivation. The soil yields poor and precarious crops and there is very little of irrigation. The population is very sparse. The boundaries of the hills, though well defined, are very irregular and often indented by the deep gorges scoured out by hill streams. Rising abruptly from the plains, their sides present sheer precipices with masses of debris at their feet; while their summits simulate a table of land broken by scores of saucer-shaped valleys, each a few miles in diameter, with a rich deposit of vegetable mould in the centre, which produces excellent paddy. They are an offshoot of the great Vindhyan range.

The description of this region in the records of the Geological Survey is as follows:—*

"The escarpments are everywhere lofty and bold, and the high lands west of Rohtas have an elevation varying from 1,000 to 1,400 feet. Their surface is uneven, being rocky, and covered with thick forest jungle; amongst the glades feed herds of cattle, which form the chief wealth of the inhabitants. The drainage which here as elsewhere is thrown north by the Vindhyan crest, falls by a series of waterfalls into the long winding gorges, which convey it to the alluvial plains of the Ganges.

"The most prominent features of the Vindhyan area are the numerous escarpments, which stamp it with a geographical character peculiarly its own. The commonest form, where the lower portion of the scarp is shale, and the upper sandstone, exhibits an under-cliff of about 30° inclination, with a vertical precipice

* As quoted in the *District Gazetteer of Shahabad* (1924), page 8.

above, the relative dimensions depending chiefly on the ratio of shale to sandstone. When the latter is absent, the scarp preserves a uniform slope from top to bottom; while the boldest precipices are found where the scarp is entirely sandstone, the undercliff being then made up of a *talus* from above. Along some lines of scarp, outlying hills are very frequent, whose elevation is equal to, or greater than, that of the main scarp, according as the stratification is perfectly horizontal or dips gently from the spur. On such eminences, either wholly or semi-detached, have been constructed the hill forts which once played a prominent part in Indian history.

"The gorges, which receive the rivers after their descent from the plateau, should also be mentioned in a description of the physical aspect of the country. After a clear drop of two to six hundred feet, the water plashes into a deep pool, scooped out by its continual falling, on leaving which it runs through a channel obstructed throughout several miles of its course with huge masses of rock fallen from above. From each side of the stream rise the undercliffs of the escarpment, covered with jungle and tangled debris, and crowned by vertical precipices."

The Kaimur hills were described in the last *District Gazetteer of Shahabad* (1924) that they were "as wild and as remote from the world as ever" although the Grand Chord Line of the Eastern Railway ran a few miles from their northern scarp, and the Dehri-Rohtas Light Railway ran beneath the eastern face. This description is still substantially correct. The approach foot or pony track from Akbarpur to the top of Rohtas has been made less difficult. There is now a fair weather jeepable road from Bhagwanpur, south of Bhabua to Adhaura *via* Karar. Adhaura is now the headquarters of a tribal block. It has got electricity and a number of houses for the block headquarters. The track from Adhaura to Rehal and Rohtas is partially jeepable. Carrier trucks from Mirzapur side can come to Adhaura with difficulty and only in fair weather. The Dehri-Rohtas Light Railway which previously terminated at Akbarpur has been extended up to Pipardih and Nauhatta which is the headquarters of a Block is now easily approachable being on the Dehri-Rohtas Light Railway.

The approach to the plateau is easier now through the *ghats* from Bhagwanpur to Adhaura *via* Karar. There are other tolerable ascents at Sarki near the south-western boundary, at Kariyari Khoh in the deep gorge north of Rohtas, at Ghora Ghat two miles south of Sasaram, and on the extreme west of the district where a *ghat* leads up to Chhanpathar.

Game, both large and small, is abundant, particularly on the western side of the plateau. The opening up of the area in the recent years has been responsible for some supplies being locally available and it will not be correct to agree with the comment in the last *District Gazetteer* (1924) that "no supplies of any kind are locally available". Although a number of wells have been sunk and springs (*chuans*) made more accessible it is difficult to get good water in most of the villages. The excellent grazing facilities still attract hundreds of cattle from a distance. Good *ghee* available in this area is taken by the middle men to the markets at Rehal, Akbarpur and Chenari. Travelling is still difficult in most of the areas on the plateau. Many of the foot-hills are now being exploited for limestone and pyrites.

Much of the recent improvement in communications, etc., in this area is due to the sponsoring of Community Development Projects and the location of the Blocks with Bhagwanpur, Adhaura, Rohtas and Nauhatta as headquarters.

RIVER SYSTEM.

The district of Shahabad occupies the angle formed by the junction of the Son with the Ganga, but neither of these rivers anywhere crosses the boundary. There are several other minor streams which rise among the Kaimur hills and flow north towards the Ganga. The main rivers flowing past or in the district are described below:—

The Ganga.

The Ganga forms the northern boundary of the district, separating it from Ghazipur, Ballia and Saran. The following quotation from the last *District Gazetteer of Shahabad* (1924) is of interest:—*

"It first touches Shahabad near Chausa, where it is joined by the Karamnasa and then flows in a north-easterly direction past Buxar, until it is north of the site occupied fifty years ago by Ballia town whence it curves to the south-east to Sapahi. There it again turns north-east for another great curve cutting into Ballia district, past Nainijor, turning again south-east to Lachmanpur. Hence it runs east by north-east until it leaves the district. Opposite Sinha begins the delta, marked by broad channels on each side, by which its great tributary the Gogra joins it from the north. Another great tributary, the Son, joins it as it leaves the district. Small tributaries which join it during its course by Shahabad district are the Thora, Juri, and Gangi, of which the latter is of some importance as forming the

* *District Gazetteer of Shahabad* (1924), pages 4—6.

outlet by which the Arrah canal joins the river. The description of this part of Bihar by the Chinese pilgrim Hiuen Tsiang, who visited India in the seventh century A.D., shows that the river formerly flowed much farther to the south than at present. The town of Masar, which in Hiuen Tsiang's time was close to the Ganges, is now ten miles away from it; but the high bank of the old bed can still be traced past Buxar, Bhojpur, Belauti, Bihia, Arrah and Koelwar.

"In the Buxar subdivision the banks, which are of hard gravel, are generally steep and abrupt, as the current strikes against them; but lower down, where the stream is deflected against the opposite bank, the slope is gradual. In many places they are composed of a schistose clay, which has an appearance similar to that of sandstone, but crumbles away very readily. The breadth of the stream in the dry season is generally from half to three-quarters of a mile but in the rainy season it is many times wider. The river is then a mighty stream; and wherever it impinges upon the bank on either side, that bank is likely to be cut away. While the main stream impinges upon one side, the stream on the other is comparatively sluggish, and detritus with which the water is heavily loaded is there deposited. The heaviest portion of the detritus is deposited first, so that the formation of these great *diaras* ordinarily begins with the deposit of a bank of sand. The process is repeated in following seasons, with increasing friction from the sandbank already there, and silt is then deposited, forming cultivable land of great value. A rush is made to settle on this as the water subsides, on the principle that possession is nine-tenths of the law; and riots then are apt to occur, amounting to pitched battles between rival villages. The proprietors who claim that the newly-formed land has become part of their estates by accretion, or that it is a reformation *in situ* of land formerly theirs which has been washed away, have opportunities for endless litigation, in which they have freely indulged. A large proportion of the leading cases on the subject of alluvial accretion have been concerned with these *diaras*; the great village of Sheopurdiar has more than its share of them, while others are concerned with the *diaras* of Nainijor, Umarpur and Parsanpa. There has been a steady thrust northwards during the last fifty years in the area immediately north of Dumraon, and the site at 25°44' N., where the town of Ballia formerly stood, is now south of the river in Shahabad. The main stream

of the Ganges forms the boundary between Bihar and the United Provinces; and annually, after the fall of the river at the close of the rainy season, Deputy Collectors from each district go down the river by boat, marking the main stream on their *dhurdhura* map to define the civil and criminal jurisdictions. The revenue jurisdiction remains unchanged until villages are transferred from one province to another by formal notifications, a fact which is apt to produce legal complications, since revenue courts in the United Provinces exercise jurisdiction which in Bihar is vested in civil courts.*

"There is a large traffic on the river; and Chausa is of some importance still in this connection; but the steamers of the Indian Navigation and River Steam Navigation Companies no longer maintain their services beyond Buxar on the Ganges and Barhaj on the Gogra."

Since J. F. W. James wrote the *Shahabad Gazetteer* (1924) there have been some significant changes. The Ganges is now commonly known as the Ganga and the United Provinces is now the State of Uttar Pradesh. The estates referred to in the quotation are now vested in the State but land disputes among the tenants continue. The problem of the limits between the districts of Ballia in Uttar Pradesh and Shahabad has been rather acute in the recent years and the matter has been referred to the arbitration of Shri Chandulal Trivedi at the instance of the India Government.

It has to be mentioned particularly that the Uttar Pradesh Government puts up a bridge of boats connecting Ram Rekha ghat of Buxar town with Sheopur ghat in Ballia district. During the flood season a steamer arranged by the Uttar Pradesh Government plies or there are big boats available. The Indian Navigation and River Steam Navigation Companies have ceased their services since a few years back. The steamers of this company used to go up to Rajmahal in Santal Parganas district and beyond. Occasionally private steamers now ply from one bank to the other or a little distance beyond. The Indo-Gangetic River Board is trying to tackle the problem of the gap by the cessation of the regular steamer services.

The Son.†

The river Son is also frequently mentioned as the Sone. The following description of the river is a quotation from the *District Gazetteer of Shahabad* (1924) with the only change of the name

* The matter has been under close investigation by both Bihar and Uttar Pradesh State Governments and the India Government (P. C. R. C.).

† Also spelt as Sone.

Ganga in place of Ganges and the name Eastern Railway in place of the East Indian Railway:—

"The Son rises, near the sources of the Narbada and Mahanadi, on the elevated plateau of Central India. After a course of 325 miles through a high rocky tract, it enters this district at Kosdera near Jadunathpur, and flowing by the steep slopes and precipices of the Kaimur range, debouches upon the Gangetic valley at Akbarpur. It then runs a straight course of one hundred miles through the plains of South Bihar, and finally joins the sacred river ten miles north of Maner midway between Arrah and Dinapore. During this portion of its course it attains a great width, which generally exceeds two miles, and opposite Tilothu amounts to three miles; and another peculiarity of these lower reaches is the height of the eastern bank, where the strong westerly winds which prevail from January till the breaking of the rains in June heap up the sand from the river bed to a height of twelve or fourteen feet above the level of the country, thus forming a natural embankment for many miles.

"The Son bounds the district for 145 miles on the south and east. It first touches on Shahabad near Kosdera, a place about 140 feet above the sea, and after gradually curving round the Kaimur hills on the west, flows by Akbarpur forty feet lower. Proceeding to the north, it passes Dehri, Hariharganj, Nanaur and Koelwar, where the East Indian Railway crosses it on a fine lattice girder bridge; and finally it falls into the Ganges opposite Dariaganj in Saran. Opposite Hankarpur it is joined by the river Koel from Palamau, and at Dehri it is crossed by the massive masonry dam which supplies a head for the Son Canals, and by the great bridge over which runs the Grand Chord line of the Indian Railway. The most noticeable features of this portion of its course are its meagre stream of water at ordinary times as compared with the enormous breadth of the river bed, its vast size and its paroxysmal violence at periods of flood. Seen in the dry season, about April or May, the bed presents a wide stretch of drifting sand with an insignificant stream of water, barely a hundred yards wide, meandering from bank to bank, and fordable in most places. But in the rainy season, especially just after a storm has burst on the plateau of Central India, the river presents an extraordinary contrast. It drains a hill area of 21,300 square miles, a tract about four times as extensive as the

district of Shahabad; the entire rainfall of this enormous catchment basin has to find an outlet by this channel and after heavy rain the river rises with incredible rapidity. The channel frequently proves unable to carry off the total flood discharge, amounting to 8,30,000 cubic feet per second, and the flood waters rush down so violently as to spill over its broad bed and cause disastrous inundations in the low-lying plains of Shahabad. These heavy floods are, however, of short duration, hardly ever lasting more than four days, after which the river rapidly sinks to its usual level.

"The Son receives no tributaries of any importance from the point where it enters the district up to Dehri, where its waters are distributed east to the Gaya and Patna districts and west to Shahabad through the great irrigation system of the Son Canals; and between Dehri and its junction with the Ganges the drainage sets away from it, so that no stream can join it north of that place. Old beds are numerous, but they are principally found on the eastern bank in the districts of Gaya and Patna. One such bed, however, runs in this district from Telkap; it is very obscurely marked, but apparently rejoins the present channel at the depression near Amiawar, a short distance south of Nasriganj. In the later years of the nineteenth century the Son shifted its course a little, and several villages, three miles north of Koelwar, were swept away, while accretions formed on the opposite bank.

"The bed of the Son consists almost entirely of sand; but in a few parts clay is found and cultivated. Nodular limestone is obtained in several places; and the trial wells sunk during the construction of the Koelwar bridge disclosed a thick stratum of that substance below the sand. Below the junction of the Koel a species of small pebbles or agates is found, many of which are ornamental, and take a good polish; most of them consist of silica, both opaque and diaphanous, of a reddish or dark green tinge. In the *Ain-i-Akbari* the Son is said to have the power of petrifying substances thrown into it and to contain many *saligran* stones.

"During the dry season there are many fords, but ferry boats generally ply for eight months in the year. The fall of the river bed below Akbarpur varies only from 1.75 to 2.80 feet a mile, but at several places above Dehri rocks and rapids effectually stop river traffic. In its lower reaches also navigation is intermittent and of little

commercial importance. In the rainy season country boats of large tonnage occasionally proceed for a short distance upstream under favourable circumstances of wind and flood; but navigation is rendered dangerous by the extraordinary violence of the floods, and during the rest of the year is impossible for any but small boats owing to the small depth of water. The principal traffic is in bamboos and timber. The former are floated down, bound into rafts consisting of ten thousand or more lashed together—a tedious process in the dry weather, as they are constantly grounding, and the many windings of the stream render their progress extremely slow.

- “The Son possesses historical interest as being identical with the Erannoboas, which is mentioned by Megasthenes as the third river in all India and inferior to none but the Indus and Ganges. Erannoboas is evidently a Hellenised form of the Sanskrit *Hiranyabahu* or golden-armed, a name formerly given to the river and apparently derived from the ruddy-coloured sand it brings down in flood. It formerly flowed far to the east and joined the Ganges near Fatuha in Patna district; and the ancient town of Pataliputra (corresponding to the modern Patna) was situated at its confluence with the Ganges. It has gradually receded further westwards and made fresh channels for itself. Old river beds have been found between Bankipore and Dinapore, and Mr. Twining, who was Collector of Shahabad in 1801–1804, mentions that in his time the river broke through the eastern bank in high flood, and flowing along what was recognised as its old channel, inundated the cantonment of Dinapore. In the *Ain-i-Akbari* it is said to have joined the Ganges at Maner, and in Rennell's *Bengal Atlas of 1772* the junction is marked at the same place. In Buchanan's time, however (1812), the Son flowed into the Ganges three miles about Maner, and it now joins that river about ten miles higher up.”*

The river Son although runs dry for months is of greater economic utility to the district than the other rivers because of the Son canals. The anicut at Dehri and the canals with its headworks at Dehri are going to be reoriented. The Son Barrage scheme is already taken into hand and a description has been given in the text on Irrigation.

* *District Gazetteer of Shahabad* (1924), pages 6–9.

The Son river is still unbridged and a mighty bridge will also be soon an accomplished fact. This will be of very great advantage to the motorists and the goods traffic transplanted by carrier trucks. Son river has a Railway-cum-Road bridge at Koilwar at present.

The Son bed at Dehri has a large turnover of business in timber and bamboos and a much smaller turnover of similar business at Koilwar.

The Karamnasa.

The Karamnasa rises on the eastern ridge of the plateau in the Kaimur hills, whence it flows in a north-westerly direction into what was Benares State before in Uttar Pradesh. Near Darihara it becomes the boundary line with Mirzapur district (Uttar Pradesh) which it enters near Kuluha. For about 15 miles it flows through Mirzapur and then enters Shahabad forming the boundary of the district till it falls into the Ganga river near Chausa having been joined by Durgauti river.

As mentioned in the last Gazetteer (1924) the Karamnasa descends from the plateau at the Chhanpathar by a fall of three hundred feet of which the lower portion, one hundred feet high, is perpendicular. This is a very fine waterfall in Shahabad district; but the velocity and volume of water has been much lessened by the diversion of much of the water for irrigation purposes while the river is in Uttar Pradesh. It flows out to the plains through a precipitous gorge, spreading out to a considerable width in the level country, cutting a deep bed through a deep clay, very retentive of moisture. The river runs almost dry after February but boats ply on it during the rainy season.

It is a legendary river. The last *District Gazetteer* (1924) mentions :

"This river is held by Hindus in the utmost abhorrence and is regarded by them as an accursed stream. In the *Tuzak-i-Babari* (1590 A.D.) we are informed that when Babar came to the river in his expedition against Bihar, the pious Hindus refused to pass it, and, in order to avoid its unholy waters, embarked in a boat and crossed by the Ganges. Its impurity is connected with the following legends:—Raja Trisanku, of the Solar line, married the step mother of a Brahman whom he had murdered and was purified from his sin only by bathing in water collected by a saint from all the streams in the world; this water, still polluted by his crime, now flows from the spring in which the Karamnasa rises. Another local legend accounts for

- the abhorrence of this river in a somewhat different manner. It relates how Raja Trisanku, being anxious to ascend to heaven in his human form, went to Vasistha, his guru or spiritual guide, and asked him to perform some religious rite by which his wish might be fulfilled. Vasistha replied that he was forbidden by the Sastras to offer such an indignity to the gods. Raja Trisanku went with the same request to Vasistha's sons, but they likewise rejected it, and, learning that he had not taken their father's refusal as final, cursed him and reduced him to the impure condition of a Chandala. In this degraded state, however, he succeeded in gaining the pity and favour of another holy man, Vishwamitra Rishi, who listened to his petition and despatched him to heaven. The gods, incensed at his insolence and impurity, cast him head foremost down again, but as he fell he cried out for help and was stopped by Vishwamitra in mid-air. Thereupon some saliva dropped from his mouth on the earth and formed the source of the Karamnasa. Several other similar legends are current, but the probable explanation of the uncleanness of this stream in Hindu eyes is that it long formed the boundary between the orthodox region of Brahmanism, whose centre was at Benares, and the heretic country of Magadha, the home of Buddhism for many centuries. There is nothing in the composition of the water itself to account for its unholiness, but no high-caste Hindu, except those who live on its banks, will even now-a-days drink or touch it. By the latter it is used freely and without a scruple for all purposes; and they have invented a simple explanation of their disregard of the ancient prejudice of their co-religionists. The word Karamnasa is derived from the Sanskrit *Karma* (an action) and the root *nas* (to destroy), the whole word signifying the annihilation of all good deeds; but the *pandits* of its riparian villages declare that its true name was Kukarmanasa (*Ku* meaning evil) and that its stream is purifying and destructive of bad deeds. At the present time, even the strictest Hindus do not consider any ceremony of purification necessary after touching the Karamnasa because the idea is that it does not in itself defile but only washes away all previous righteousness."*

Karamnasa will probably be soon utilised for a major irrigation project. The scheme is reported to be under investigation (1964).

* *District Gazetteer of Shahabad* (1924), pages 9-10.

The Kao.

The description of this river in the last *District Gazetteer* stands good and is quoted below:—

"The Kao or Dhoba rises on the plateau six miles south-west of Tilothu, and, after flowing through a glen in a northerly direction, forms a fine waterfall, and enters the plains at the Tarachandi pass, two miles south-east of Sasaram. At this place it bifurcates; one branch, the Kudra, turns to the west and ultimately joins the Karamnasa, while the other, which preserves the name Kao, flows to the north, and finally falls into the Ganges, near Gaighat. There is very little water in its bed during the cold and hot seasons but in the rains it is subject to floods of the most violent character. At Bichia it is crossed by the Main Western Canal, underneath which it is conveyed by means of a syphon of twenty-five arches, which has a waterway of nine hundred square feet and is a cause of much anxiety during freshets. In the hilly portion of its course the bed is rocky and full of enormous boulders washed down during heavy rains. The banks are generally high and firm, but in the plains are less elevated. The river, which is nowhere navigable, except at flood-time as far as the railway line, is the principal drainage channel of the southern and central parts of the district."*

The waters are now in good use for irrigation purpose. The Kao irrigation project has already been completed. It has cost 2.86 lakhs of rupees.

The Kudra.

The description of the Kudra river and the legend associated with it in the last *District Gazetteer of Shahabad* are quoted below:—

"The Kudra, as already explained, is a branch of the Kao, and carry off the overflow of that river when it rises in flood. After leaving the Tarachandi pass near Sasaram, it is swollen by a number of small streams, and, flowing in a north-easterly direction, crosses the Grand Trunk Road at Khurmabad, and falls into the Durgauti at Tendwa after a course of fifty miles. In the dry season it contains very little water; but during the rains a large stream passes down it. The bed is rocky and full of enormous boulders until the river has fairly debouched into the plains, after which it

* *District Gazetteer of Shahabad* (1924), page 11.

varies according to the character of the soil through which it passes. According to local tradition, the origin of the Kudra is as follows:—A powerful Brahman zamindar, who owned large estates near Kargahar, came down with a large following to the Tarachandi pass, and, after defeating the local levies, proceeded to excavate a new channel from the Kao river to his own domains. This channel was called the Kudra because it was excavated with *Kudaris*, and it is noticeable that an old bed of the Kudra is still to be seen passing northwards towards Kargahar. Legends of this great battle still linger among the people, who say that such a vast number of Brahmans were slain that over a maund of sacred thread was collected from their dead bodies.”*

The river is now utilised for irrigation purposes.

The Durgauti.

The last *District Gazetteer of Shahabad* (1924) mentions as follows:—

“The Durgauti rises in the village of Bhakma, on the southern ridge of the Kaimur plateau, a few miles north of the Karamnasa. For about nine miles it pursues a northerly course, being joined by some unimportant hill streams, after which it rushes over a precipice three hundred feet high into the deep glen of Kadhar Khoh, where other hill torrents help to swell its volume. After passing by the stalactite caves of Gupteswar and the hill fortress of Shergarh, it enters the plains at Karamchat and makes for Jahanabad, eight miles north, on the Grand Trunk Road. Here it runs to the north-west, running parallel to the road for twenty-two miles, until it crosses it near Sawath, where it bends towards the north-east and falls into the Karamnasa, after receiving the Kudra from the east. The Durgauti drains an area on the plateau of about two hundred square miles. In the upper part of its course it has a rocky channel, with a clear and rapid stream not more than thirty feet wide; but, after it enters the plains, it is wider, and at Jahanabad it attains a breadth varying from thirty to forty yards. The river-bed in the plains is sandy, mixed here and there with nodular limestone, which is largely quarried and used in repairing the Grand Trunk Road. It contains water all the

* *District Gazetteer of Shahabad* (1924), page 11.

year round; and during the rains boats of forty maunds' burthen can navigate it fifty or sixty miles from its mouth."*

There is now a very fine road bridge on Durgauti river. This river has been responsible for some severe floods in the recent past. Durgauti river waters are also used largely for irrigation purposes. The Durgauti irrigation project has already been completed and the estimated cost is Rs. 32.16 lakhs of rupees.

The Shuara.

As mentioned in the *District Gazetteer* (1924):

"The principal tributaries of the Durgauti are the Shuara, Kora, Gonhua and Kudra.

"The Shuara rises near the village of Dahar, on the plateau, and falls into the Lal Kakand or Red Pool, at Makri Khoh. As it proceeds it receives a number of affluents, the principal of which are the streams of the Kandan Khoh and Jawar Khoh. It debouches on the plains six miles south of the town of Bhabhua, which it leaves about a mile on the east, finally falling into the Durgauti after a course of about twenty-five miles. Its bed is pebbly in the hills and sandy in the plains, and nodular limestone is largely quarried from it. In the rains, boats of a hundred maunds' burthen can ply up to the foot of the hills."*

The Shuara waters have been tapped by an irrigation scheme with an estimated cost of 15.50 lacs of rupees. The project has been completed.

LAKES, TANKS AND SPRINGS.

There are no natural lakes in this district. A number of tanks are scattered throughout the district. Many of them have now got filled up and are under reclamation. Some natural* depressions which used to store water and attract birds like the one near Dumraon are under cultivation. In the hilly regions there are some springs which serve a great purpose in an area where water resources are scarce. The water of some of the springs get into natural reservoirs and some of them are in beauty spots and have been noticed elsewhere.

GEOLOGY.

The report on Geology in the last *District Gazetteer* remains basically correct and is quoted below. There is a separate treatment under the sub-section of "Economic Geology and Mineral Resources" giving the picture now of the exploitation of the resources particularly and there will be slight repetitions.

* *District Gazetteer of Shahabad* (1924), page 12.

The last Gazetteer mentions:—*

"Throughout the greater part of the district the rocks are hidden by the alluvium of the Ganges, and, except for some small hillocks about ten miles north of Sasaram, there are no rocks exposed north of 25° north latitude. The portion of the district situated south of that parallel, including the southern portion of the Sasaram and Bhabhua subdivisions, is mostly a plateau bounded by steep scarps. This plateau is the easternmost termination of one of the most pronounced geographical and geological features of India, the vast area constituting the Vindhyan table-land. Of the numerous stratigraphical subdivisions constituting the great Vindhyan system, only three are conspicuous in this district. They are, by order of superposition, the

- Kaimur sandstone, the Bijaigarh shales, and the Rohtas limestone.

"The uppermost of these subdivisions, the Kaimur sandstone, occupies the greatest superficies. It covers the greater portion of the table-land, and along its southern and south-western borders forms the upper portion of the precipitous escarpments that overlook the Son, while along its northern edge it constitutes the whole height of the cliffs down to their base where they meet the Ganges alluvium. The Kaimur sandstone constitutes an excellent building material, and has been largely quarried at Karaundia and Dhaudhanr near Sasaram, whence it has been conveyed to Dehri to be utilised in the works connected with the Son Canals. There are also quarries of a very evenly-bedded rock at Pateswar, a detached hill close to the northern escarpment of the table-land, 8 miles west of Chainpur.

"The Bijaigarh shales and Rohtas limestone form the under-cliff facing the Son along the southern and south-eastern edges of the Kaimur outcrop, and are also seen, further north, in the deep river gorges like those of the Durgauti, where they cut through the anticlinal axes of the shallow corrugations which, striking a little north of east, help to diversify the surface of this eastern termination of the great Kaimur plateau. The Rohtas limestone, whose aggregate thickness is about five feet, is a very fine-grained, evenly-bedded rock, largely burnt for lime; and some of the beds can be used as lithographic stone. It is in this limestone that the sacred Gupteswar caves of the Durgauti valley

* *District Gazetteer of Shahabad* (1924) pages 12—14.

are found. The Bijaigarh shales, about 150 feet thick, are intensely brittle and splintery, and are frequently so black in colour as to be easily mistaken for coal. They are often impregnated with iron pyrites and have been used to a small extent to manufacture sulphate of iron. In the Durgauti valley and other northern inliers, as also south-east of Khadar, the Bijaigarh shales rest directly upon the Rohtas limestone, but along the southern scarp there intervene a subsidiary sandstone and shale known as the Lower Kaimur sandstone and Rohtas shale. Sometimes an additional thin band of limestone is intercalated between the Rohtas shale and Lower Kaimur sandstone.

"South-west of Rohtasgarh, in the low ground intervening between the foot of the scarp and the bank of the Son, some of the Vindhyan subdivisions underlying the Rohtas limestone are seen for a short distance. The most interesting are some ancient volcanic beds remarkable for their porcellanic texture. The isolated low hills north of Sasaram consist of a very coarse quartzose and felspathic sandstone, containing abundant rounded pebbles of a red felspathic rock and quartz. Being surrounded on all sides by alluvium, their relations to the other rocks cannot be clearly made out; they may be the basement beds of the Vindhyan formation, or else connected with the Kaimur sandstone."*

ECONOMIC GEOLOGY AND MINERAL RESOURCES.

Bihar is the richest province in India as far as occurrences of diverse minerals and their monetary value are concerned. Shahabad district holds the same position in the case of limestone in the Province and the new find of extensive Iron Pyrite. The geology of the district is very simple. We get, besides the alluvium of Gangetic plain and Sone Valley, rocks of Vindhyan age, confined to a smaller area in the extreme south-western portion of the district, between Sasaram and Sone river, forming the eastern end of the Kaimur plateau. These Vindhyan rocks consist of sandstone, quartzites, limestones, dolomitic limestones and shales. The rocks are generally horizontal, except for some folding affecting limestones

* The account of the geology of the district has been contributed by Mr. E. Vredenburg, Superintendent, Geological Survey of India. Further details will be found in "The Vindhyan Series" by F. R. Mallet (Memoirs of the Geological Survey of India, Vol. VII, part I) and "The Volcanic Rocks of the Lower Vindhyan Series, by Mr. E. Vredenburg (Memoirs, Vol. XXXI, Part I).

and crop out as precipitous scarps around the edge of Kaimur plateau. The following is the sequence of the Vindhyan rocks of the district with average thicknesses:—

Kaimur series—Upper Kaimur Sandstones 600 feet, top not seen; Bijaigarh Shales and quartzites 200 feet; Lower Kaimur sandstones 150 feet.

Semri series—Rohtas Limestone 500 feet. Base observed Kheinjua stage—Thickness not known. Porcellanic stage?

There is a relation between mineral deposits of an area with its geology and as such the Vindhyan system of the district is expected to contain the following minerals of economic importance, viz., Limestone, Sandstone, Shale, Glass-sand and Iron Pyrite. Minerals of lesser importance are Dolomite, mineral pigments, Ammonium Sulphate, Saltpetre and Sodium salts.

An outline of the occurrences of different minerals is given below:—

(1) *Abrasives*.—There are no other abrasives available in the district except some friable sandstones of Vindhyan age along the Son valley, west of Dehri-on-Sone and south of latitude $24^{\circ}50'$ which could be easily crushed and used for cutting, polishing and varnishing.

Sandstones of fine grain, even texture for use as Grindstones, sharpening hones and mill stones may be obtained from Vindhyan sandstones of the district.

Quartzites of fine grained texture are also available for use as millstones and sharpening hones in the Vindhya.

Porcelain which is an extremely fine-grained siliceous rock is ideal for use as hones as sharpening stone. So far no detailed search has been made for above type of useful stone in the district.

(2) *Alkali Salts*.—The Alkali salts include Potassium Nitrate and Saltpetre, Sodium carbonate and Sodium Sulphate. Only a small quantity of saltpetre is produced in Shahabad district.

(3) *Building Materials*.—Shahabad district is fortunate in having varieties of building materials, viz., alluvial clays, sands, gravel, sandstone, quartzites and limestones for lime and cement manufacture—

(a) *Building clays*.—These are alluvial deposits widely distributed in the district utilised for manufacture of bricks and tiles.

- (b) *Building stones*.—Excellent fine-grained sandstones are available in the Vindhyan rocks of the Kaimur hills in the district. These provide the best building stones in the province. They occur in massive beds permitting extraction of large blocks. Their colour is generally pale red to grey, some are banded or mottled. These sandstones have been extensively used in the buildings of Rohtas Fort and other buildings in Sasaram. There is little use made these days from the small quarries at Karwandia, Tarachandi and Barhai-bagh. This building stone industry has diminished largely due to present day trend for stream-lined R. C. C. structures.

The sand used for the construction of buildings is obtained from the different rivers flowing through the district. The two most important sand-ghats in the district are at Koilwar and at Kudra.

(4) *Limestones*.—This is one of the most useful raw materials and mainly used for manufacture of lime and cement. The earliest quarrying for limestone was done in the year 1847 in Vindhyan limestones near Rohtasgarh. Since those days lime burning industry has greatly increased in the district. Main centres for lime are Banjari and Dehri-on-Sone where a number of lime-kilns exist and meet the demand of the province and to some extent of West Bengal. Besides there are number of factories producing Portland Cement at Dalmianagar, Kalayanpur and Japla (in Palamau district using Shahabad limestone).

All the above required limestone comes from the Rohtas stage of lower Vindhya of the district. These limestones crop out along the left bank of the Sone river in the lower slopes of the Kaimur scarp and the length of the outcrop is about 45 miles, neglecting the embankments in the scarp. The full sequence of the limestone is not exposed but good exposures are seen in Chotia Pahar in Pipardih Mahal where a thickness of about 700' is exposed. This area is in the basal portion and exposes a thick bedded limestone of good quality having a thickness of about 60' and is topped by 10' of nodular limestone. Above this there is about 180' of thin bedded shales and then a 30' thick limestone. This 30' limestone extends eastwards and is seen at the base of the hill slopes at Chunhatta (24°36' : 83°52'), Baulia (24°36' : 83°55'), Banjari (24°41' : 83°59') and Murli Hills. On account of gentle northward dip of the Vindhyan rocks, the Rohtas limestone becomes progressively overlapped and drowned by Alluvium. Limestone of top portion of Rohtas stage also occurs in patches at Dumarkhar and Kauriari. On account of variable dips and the disturbance of true

dips by surface creep, it is not easy to determine the depth range at which the best limestones for the manufacture of cement occur below the lower Kaimur sandstone.

For cement manufacture there are large reserves of limestone available in Chunhatta quarries. The reserves of limestone in Murli Hills and Kauriari are very limited and fast depleting. But there are large reserves of good limestone in the localities named Dabua-Jatahara, Chetia Pahar and Gatiahi and sufficient to meet all the requirements of cement industry of the district. Effort should be made to develop new limestone finds in Pipardih Mahal and the vicinity. This is now being done.

(5) *Mineral Pigments*.—Natural mineral pigments expected to occur in the district are (i) Red ochre consisting of a clay base with red ferric oxide and (ii) Red oxide which is soft ferric oxide with little or no clay base.

In the district some ochre is reported to occur on the Kaimur plateau at Madda ($24^{\circ}38' : 83^{\circ}30'$) and Chathans ($24^{\circ}38' : 83^{\circ}40'$). Such deposits require further investigation.

(6) *Refractory minerals*.—The only refractory mineral reported in the district is dolomite. True dolomite should contain equal molecular proportion of 45.65% $Mg CO_3$ and 54.35% $Ca CO_3$ but usually the proportion of $Ca CO_3$ is greater. In the Rohtas stage of Shahabad district a hard dolomitic limestone is reported to occur near Banjari and also at Kauriari. The thickness of this dolomitic bank is about 3' and it contains about 35% $Mg CO_3$ and can be used as a refractory material in the form of bricks or as a plaster in basic open-hearth furnaces and in Bessemer converters. These dolomitic occurrences require investigation for their available reserves and their utilisation as refractory.

(7) *Glass-making materials*.—The principal constituents used in the manufacture of glass are (i) Silica, (ii) Soda Ash or Salt Cake, (iii) Limestone, (iv) Borax, (v) Manganese dioxide and other decolorizers and colouring agents.

Silica which is the main constituent should be free from other impurities specially iron oxide which should not exceed 0.02% for colourless glass. Sand grains also should average 0.4 mm in diameter.

Some of the Vindhyan sandstones are a possible source of glass sand. The top stage of the upper Kaimur sandstones has some white quartzites, which form the top of Kaimur plateau in Shahabad district. It is also considered that part of the Lower Kaimur sandstone along the Sone valley west of Dehri-on-Sone and south of

latitude $24^{\circ}50'$ is also a potential glass sand rock. This sandstone, over quite a wide area, is white in colour and has been extensively desilicated, thus rendering it friable so that it is easily crushed. The rock is even grained and occurs just above the Rohtas limestone. These require proper investigation in order to ascertain its suitability for glass-making. If good extensive suitable sandstones are located, there should be a good scope for starting glass industry in the district.

(8) *Sulphur*.—Sulphur occurs in the district in the form of Iron Pyrites. Much work has been done by the Geological Survey of India and the deposits have offered hopes of commercial success.

Iron Pyrite occurs in black carbonaceous Bijaigarh shales of Kaimur series, within about 30 feet from the base of upper Kaimur sandstones. These shales occur half way up the scarp slopes of the Kaimur plateau on the left bank of Son river east of longitude $84^{\circ}0'$ and south of latitude $24^{\circ}50'$. Usually pyrite occurs as small scattered crystals but at places the concentration is heavier.

The best seam of Pyrite occurs by a tributary of the Amjhor, three miles from Banjari at the position $24^{\circ}43' 15'' : 83^{\circ}58' 45''$. The thickness here is about 2 feet 6 inches and it occurs about 20 feet below the top of the black shales and has been exposed for 120 feet along the outcrop and about 115 feet into the hill. A gallery driven here up to a distance of 400 feet has passed through pyrite band. The seam is practically horizontal with perhaps a slight inclination to west. The Sulphur content is about 35%.

Besides the above pyrite band is also seen at Kasisya Khoh ($24^{\circ}41' : 83^{\circ}53'$) about 8 miles from Rohtas Railway station having thickness of 2 feet. Another exposure is seen at Yogyaman Khoh but the thickness here is only 4 to 6 inches. The third outcrop is in Barushals about 2 feet thick. There are further traces in far removed localities, namely Mahadeo Khoh. Indications of the Pyrites are given by a porous red cindery exudation product or a dense growth of white feathery crystals of ferrous sulphate. Such indications are usually to be found near nalas and below waterfalls at the foot of the Kaimur scarp.

There are good reasons to believe that the Iron pyrite occurs extensively in the Shahabad district and it is desirable that the pyrite occurrences are properly prospected and opened up to ascertain if there are sufficient reserves for starting and maintaining an industry for the manufacture of sulphuric acid. This work has now been taken up with Amjhor as the centre.

The annual income from mines and minerals in the district of Shahabad is to the tune of rupees ten lakhs, and about eighty per cent of this amount comes from the limestone quarries.

LIST OF SOME IMPORTANT QUARRIES AND MINES EXISTING IN DISTRICT-SHAHABAD.*

Government Khas Mahal Zamindari.

Name of quarries.	Area in acres.	Name of the lessee.
1. Bhangia Gurisoti Quarry.	64.08	M/s. Sone Valley Portland Coy., Limited.
2. Rohtas Fort Block II (Kamal Khairwa).	65.00	Ditto.
3. Rohtas Fort Block I	139.94	Ditto.
4. Lower Bharuhi	127.67	Mr. J. K. Patel.
5. Upper* Bharuhi	37.00	M/s. New Limestone Comp.
TOTAL	433.69	

In Banskatti Mahal.

1. Banjari Quarry	31.04	M/s. Dehri Lime Company.
2. Bajidpur Quarry	30.12	B. Sukhram Singh.
3. Kalyanpore Quarry	101.12	M/s. Kalyanpur Lime and Cement Work, Ltd.
4. Banjari Quarry	47.59	Ditto.
5. Labura Quarry	76.93	Ditto.
6. Kasiawan Quarry	39.48	B. Sukhram Singh.
7. Basarhi Quarry	14.50	Mr. Mohamed Ali.
8. Kauriari	500.00	M/s. Dalmia Jain & Co., Ltd.
TOTAL	840.78	

In Banskatti Mahal worked by the State, i.e., landlords.

1. Upper Murli Hill Quarries.	137.0	By the State through the Agent.
2. Lower Murli Hill Quarries.	82.76	Ditto.
TOTAL	219.76	

* Supplied by the office of the District Magistrate. There is no Khas Mahal now. The list came sometime back and there may have been changes in the names of the lessees (P. O. B. C.).

IN ESTATES VESTED INTO GOVERNMENT UNDER L. R. ACT.

(a) *Sonepura Estate.*

Name of quarries.	Area in	Name of the lessee.
(i) Fajdhar Quarry	75.00 acres	M/s. Rohtas Quarries, Ltd.
(ii)* Bharwa villages, etc.	4 sq. miles	M/s. Dalmia Jain & Co., Ltd.
(iii) Ulli Banahi etc.	4 sq. miles	Ditto.
(iv) Chunhatta Quarries.	663.00 acres	M/s. Sone Valley Portland Cement Co., Ltd.
(v) Mahadeo Khoh Quarries.	75.08 acres	Ditto.
(vi) New area	5,306.00 acres	Ditto.
(vii) Mahiaon	..	Sri B. K. Dutta.
TOTAL		8 sq. miles and 6,119.08 acres.

(b) *Dumraon Estate.*

(i) Dumarkhar Quarries.	19 sq. miles.	M/s. Rohtas Industries, Ltd.
TOTAL		19 sq. miles.

In private estates.

1. Dumarkhar Quarries.	1½ sq. miles	M/s. Rohtas Industries, Ltd.
2. Rampur Quarries	500 acres	M/s. R. P. Sinha & Sons Co., Ltd.
TOTAL		1½ sq. miles and 500 acres.

In private estates worked by landlord himself.

1. Kuchwar Quarries.	118.06 acres limestone.
2. Amjhor mines	2.26 acres iron pyrites.

* No landlords now (P. C. R. C.).

BOTANY.

The *District Gazetteer of Shahabad* (1924) mentions:—

"The alluvial and highly-cultivated country which forms the greater portion of the district presents in its botanical features a great contrast to the wild hilly tracts to the South. In the former sugarcane, wheat, rice and a great variety of other food-crops are extensively grown; the area under cultivation is bare or dotted over with clumps of bamboos and mango orchards; while the villages are frequently surrounded by groves of palmyra (*borassus flabelliformis*) and date-palm (*phoenix sylvestris*). Numerous more isolated examples of *tamarindus*, *odina*, *sapindus* and *moringa* also occur, associated with which one frequently finds in village shrubberies, *glycosmis*, *clerodendron*, *solanum*, *jatropha*, *trema*, *streblus* and similar semi-spontaneous and more or less useful species. In the rice fields which cover the low-lying lands near the Ganges, the usual weeds of such localities are found, such as *ammannia*, *utricularia*, *hygrophila* and *sesbania*. Further from the river a dry scrub jungle is sometimes met with, of which the principal species are euphorbiaceous shrubs, *butea* and other leguminous trees, and various examples of *ficus*, *schleichera*, *wendlandia* and *gmelina*. The grasses clothing the drier parts are generally of a coarse character, such as *andropogon contortus*, *aciculatus annulatus*, *foveolatus* and *pertusus*, *aristida adscensionis*, *tragus racemosus* *iseilema laxum*, various *anthætriea*, and *sabai* grass (*ischoemum angustifolium*). Throughout the alluvial country which stretches to the foot of the hills the *pipal* (*ficus religiosa*) and banyan (*ficus indica*) are common: the other principal trees growing in this area are the *bel* (*aegle marmelos*), *nim* (*melia azadirachta*), *sisir* (*mimosa sirissa*), and jack fruit tree (*artocarpus integrifolia*).

"In the Kaimur hills, which with their outlying spurs occupy the southern portion of the district, a different class of vegetation exists. Though now to a great extent denuded of their best timber, they are still largely covered with forest growth, while their slopes are densely clothed with jungle. On the plateau there is long grass, chiefly spear-grass, *kus* (*poa cymosuroides*), the *khaskhas* (*andropogon muricatus*), trees of *diospyros* and *terminalia*, and here and there the *Boswellia*; in places the curious white-barked *sterculia fatida* spreads over the precipitous cliffs which form

its outer face; and vast stretches of bamboo cover the debris at its base. The forest consists for the most part of a mixed growth of stunted trees of no great height or girth, and though there are patches of *sal* (*shorea robusta*), the timber is poor and scarcely worth exporting. Among other important trees found in this area may be mentioned the *amaltas* (*cassia fistula*), the red cotton tree (*bombax malabaricum*), the *hara* (*terminalia chebula*), the astringent fruit of which forms the Indian or black myrobalan, and the *tend* (*diospyros melanoxylon*) yielding the abony of local commerce. The plateau is also rich in various jungle products from many of which the aboriginal inhabitants obtain a livelihood; from the *khair* (*acacia catechu*) cutch is prepared; lac is obtained from the *palas* (*butea frondosa*); *tasar* silkworms feed on the *asan* tree (*terminalia tomentosa*); the long coarse *sabai* grass is made into a strong twine; and the *kus* grass produces a fragrant oil. Perhaps, however, the most useful of all the trees which clothe the hills and the undulating slopes at their base is the *mahua* (*bassia latifolia*), which yields food, wine, oil and timber, and affords the denizens of the jungle a ready means of subsistence in times of dearth. From the flowers the common country spirit is distilled, and whether fresh or dried they furnish the poorer classes with wholesome food; from the fruit is pressed an oil largely used for the adulteration of *ghi*; and the tough timber is used for the naves of cart wheels."*

This picture of botany of the district continues substantially to be the same. The most noticeable change is in the decline of large number of mango orchards which have fallen to the axe. Before the legislation of the abolition of Zamindari was passed many zamindars sold their mango groves and the groves were cut down. There has also been a fairly large exploitation of the bamboos on the Kaimur hills. There has, however, not been much exploitation of the grasses for the manufacture of paper. With the provision of network of forest roads in the Kaimur plateau, it is likely that there will be more exploitation of the grasses for the manufacture of paper. There has not yet been much economic use of *Khas* grass. The Adhaura plateau offers excellent pasturage for the cattle for months at stretch. The economic use of some of the trees has been mentioned in the section on 'Forests'. Some of the main species which could be more utilised economically are—*Diospyros melanoxylon* (*kend*), *Boswellis serata* (*salai*), *Buchanania lanzon* (*Piyar*), *Anogeissm latifolia* (*dhau*), *Madhuka latifolia* (*mahua*), *Terminalia*

* District Gazetteer of Shahabad (1924), pages 14—16.

tomentosa (asan), *Terminalia chebula* (harra), *Terminalia belerica* (bahara), *Acacia catechu* (khair), *Embllica officinale* (aura), *Lagerstoraemia parviflora* (sidha), *Halarrhena antidysenterica* (Koraiya), etc. *Diospyros melanoxylon* (kend) has already found good market and is being utilised economically. In the year 1964-65 it has fetched a revenue of Rs. 2,11,600.00.

It will be remembered that the Jagdishpur area right from Bihea was once a thick forest and this was cleared almost a century back. Now most of the forests are in the Kaimur Hill range. Some patches of forest are found in Sasaram revenue thana in the south-eastern corner of the district between the river Sone and the eastern slope of the plateau. The separate section on 'Forests' may be seen for details. Afforestation has been taken up to replenish the forest.

FORESTS.

The first scientific examination of the forests was made in 1872 when an officer of the Forest Department visited the Rehal plateau. He did not come across a tree which might yield a 20' beam. He reported that there was an absence of large trees but young saplings were plentiful which if protected might yield the required timber. Indiscriminate felling continued right for nearly a century. His visit bore fruit in declaring about 20 square miles of forests, as protected forest in 1896. Another 145 square miles of forests were declared protected forests in 1909. These forests remained under the charge of a Deputy Collector till 1951 with the result that unsystematic felling could not be controlled owing to his being a non-technical man. These forests were entrusted to the charge of the Forest Department in 1952 and subsequently all the privately-owned forests were declared as protected forests. A Forest Division was started in 1954 with headquarters at Sasaram. The total area of the Division is 689.95 square miles. The total area of the district comes to 4,392 square miles. The forest, therefore, comprises nearly an area of 15.66 per cent of the district. These are located in the two subdivisions of Bhabua and Sasaram.

The Kaimur hills which have most of the forests form the eastern limit of the Vindhyan Range. The Vindhyan rocks, constituting the great sedimentary series, are even geologically speaking very old. No definite fossils have been found in the district of Shahabad though coaly matter found in the carbonaceous shale, indicates existence of vegetative matter at the time during which the Vindhyas were laid down. The age of these rocks as told by the radio-active minerals in igneous rocks intruded into equivalent systems in other part of the world may be of the order of 600 million years.

Before the creation of this Forest Division unsystematic and indiscriminate fellings were the order of the day. The Forests are completely ruined and *sal* is now seen confined to Rehal plateau and in patches at other places. Inferior miscellaneous species like

salai, *kend*, *sidha*, etc., are seen scattered about. Bamboos are spread over an area of 57 square miles but the clumps are pitiably congested or over-exploited. The damage had been done by the graziers who lop the tops of the clumps to feed their cattle. This system is still prevalent and Government is trying its best to put a stop to this ruinous habit of the grazier.

Afforestation over the blank area of the 689.95 square miles of the forest wealth of this district is the main problem, which the Forest Department is at present facing. In this direction, commendable progress has been achieved by afforesting 3,062 acres with plants of bamboo and *sisoo* species. One Afforestation Range with an annual target of planting 600 acres is functioning under the charge of Shahabad Division. Scientific working of the forests has already been introduced with the introduction of the first working plan for Shahabad Division, from the year 1962-63 to 1971-72. The right-holders are now being given forest produce for their *bona fide* domestic requirements according to their rights recognised in *Farde-rewaj* from annual right-holders' coupes.

The bamboo-bearing forests have now begun to show much improvement due to introduction of their scientific exploitation since 1954 and in course of time, this is going to be a major source of forest revenue from this division.

There are four forest rest houses in this division, three are on Kaimur plateau and one on the plain at Chutia. One of the three rest houses, on the plateau, viz., at Karkatgarh is on the bank of the Karamnasa and commands a panoramic view of the river and the hill. There is a magnificent waterfall on Karamnasa river nearby and crocodiles are often seen in the river down below. It is a great place for the *shikaris* and tourists. The other rest house is at Rehal plateau. It will help tourists to reach Rohtas fort easily since one can drive down on a jeep up to Singh Gate easily and from there the fort is a four-mile walk of plain ground. Forest Department is contemplating to construct a forest road from this rest house to Rohtas fort.

The third rest house is at Dhobhar near "Dhuwan-Kund" and is hardly six miles from Tarachandi. From this rest house, tourists can enjoy a visit to "Dhuwan-Kund", another waterfall on the plateau, which becomes a place of great attraction by the tourists and visitors during rains.

Since the creation of this division a number of forest roads have been constructed. The present length of forest roads in this division is 412 kilometres.

The only forest in the district is on the Kaimur hills and on their slopes on either sides towards south. The conservation of the trees in these areas was not systematically undertaken for one reason or the other in the past though this aspect of the question was examined between 1872 to 1879. In 1876 a portion of Khasmahal

forest in Banskatti Mahal of Rohtas hill area was proclaimed to be protected forest. This area has been managed by one trained Forester and eight Forest Guards of the Khasmahal Department of Government. There has been no systematic plantation of timber in this area either so far.

Consequent upon the abolition of the *zamindaris* after the implementation of the Land Reforms Act, a big tract of 21 square miles of the forest area has vested in the State. This tract contains some good patches of *Sal* forest and several trees more than 50' to 60' high. *Sal* timber from the vested forest of Bhabua subdivision is mostly extracted for being used as beams for house building purposes in Bhabua subdivision. Such beams are also transported to Varanasi where they command a good market.

In Rohtas area bamboo shrubs are thick and after the opening of the Paper Mills at Dalmianagar extraction of these bamboos for making paper pulp is on an appreciable scale.

The plateau is predominantly inhabited by aboriginals, locally called *Dhangar* and *Bhuiyan*. The population in the foot hills and the adjoining area is heterogenous in character. But their requirements are generally identical. Agriculture and cattle-rearing are the two main occupations in the locality. A few heads of cattle and some sheep and goat are kept by all the well-to-do families on the plateau and below. Besides these there are a number of professional graziers who take herds of buffaloes as also sheep and goat on the plateau for grazing. The houses in the locality are generally constructed of mud and sundried bricks with thatched or tiled roofs. Apart from agriculture and animal husbandry stone-cutting for use as bricks, and making of tiles from shale are the other local industries.

On the whole, the wants of the population are few and simple. The main requirements are grasses and leaves for cattle fodder, fuel, poles, small timber, bamboo and thatch for house construction and some small timber for agricultural and domestic implements. There is a fairly keen demand for bamboos amongst basket-makers. The demand for big size timber on the plateau or in the vicinity is not very great as *pucca* buildings are rarely constructed in the locality.

In the north and the west of the tract, however, there are vast thickly populated areas, without any forests worth the name and there is keen demand for bamboo and timber in these areas. Apart from local market, almost everything is saleable at Varanasi.

A toll is realised for grazing cattle in the forest, cutting *sabai* grass, collecting *Kendu* leaves for preparing *biris*, besides extraction of timber. No toll is realised for the collection of honey, *mahua* flowers and *chiranjī*. Some catechu is also prepared in this forest by boiling a portion of *Khair* plants.

The management of the vested forest has been handed over to the Forest Department only very recently. It is hoped that in the next 25 years the forests will be developed on scientific lines and this region will also compare favourably with dense forest of Palamau district on the other bank of the river Son. By and by it is hoped the entire forest region will come within the protected zone after examination of the possibility of its development by the Forest Department.

Kaimur hill forest is noted for Royal Bengal Tigers. Jawar Khoh at a distance of 15 miles from Bhabua has been considered by the *shikaris* of Shahabad district and eastern districts of Uttar Pradesh to be sanctuary for big game shooting. Royal Bengal Tigers are also found in Rohtas and Pipardih areas of this hill. Leopards, hyena, wolf and bears are also found in a large number. Herds of deer, and *nilgai* (blue bulls) and *ghorparas* move in the *Kash* zone area of the *diara* both on the banks of the rivers Ganga and Son. *Nilgais* cause considerable damage to the crop grown in the fields but due to the religious sentiment attached by the Hindus they do not kill these animals and the non-Hindus are doing the same.

In the beds of the rivers, geese and other tame birds flock in abundance generally in paddy harvest season or in the winter and they provide good sports to the *shikaris* in the district.

Importance of forestry in the economy of the district.

The forests of this division have an important influence on the economy of the district, inasmuch as, they have been responsible for feeding various industries, both large and small scales, besides meeting the requirements of the local people and providing for many of them their sources of livelihood.

Bamboo is the most important produce. At present about 2,169 tons of bamboos are supplied to M/s. Rohtas Industries at Dehri-on-Sone for manufacture of paper pulp. Besides 914 tons are being supplied to the local people for the house-building purposes. A small-scale industry of manufacturing baskets is developing gradually in Sasaram subdivision. The toy industry is fed with supply of toy-making wood such as that of Koryadanda (*Holorrhena antidiysenterica*).

The requirement of timber (small poles), firewood and agricultural implements of the inhabitants of hundreds of right holding villages is met from these forests, free of cost, while the non-right-holders get the supply on reasonable cost, fixed by the Forest Department from time to time. Poor people have the privileges of collecting and selling dry firewood free of cost. Charcoal is manufactured in sufficiently large quantity, which enables to sell the same to U. P., after meeting local requirements.

A small-scale tanning industry is developing in the localities of Adhaura and Chanari. Fruits of *harra* and barks of *asan* and

panjan are being used in tanning. *Koraiya* (*Holorrhena antidy-senterica*) is found in large quantity and a few centres for toy-making are developing in the forest areas. At present the bulk goes to the Varanasi market as local consumption is still negligible. Unclaimed hides and skins are annually settled with local Harijans eliminating competition from contractors which is considerably assisting development of this community. *Sabai* grass is widely used for making ropes and strings for local use. Out of *salai* (*Boswellis serrata*) wood people manufacture wooden utensils for domestic use. Fruits of *mahua*, *kend* and *piar* constitute a considerable proportion of the food of the local people, specially on the plateau. Honey is allowed to be collected free by the local people at present. The forest areas of the plateau afford grazing to thousands of cattle of the plains below, in addition to the cattle belonging to the inhabitants of the plateau. When all the fields have been cultivated in the plains and there is no grazing ground left, herds of cattle go to the plateau every year and are allowed grazing in the forest areas on nominal charge realise by the Forest Department.

The production of these forests had been constantly increasing year after year since the creation of this division. In 1962-63 the following quantity of timber, firewood and bamboos was extracted from these forests:—

Agency of extraction.				Timber in cft.	Firewood in cft.	Bamboos in nos.
1. Purchasers	..	..	..	49,325	6,16,400	26,12,587
2. Right-holders	..	..	..	7,785	34,800	2,92,596
3. Government Agency	..	..	..	1,222	900	4,744
TOTAL				58,332	6,52,100	29,09,927

Besides bamboos, *kendu* leaves are the most important among the forest produce, which yielded a revenue of Rs. 2,11,600.00 from auction during 1963-64. Other minor forest produce are fodder grass, *sabai* grass, *bharuhi* grass, hides and skins, myrobalans, *Koryadanda* barks and leaves gum, thatch grass and palm and dates which collectively added Rs. 12,126.00 only to the public exchequer.

Measures to secure scientific exploitation and development.

The Shahabad Forest Division created in the year 1954 and now a first working plan for the whole of the division for the period from 1962-63 to 1971-73 has already been prepared and has come under operation since 1963-64. The villagers are being persuaded to take their *bona fide* domestic requirements in a systematic manner. The bamboo clumps are also being attended to and in course of time this is going to be a major source of forest revenue from this division.

As regards development works, the most important and significant achievement is the construction of 412 kilometres of new forest roads during the last ten years. A good number of villages and a vast forest area on the plateau have become accessible through these roads. Prior to this, the plateau was practically inaccessible, the only means of approach was the foot-paths over precipitous slopes and escarpments.

Forest Belts.

The forests of this district are located in the two Civil subdivisions of Sasaram and Bhabua. The bulk of the area is situated on the plateau which is a part of the Kaimur plateau of the Vindhyan Ranges.

Condition of the Forest.

The forest is thin and poor perhaps due to shifting cultivation resorted to by the Adibasis in the older days. Miscellaneous species abound in these areas while *sal* is limited to small villages locally known as *khoh* and certain small patches on the plateau by the sides of perennial *nalas*.

Hardwickia binata used to grow on the southern slopes of the hills facing Son, but at present only a few are seen in about 3 to 4 square miles. These are all badly pollarded and useless.

Bamboos (*Dendrocalamus strictus*) are found over an area of 57 square miles mostly in badly congested form due to unsystematic and indiscriminate exploitation in the past. However, some of the bamboo bearing forests have responded very well to the scientific exploitation after 1954, and it can now be favourably compared with the good bamboo forests of Palamau district.

FAUNA.

The *District Gazetteer of Shahabad* (1924) mentions:—

"The district formerly abounded in wild animals and game-birds, but with the extension of irrigation caused by the introduction of canals they have had to give way before the advance of the cultivator, and are now only met with in the more remote parts and in diminishing numbers. With the exception of *hyaenas*, black buck, wild pig and *nilgai* (*boselaphus tragocamelus*), large game is practically confined to the Kaimur hills and the gorges which pierce the plateau in all directions. In this area tigers, though not common, are occasionally met with; bears, leopards and riverine cats are numerous; while the *koa* or wild dog, though comparatively rare, is still sometimes seen in the wilder recesses of the plateau. There are several varieties of deer; the *sambar* (*cervus unicolor*) chiefly frequents the gorges of the table-land; spotted deer and black buck are met with in the plains, the former principally

in the plains adjacent to the hills and the latter in large herds on the open country in the central zone of the district; and the hog deer (*cervus axis*) is found in the jungle growth on the hills and in the glens which fringe the plateau. The habitat of the *nilgai* is the table-land and the alluvial tract bordering on the Ganges.* Wild pigs abound on the table-land, in the *diaras* of the Ganges and the Son, and generally throughout the district. They are particularly common in the central plain, and of late years they have been hunted with considerable success in the country between Bikramganj and Dinara. Other animals include the *hyena*, found principally on the plateau and its slopes, and the jackal, fox and hare, which are common throughout the district.†

It may be mentioned that the population of wild life had considerably declined owing to large scale shooting. But since the last few years owing to the high prices of lethal weapons and bullets there is very little of organised shikar and wild life is again prospering. There are now quite a good number of Royal Bengal tigers and panthers among the Carnivora. The number of black bear, boar, sambar and blue bull also appears to have gone up. It is rather unfortunate that there has been a great decline in the number of spotted deer and *Chinkara* (Indian Gazell), and wild dogs and riverine cats owing to a rather indiscriminate shooting in the past. Recently game laws have been tightened up and the following acts are prohibited:—

- (a) Poisoning of carcasses of animals.
- (b) Spearing and running deer with dogs.
- (c) Watching in the neighbourhood of water or salt lakes between sunset and sunrise to shoot animals other than Carnivora resorting to such places.
- (d) The setting of traps except with the written permission of the Divisional Forest Officer.
- (e) Hunting, chasing and shooting and fishing except by authorised persons or permit holders.

Indiscriminate shooting has been stopped. The entire plateau has been notified as a game sanctuary in 1960 where all shootings are strictly prohibited for preservation of wild life.

The fish-eating crocodile is found in the larger rivers, and the common crocodile is frequently seen. A peculiar kind of crocodile shooting which is quite uncommon in other areas has been in vogue at the anicut area of Dehri. Fish-eating crocodiles usually come in

* Now called Ganga.

† *District Gazetteer of Shahabad* by J. F. W. James, 1924, page 16.

the night on the other side of the anicut with the hope that some fish will escape although the anicut gates are shut. *Shikaries* on boat go over the water by the side of the anicut and with the help of strong petromax lights dazzle the crocodiles and shoot them. This type of bagging crocodiles which has little sport in it has also led to a decline in the number of crocodiles in that area.

REPTILES.

Squirrels (*Ratufa*, *Funambulus*) are pleasant animals. The fish-eating crocodile is in large river (Son). Crocodiles frequently attack human beings. During heavy rains common mud tortoises are to be seen in marshes. In muddy rice or wheat held another type *Testudo elegans* burrow and children usually prey upon them. *Gavialis* and *Crocodilus palustris* live in rivers. *Calotes Versicolor* *Varanus* spp. are common lizards. *Inguana* has almost disappeared. Snakes are also frequent. Non-poisonous colobrids can be seen along with occasional *Naja Tripudians*. Most common amphibian is *Rana tigrina* along with toads which produce a melodious music during rainy season.

Mortality.

Human kills by wild animals is almost nil. Some rare cases occur in the hills. There are a few deaths by snake biting, where they are locally attended by village *Ojhas* and charmers. It is just the other way that the mortality rate of wild animals should be checked by taking efficient steps.

AVI-FAUNA.

This district is rich in the variety of its bird-population on account of its geo-physical character; the northern half is alluvium and riparian and about eight hundred square miles of rock and jungles in the south. This area is the north-eastern extremity of the Kaimur plateau. It becomes the meeting ground of the birds of the hills and of the plains. It also becomes the eastern frontier line of birds which come to India from beyond the Hindukush and the Karakorams in winter and spread out over the plains of Northern India. Very few of these pass beyond the district further east. For birds of the *anseridae* family that enter India through the Nepal passes of the Himalayan range*, the Ganga, the Son, the Koel, the Karamnasa and the Durgauti rivers offer welcome halting places in their passage south and west while many choose to remain and pass their winter here. The migration routes of many important birds have not been studied in India. The Flamingoes, for example, with which have been identified with the "*Rajhans*" of Kalidasa (by Dr. S. C. Law as well as Jerdon) which pass over India for their winter resorts undoubtedly pass over the plains of India. Those that enter India through the eastern gaps of the Himalayas *across Bhutan and extreme north-east fly over the Bay of Bengal to

* An account of the District of Shahabad by Francis Buchanan, 1812-13.

Rameshwaram and South Africa. But those come through the Nepal passes are expected to hop over the western borders of Bihar, specially those whose destination is Madras and the Runn of Cutch. Shahabad is also the northern limit of local migrants from the Deccan that move north in their seasonal shiftings.

Post-independence Planning and Development schemes involving deforestation and damming of rivers have had marked effect on the habitat of birds. The Rihand Dam to the south-west of Shahabad has regulated the flow of water into the Son with the result that many species of aquatic game birds do not find it as inviting as before. The new Sone Barrage at Indrapuri near Dehri will have the same effect. Unless a detailed bird-survey is carried out, it is difficult to estimate on individual observation, the extent of displacement in bird-population. The common storks (*Janghill*) which used to set up their nest-colonies in Arrah and around, (and also Patna and Gaya) have been driven out of their favourite breeding places, a definite loss to agricultural economy. The storks devour locusts and other insects in large numbers when these pests invade any locality and the thinning away of their number would largely frustrate agricultural planning.

The resident and migrant birds of the district are listed below:—

The Jungle and the House Crow (*Corvus macrorhynchos* and *C. splendens*); the Tree-Pie (*Dendrocitta rufa*); the Grey Tit (*Parus major*); the Chestnut-bellied Nuthatch (*Sitta castanea*); the Jungle Babbler (*Certhrops canorus*); the Common Babbler (both *Argya candata* and *A. Malcolmii*); the Rufous-bellied Babbler (*Dumetia hyperythra*); the Common Iora (*Aegithina tiphia*) (also *Aegithina humei*); the Harewa or the Gold-fronted Green Bulbul (*Chloropsis aurifrons*) and Jerdon's Chloropsis (*Chloropsis jerdoni*); the Red-vented Bulbul (*Molpastes bengalensis*); the Sipahi Bulbul or the Red-whiskered Bulbul (*Otocompsa emeria*); the Kata Piddah or the Pied Bushchat (*Saxicola caprata*); the Kali Shama or the Indian Robin (*Thamnobia cambaiensis*); the Dhayal or Magpie-Robin (*Copsychus saularis*); the Shama (*Cittocincla macrura*); the Paradise Flycatcher or Dudhraj (*Tchitrea paradisi*); the Fantail Flycatcher (*Leucocirca pectoralis*); Tickell's Blue Flycatcher (*Muscicapula tickellae*); the Lahtora or the Grey Shrike (*Lanius Excubitor*); the Wood Shrike (*Tephrodornis pondicerianus*); the Rufous-backed Shrike (*Lanius Schach*); the Bay-headed Shrike (*Lanius Vittatus*); the Small minivet (*Pericrocotus peregrinus*); the Black-headed Cuckoo-Shrike (*Lalage Sykesi*); the Large Cuckoo Shrike (*Graucalus javensis*);

the Ashy Swallow Shrike (*Artamus fuscus*); the Black Drongo or King Crow (*Dicrurus ater*); the white-bellied Drongo (*Dicrurus Coerulescens*); the Bhimraj or the Racket-tailed Drongo (*Dissemurus paradiseus*); the Tailor Bird (*Orthotomus sutorius*); the Streaked Fantail Warbler (*Cisticola jeinoides*); the Ashy Wren Warbler (*Prinia Socialis*); the Indian Wren Warbler (*Prinia inornata*); the Pilak or the Indian Oriole (*Oriolus Kuncloo*); the Black-headed Oriole (*Lriolus melanocephalus*); the Pawi or the Grey-headed Myna (*Sauria malabarica*); the Brahminy or Black-headed Myna (*Temenuchus pagodarum*); the Common Myna (*Acridotheres tristis*); the Bank Myna (*Acridotheres gingianus*); the Ablak or Pied Myna (*Sturnopaster Contra*); the Pahari Myna or the Indian Jungle Myna (*Aethiopsar fuscus*); the Baya or the Common Weaver Bird (*Ploceus Phillippinus*); the Striated Weaver Bird (*Ploceus manya*); the Sarbo Baya or the Black-throated Weaver bird (*Ploceus bengalensis*); the Northern Chestnut-Bellied Munia (*Munia articapilla*); the White-throated Munia (*Uroloncha malabarica*); the Spotted Munia (*Uroloncha punctulata*); the Lal or Red Munia (*Amandava amandava*); the Gāuriya or the House Sparrow (*Passer domesticus*); Raji or Jungli Churi; the fellow-throated Sparrow (*Gymnoris Xanthocollis*); the Crested Bunting (*Melophus melanictus*); the small Sand-Martin (*Riparia riparia*); the Dusky Crag Martin (*Riparia concolor*); the Indian Wire-tailed Swallow (*Hirundo Smithu*); Dhobin is the generic name for all Wagtails among which the only resident one is the *Motacilla maderaspatensis*, the large Pied Wagtail. Similarly the only resident Pipit is the Indian pipit (*Anthus rufulus*); the Bharat or the Small Sky-lark (*Alanda Gulgula*); the Aggia or the Bengal Bush Lark (*Mirafra assamica*); the Chendool or the Crested Lark (*Galerida cristata*); the Aggin or the Singing Bush-lark (*M. Cantillans*); the Ashy-Crowned Finch-Lark (*Eremopterix grisea*); the retail or the Indian Rufous-tailed Finch Lark (*Ammomaner phoenicura*); the white-eye (*Zosterops palpebrosa*); the Shakarkhora or the Purple Sunbird (both *Aracnechitra asiatica* and *A. Zeylonica*); Jickell's Flowerpecker (*Dicaeum erythrorhyncos*); the Naurangi, or the Indian Pitta (*Pitta brachyura*); the Golden backed Woodpecker (*Brachypterus benghalensis*); the Coppersmith or the Crimson-breasted Barbet (*Xantholema haemacephala*); the Green Barbet (*Cyanopo asiatica*); the Koel (*Endynamis honorata*); the Papecha or the Hawk-cuckoo

(*Hierococcyx varius*); the Indian Cuckoo (*Cuculus micropterus*); the Shah Bulbul or the Pied Crested Cuckoo (*Clamator Jacobinus*) is a rainy season visitor; the Mahukal or the Crow-Pheasant (*Centropus sinensis*); the Large Indian Parrot (*Psittacula eupatria*); the rose-ringed Parakeet (*P. krameri*); the Blossom-headed Parakeet in the wooded areas (*P. cyanocephala*); the Nilkanth or the Blue Jay (*Coracias indica*); the Banspatti or the Common Bee-eater (*Meropo viridis*); the Blue-tailed Bee-eater (*M. superciliosus*); the Pied Kingfisher (*Ceryle varia*); the White-breasted Kingfisher (*Halcyon smyrnensis*); the Common Kingfisher (*Alcedo insipida*); the Brown-headed Stork-billed Kingfisher (*Ramphalcyon capensis*); the Common Grey Hornbill or Dhanesh (*Tockus birostris*), the Hud-hud or the Hoopoe (*Upopus epops*); both the houseswift and the Palmswift (*Micropus officinis* and *Cypsiurus parvus*); the Common Indian Nightjar (*Caprimulgus asiaticus*); Franklins Nightjar, (*C. monticolous*) in the southern parts; among owls; the Spotted (*Athene brama*); the Barn, (*Tyto alba*); the Brown Fish owl (*Ketupa zeylonensis*) and the Great Horned owl (*Bubo bubo*); the Commonest Vulture is the White-backed (*Pseudogyps benghalensis*); the King Vulture (*Sarcogyps calvus*) and the White Scavenger Vulture (*Neophron percnopterus*); among birds of prey can be listed the Common Kite (*Milvus migrans*); the Brahminy Kite (*Haliastur indus*); Pallas's Fishing Eagle (*Haliaeetus buccorophus*); the Laggar Falcon (*Falco juggar*); the Red-headed Merlin (*Falco chiquera*); the Short-toed Eagle (*Circus feron*); the Buzzard Eagle (*Butastor teesa*); the Crested Serpent Eagle (in the hilly area) (*Haematornis cheela*); the Crested Honey Buzzard (*Pernis ptilorhynchus*). The Shikra (*Astur badins*); the Green Pigeon (*Crotopus phoenicopterus*) is very plentiful in the South; the Blue Rock-pigeon (*Columba livia*) everywhere; among doves only the Red Turtle dove (*Oenopopelia tranquebarica*); the Spotted Dove (*Streptopelia chinensis*) and the Ring Dove (*S. decacotta*) are common. The common Sandgrouse (*Pterocles exustus*) is the only grouse found along the rivers of the district. The Pea-fowl (*Pavo cristatus*) is plentiful in the southern parts; the Red Jungle Fowl (*Gallus gallus*) is abundant in the woodlands; the Jungle Bush Quail (*Perdica asiatica*); the Black-breasted Quail (*Coturnix coromandelicus*); the Bustard Quail (*Turnix suocinator*) are the three resident quails; the Grey Partridge (*Francolinus*

pondicerianus) and the Black (*F. francolinus*) are plentiful: the White-breasted Waterhen (*Amaurornis phoenicurus*); the Indian Moorhen (*Gallinula chloropus*); the Purple Moorhen (*Porphyrio poliocephalus*); the Coot (*Fulica atra*); the Jacana is a rare bird in this district; the Painted Snipe (*Rostratula benghalensis*) occurs along the lower reaches of the rivers; the Stone-Curlew (*Burhinus Oedinemus*); the Indian Courser (*Cursorius Coromandelicus*); the River Tern (*Sterna aurantia*); the Red-wattled Lapwing (*Lobivanillus indicus*) is more common than the Little Ring Plover (*Charadrins dubius*); the Yellow-wattled Lapwing (*Lobipluvia malabarica*) does occur but is rare; the Avocet (*Recurvirostra avosetta*) has been recorded but has been absent for years; the Cormorant (*Phalacrocorax niger*) and the Snake-Bird (*Anhinga melanogaster*) are very common. The Ibis, both black and white, is rare in this district; the Stork, both the white and the white-necked (*Ciconia ciconia* and *Dissoura episcopus*), are numerous; the Grey Heron (*Ardea cinerea*) is a rarity; the Little Egret (*Egretta garzetta*); the Cattle Egret (*Bubulcus-i-bis*); the Pond Heron (*Ardeola grayii*) and the Night Heron or the Andherua (*Nycticorax nycticorax*) in large numbers are a pleasing feature of the countryside; the Pandubbi or the Little Grebe (*Podiceps ruficollis*) is ever present in all *jheels*, ponds and lakes; the resident ducks are represented by the Nukta or the Comb Duck (*Sarhidiornis melanotos*); the Cotton Teal (*Nettapa coromandelianus*) and the Lesser Whistling Teal (*Dendrocygna javanica*).

Winter considerably adds to the bird-population when visiting birds arrive. The most conspicuous among the smaller in the Red-Start or Fureera (*Phoenicurus Ocrurus*); the Bush Chat (*Saxicola torquata*); the Hussaini Piddah or the Indian Blue Throat (*Cyanosilva Suecica*); the Common Ruby Throat (*Calliope camatschatkensis*); the Kher-Piddah or the Indian Bush Chat (*Pratincola maura*); the Brown Rock-Chat (*Cercomela fusca*); the Dama or the Orange-headed Ground Thrush (*Geocichla Citrina*); also the Blue Rock-Thrush (*Monticola solitaria*); the Muscicapidae are well represented by several species; the Ghulabi Myna or the Rosy Pastor (*Pastor Roseus*) stray into this district from Uttar Pradesh; several Warblers spread out in the district; the Tuti or Hodgson's Rose Finch (*Carpodacus erythrinus*); the Red-Headed Bunting (*Emberiza brunniceps*); the Common Swallow (*Hirundo rustica*);

the Grey and the White-Wagtails (*Motacilla cineria* and *M. Alba*) are most numerous; several Pipits (genus *Anthus*) are evident; among the Raptorial winter visitors the Kestrel (*Falco tinnunculus*) is rare; the Osprey (*Pandion haliaetus*) is the commonest; the Pale Harrier (*Circus macrourus*) occurs. Among game birds the Auserinae are represented by the Grey Lag and Barheaded Geese; the Chakwa or the Brahminy Duck, mallard, teal, gadwall, pigeon, pintails, pochwads and shovellers. The Common Snipe (*Capella gallinago*) is abundant along with the little Stint (*Calidris minuta*) and the Spotted Sand-piper (*Tringa galierola*).

It may be mentioned that Francis Buchanan who had visited the district in 1812-13 had also mentioned the species of some birds. Sparrow hawks were nursed by the Raja of Bhojpur and his kinsmen at Jagdishpur. Partridges, quails, *Saliku* (*Gracula tristis*) were pursued. *Jimach* was a large bird of prey and there used to be fights between a *Jimach* and a falcon. Peacocks, parakeets, various kinds of crane were numerous. It has to be mentioned here that partridges, quails and peacocks have become very rare now.

THE CLIMATE OF SHAHABAD DISTRICT.

The climate of this district is generally dry and bracing for the greater part of the year. The cold season starts early in November and extends to late March. The hot season is from April to about the middle of June when the monsoon season commences. The monsoon continues till the end of September. October is a transition month.

RAINFALL.

The district has a network of 20 rain-gauge stations with records extending in most cases to 70 or 80 years. Tables 1 and 2 give the details of the rainfall at the 20 stations and for the district as a whole. The average annual rainfall in the district is 1,131 mm. (44.5"). The central part of the district around Chenari, Sasaram and Kargahar receives a little more rainfall than the rest of the district. The district gets 88 per cent of the annual rainfall during the monsoon months June to September. The maximum rainfall occurs in August. The variation in the annual rainfall from year to year is not large. In the fifty years, i.e., 1901 to 1950, the highest rainfall amounting to 143 per cent of the normal fell in 1936; the year 1908 had the lowest annual rainfall amounting to 61 per cent of the normal. During these fifty years there were only 6 years when the district rainfall was less than 80 per cent of the normal. None of these were consecutive years. At individual stations two or three consecutive years of low rainfall have occurred once or twice. From Table 2 it will be seen that in 40 years out of fifty the district rainfall was between 900 and 1400 mm. The average number of rainy days (days with rainfall of 2.5 mm.—10 cents—or more) per year for the district is 52.

The highest rainfall in 24 hours recorded at any station in the district was 389.4 mm. (15.33") at Chcnari on 11th September, 1936.

Temperature.

Meteorological data are available for Dehri, Arrah and Buxar. Dehri is the only observatory now existing in the district as the other two were closed down long ago. As the data of all the three stations show similar features the data for Dehri only are included in this summary. From the middle of March temperatures begin to rise and hot dry westerly winds blow. May is the hottest month. Towards the peak of summer preceding the onset of the monsoon maximum temperatures can reach values as high as 47°C (117°F) on individual days. With the setting in of the monsoon, day temperatures drop by about 8 to 9°C without appreciable drop in night temperatures. After the withdrawal of the monsoon by the beginning of October temperatures begin to decrease reaching the lowest value in January which is the coldest month with minimum temperature sometimes going down to 4 or 5°C.

Humidity.

The summer months are very dry and relative humidities can be as low as 20 per cent to 25 per cent in the afternoon. In the monsoon season air is very humid; during the rest of the year humidity averages about 50 per cent in the afternoon.

Cloudiness.

During the winter and summer months skies are generally clear or lightly clouded but towards late summer cloudiness is more in the afternoon. In the monsoon months skies are heavily clouded or overcast.

Winds.

Light south-westerly or westerly winds prevail in the winter and early summer months. Towards the end of summer easterlies set in and continue throughout the monsoon season.

Special weather phenomena.

Locally heavy rain and strong winds are experienced in the district in association with some of the storms or depressions which move inland from the Bay of Bengal during the monsoon and post-monsoon months. Thunderstorms and occasional duststorms accompanied with squalls occur in the summer months. Even during the monsoon months rain is sometimes associated with thunder. Morning fogs are possible during the winter months.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Dehri.

No. of years of Janu- ary. Robu- March. April. May. June. July. August.

(a) Normal rainfall in mm.
(b) Average number of rainy days (days with rain of 2.5 mm. or more).

Sep- ember.	October.	Novem- ber.	Decem- ber.	Annual.	as annual rainfall	Lowest	Highest
per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent
of normal	of normal	of normal	of normal	of normal	of normal	of normal	of normal
Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount
as Heavyest rainfall in 24 hours.*	Pato.						

11	12	13	14	15	16	17	18	19
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194.8	51.3	6.9	5.3	1,050.8	148	67	231.4	23rd July 1895.
8.6	2.4	0.5	0.6	51.4	153	51	254.5	14th August 1910.
214.9	44.2	11.9	4.3	1,122.6	(1936)	61	274.8	21st August 1933.
225.5	51.3	8.6	5.1	1,160.3	(1946)	55	278.9	14th August 1910.
236.6	55.9	11.4	4.6	1,226.6	(1946)	57	260.9	24th June 1897.
9.5	2.6	0.6	0.4	67.0	184	44	277.1	28th August 1940.
228.0	58.9	9.7	4.3	1,167.4	(1949)	48	355.6	25th June 1897.
206.8	46.5	6.6	5.8	1,082.6	(1936)	43	216.4	18th July 1926.
170.2	45.7	9.7	6.1	988.4	(1911)	59	190.0	15th July 1897.
193.3	54.1	11.7	4.6	1,079.8	(1929)	67	260.1	15th July 1897.
8.6	2.3	0.6	0.3	51.1	147	61	251.5	5th September 1942.
197.4	41.9	8.1	5.1	1,053.1	(1922)	43	263.1	7th August 1948.
213.1	54.4	6.3	5.3	1,127.8	(1942)	44	381.0	29th August 1940.
198.6	46.2	9.9	4.6	1,169.0	(1948)	48	228.6	14th August 1935.
8.5	2.5	0.5	0.3	53.0	237	64	226.1	12th September 1936.
252.5	55.9	11.7	5.8	1,337.8	(1919)	41	196.1	12th September 1936.
217.7	55.1	11.2	7.9	1,198.2	(1930)	62	317.5	17th September 1913.
9.0	3.6	0.6	0.4	984.5	(1938)	61		
238.3	24.6	3.6	3.3	984.5	(1938)	61		
7.9	1.7	0.4	0.3	46.3	127	61		
242.3	52.8	2.0	7.1	1,122.9	(1942)	61		
9.8	2.5	0.3	0.5	53.5	148	61		
250.7	41.4	12.7	1.3	1,280.4	(1913)	61		
6.8	2.1	0.4	0.1	43.9	143	61		
217.5	49.3	9.4	5.3	1,130.7	(1936)	61		
8.6	2.4	0.5	0.4	51.5				

* Based on all available data up to 1958.
† Years given in brackets.

TABLE 2.
Frequency of Annual Rainfall in the district.
(Data 1901-1950.)

Range in mm.	Number of years.	Range in mm.	Number of years.
601-700	1	1,201-1,300	4
701-800	0	1,301-1,400	6
801-900	5	1,401-1,500	1
901-1,000	7	1,501-1,600	2
1,001-1,100	11	1,601-1,700	1
1,101-1,200	12	1,701-1,800	0

TABLE 3.

Normals of Temperature and relative humidity.
Dehri.

Month.	Mean daily maximum temperature. °C.	Mean daily minimum temperature. °C.	Highest maximum ever recorded. °C.	Lowest minimum ever recorded. °C.	Relative humidity.*
			Date.	Date.	
					Per- cent. age.
					Per- cent. age.
					0830 1730

1	2	3	4	5	6	7	8	9
January	23.9	11.4	30.6	28.1-1958	4.4	6.1-1950	74	50
February	27.6	14.2	34.4	19.2-1952	6.7	12.2-1950	63	39
March	33.7	19.1	41.1	27.3-1953	11.7	8.3-1945	45	26
April	38.9	23.9	44.4	22.4-1956	17.2	6.4-1955	38	23
May	41.6	27.7	43.2	21.5-1948	20.6	3.5-1955	47	26
June	38.6	28.2	46.1	9.6-1953	20.8	11.6-1957	64	50
July	32.7	26.4	41.4	7.7-1958	22.2	7.7-1951	84	77
August	32.1	26.2	36.1	11.8-1945	23.3	25.8-1953	85	80
September	32.0	25.5	35.6	29.9-1951	20.6	19.9-1946	84	80
October	31.5	21.9	35.6	21.10-1951	14.7	31.10-1957	74	66
November	28.3	15.2	33.9	2-11-1951	9.4	30.11-1952	68	52
December	25.1	11.6	30.0	22.12-1950	7.6	24.12-1957	72	49
Annual	32.2	21.2	..	..	..	..	67	51

*Hours I. S. T.

TABLE 4.
Mean wind Speed in Km/hr.
Dehri.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1	2	3	4	5	6	7	8	9	10	11	12	13
4.2	5.6	6.9	7.4	7.4	7.6	6.4	5.3	5.0	3.5	3.2	3.4	5.5

TABLE 5.
Special Weather Phenomena.
Dehri.

Mean no. of days with—	Janu- ary.	Feb. ruary.	March.	April.	May.	June.	July.	August.	Septem- ber.	Octo- ber.	Novem- ber.	Decem- ber.	Annual.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Thunder	..	0.4	0.3	0.8	0.4	0.5	0.4	0.4	0	0.3	0	0	3.5
Dust-storm	..	0	0	0	0.3	0.3	1.3	0	0	0	0	0	1.9
Squall	..	0	0	0	0	0.1	0	0	0	0	0	0	0.1
Fog	..	1.6	0	0	0	0	0	0	0	0	0	0.5	2.1