INTRODUCTION.

Peace and prosperity are the twin goals of a nation. The first goal was partially achieved in 1947 by taking the reigns of administration in our own hands and by making plans for future development and well being of the nation in our country. Our economists, planner, administrators, and social workers are trying to achieve the second goal of economic prosperity and welfare of individuals. During the last forty-five years of Independent and Planned India, we have made a great deal of progress in the field of agricultural and technological development and mobilisation of resources. Now the needs, priorities and preferences of national development are changing with the lapse of time, therefore, new challenges have emerged.

India is a vast country having sound vegetative resources, therefore, the faster and speedy development of the nation depend on the mobilisation of a dormant resource in vegetative sector. It is axiomatic that the new opportunities of employment for the growing millions of Indian lie in the field of non-agricultural sector, that is, the sector of resource development and industrialization of the vast rural areas of the country. Rural India has large areas under agriculture and forests. The New Techniques are being adopted by the agriculturists, and hyke in agricultural production has been well marked. During the last two decades the forest department has also launched the programme of scientific development of forest in the country. The natural hazards like ...
droughts and floods and soil erosion have awakened the people to maintain our forest cover and protect it against unscientific cutting and misuse by the man. This is the need of the hour that this valuable resource known as green gold must not only be preserved but also increased by afforestation and social forestry programmes.

This work is an effort to search out new dimensions for the industrial development specially in rural areas by using local agricultural and forest resources. Various small scale and household industries can be established which produce items of local need by utilizing local agricultural and forest resource.

The World has witnessed the severe consequences of large scale industrialization. Ecological disturbance and Environmental degradation has caused a number of serious problems pertain to the health of the biota therein. Air, water, soil, noise and social pollutions are the major expressions of environmental degradation. Now, therefore, the developing world must choose a medium technology instead of sophisticated technology and develop small and cottage industries for economic development and protection of their environment.

1.1. A Review of the previous work :-

The studies related to the vegetative resource based industries are few because the growth of such industries has been very slow. The vegetative resources are quite abundant but their use for industrial purposes has been a very little.
During the five year plans, however, a sound base for industrial development has been laid down. Previously, only the economists thought about the resource mobilization and industrialization of the country. It was in the gamut of economics to study the growth of vegetative industries, but with the development of economic geography, the geographers have shown their keen interest in the study of industries with special emphasis on their spatial distribution and forces of pulls and pushes of their locations.

The green revolution with advanced agricultural technology made it possible to produce various crop yields in surplus quantities which encouraged the development of agro-based industries specially of small and cottage size mostly in urban centres.

INDUSTRIAL GROWTH :-

A number of Geographers have studied the recent industrial growth in some of the important industrial regions of India. The contributions of Sen Gupta and Bharadwaj are very valuable. Sen Gupta¹ (1958) presented a study of industrial growth in the Hooghly Region of West Bengal. She used modified version of the three formula technique to measure the industrial diversification in the area and computed ranked employment percentages of 29 major groups of industries of the area. Her study revealed the fact that although the Jute manufacturing dominated the scene, yet it exhibited a slight trend of diversification.

S.L. Gupta² traced the industrial growth of Faridabad,
which made a remarkable progress during the first decade of planning in India and attributed that it was mainly because of the government's encouragement. He listed a number of problems including shortage of labour, poor power supply and inadequate transport which proved detrimental to a steady growth of industries of Faridabad in the later decades.

O.P. Bharadwaj\(^3\) reviewed the industrial growth of Punjab since independence. He attributed this growth to the initiative and enterprise of the energetic people of Punjab, who, firstly, started with minor industries such as hosiery and sports goods, have achieved distinction in major industries like the manufacture of sewing machines, bicycles, agricultural implements, machine tools and a number of agro-based industries. He linked the State's future industrial development with farm products. Sinha\(^4\) (1968) surveyed the industrial growth of Bihar viewing it in the context of State's share in the country's industrial income.

Mahamaya Mukherji\(^5\) has traced the growth of the industries of Bihar from the beginning of the present century but has emphasised their later development mainly after independence. In her view the industries in that State are essentially based on local resources and they have a fuel based orientation. She remarked that in the pre-independence Era, the industrialization in the State was largely conditioned by the transport factor, but later on industries developed even in such areas where transport was yet to follow. Most of new industries of Bihar have come up in the South—
western section of Chhota Nagpur region.

Besides above mentioned contribution, individual industries have been studied by a number of other Indian-geographers. The important groups of industries which have attracted the attention of Geographers for their studies are agro-based, mineral based, forest-based and scale-based - such as large scale, small scale and cottage industries.

(1). Agro-based Industries :

In India, the cotton textiles industry is among the oldest and most developed of the agro-based industries. - Iyengar (1930) studied the growing cotton mill industry of Coimbatore in all its aspects from the supply of materials to the disposal of the finished goods.

Loknathan (1936) presented a more comprehensive study of the prevailing trends of growth and spatial distribution of the cotton textile industry in the country. He investigated the causes of its heavy concentration in a few areas like Bombay and Calcutta in nineteenth century. He also reviewed the theory of industrial location in order to explain the reasons of Bombay Pre-eminence in this field and concluded that the transportation cost was the Pre-dominant factor in the location. Another study of the Coimbatore - Cotton Mill industry was made by Narayana Swami (1941). He traced its history dividing into three phases: pre-war, post-war and post-Pykara development. He described some of the features of the industry such as yarn and cloth production, location of mills, the labour problems, etc. and
assessed Coimbatore's position in cotton textile industry of India.

Virendra Benerji and Basu⁹ (1968) traced the evolution of the cotton textile industry of India. They recognized it as the largest single organized branch of industry in India, employing about one-third of the total industrial labour and accounting for about one-fourth of the total industrial output in terms of value in the country. The authors also linked the growth of the cotton mill industry with the development of railway and the two-world wars which gave incentive to the industry.

Kanan Chakravarti¹⁰ attempted to review the position of cotton textile industry of West Bengal in Indian context. This industry in the State engaged 2.4% of total employment in the country. The industry is faced with many problems such as distance from raw material sources, uneconomic and unbalanced working of mills, lack of facilities for workers, high cotton prices etc. In this view, to attain a balanced economy for the industry, the development of small scale units will be an appropriate approach. Basu¹¹ (1961) made a comprehensive study of the problems of the Jute industry of West Bengal. He considered the price fluctuations of raw Jute the greatest set back to its stability and suggested that economic price paid to the Jute growers would be a major incentive to the industry.

Silk industry of Varanasi, the paper by Aruna Gupta¹² discusses the growth, evolution and structure of silk industry in Varanasi. R.P. Sinha and Anil Kumar¹³ studied the silk
industry in Bhagalpur and the silk industry of Murshidabad. The article by Kalpana Ghoshal surveys the development and problems of the silk industry in Murshidabad Mulbery Cultivation. Silk cocoons rearing, silk collection and silk weaving are the various aspects of the industry. Its historical back-ground and present trends have been described by the author. In her view the storage of raw materials, inadequate dyeing and printing facilities and the want of marketing agencies are the main problems of the industry. R.N. Tiwari (1961) worked out the operation of economic factors such as freight charges, distance from the cane supply centre and the mode of transport in the selection of site for sugar factory. He found the proximity to the supply zone as major attractive force in its location. Dayal (1968) in his study of major trends in the development of sugar industry of India listed the main problems from which the industry suffered such as the irregular supply of cane, low-yield, low sucrose content and short crushing season etc. Majid (1968) discussed the problems of sugar industry in Bihar. He concluded that the industry could prosper if the prices of cane could be regulated in Eastern Uttar Pradesh. He thought that the dispersal of sugar mill was essential for striking an economic balance in the region.

(ii). Forest based Industries:

The lac and shellac industry of Bihar was studied by Majid in 1960. He emphasised the need for implementing the recommendations of the various enquiry committees which were set up for ensuring a smooth development of the industry.
Dixit (1963) traced the growth of paper industry of India, analysing the role of supply of raw materials and water in the location of its factories. He critically assessed the recent trends of the industry and recognised main patterns of its spatial distribution. The study also highlighted some of the major problems from which the industry suffered—such as inadequate foreign exchange for the import of machinery and the absence of a rational policy of forest conservation.

(iii). Cottage and Small Scale Industries:

In predominantly an agrarian setting of the country, the cottage and small-scale industries assume great significance as they engage a portion of the surplus rural population, provide it with dependable means of livelihood and support it in the year of calamity. Rao in 1930 presented a comprehensive survey of the common 'home' industries of the Coimbatore District, which included hand-spinning, handloom weaving, Khadi sericulture, silk-weaving, carpet making— and metal industries. The problems of the cottage industries of Malabar were studied by Rao in 1932. Among the major problems which handicapped the development of these industries, were the lack of capital and un-organised marketing. He dealt in detail the coconut fibre, handloom weaving, mat making, bell metal, bronze cabinet and soap industries.

Rangappa (1957) examined the structure of small scale and cottage industries in Mysore Estate and observed
that the State offered vast scope for their development. He criticised the lack of comprehensive survey to identify the problems of these industries. He studied in detail the State's two main cottage industries i.e. the Handloom weaving and Khadi.

Majid\textsuperscript{23} surveyed the existing position of tasar industry in Bihar, specially developed in the district of Palamu, Dhanbad, Hazaribagh, Ranchi and Santhal pargana. He recommended for the widening of the present organization of research and training & the evolution of a better system of seed distribution.

Small scale and medium size industries of Orissa were studied by Sinha\textsuperscript{24} (1960) in his analysis of the problems and prospects of Industrialization in that State. He analysed the total employment, present structure and the prospects of growth of a large number of industries including glass, paper, sugar, rice, and pulses mills, Ceramics, Jute pressing bailing and weaving, and weaving, and leather.

Tewari\textsuperscript{25} (1967) discussed the current trends of the small scale industries in Eastern Uttar Pradesh. Exploring the possibilities of future development in the context of the available raw material and a ready market, he suggested the establishment of a large number of small scale industries in the region.

'Some aspects of the Indian Automobile Industry' the paper by M.G. Bhasin\textsuperscript{26} gives a multi-sided account of the Industry. In a skill-based industry like automobile, there is direct relationship between the location of an industry and the availability of technical skill. Though providing large scale employment to
people, the industry is confronted with a great labour trouble. It enjoys a dominant role in the country's private sector.

K. Vithal Reddy studies the industrial Estates in Telangana and discussed their main objectives and types. Chandra Bhan in his paper, "The Industrial Estate of Nunchai: A Museum of Waste" seeks to identify the factors which jeopardised the success of the estate, were an unfavourable location and site, deficient water supply, problems of labour supply, non-competitive returns of investments, unsound policies concerning admission and allocation of units, etc.

R.N. Singh (1977) in his article, 'Industrial Estates: The concept and its Socio-economic Dynamics dealt with the origin and development of Estate's idea in the world and discussed its multi-dimensional objectives.

From the above description showing the contribution of geographers in the field of industrial geography, it becomes evident that a variety of topics have been studied by the Indian Geographers. The recent topics of research in this field which have greatly drawn the attention of geographers are the problems of industrialisation in rural areas, the opportunities for industrial development, especially of those having high potentials of man power and resource-base but lacking in industrial planning, and the programmes for the development of cottage & small-scale units on sound basis etc.

The most recent concern of industrial development is the protection of environment from the ill-effects or industri-
rialisation. The focus on rural industrialisation also includes the opportunities of employment generation by using local resources and conserving natural environment.

After the above mentioned analysis of the previous contributions in the field of vegetative resource-based industrial development, the introduction of the study region becomes necessary.

(1:2)
(A).

THE REGION.

Spatio-Administrative Organisation.

The land of Bundelkhand, the Bundelkhand Plain, astronomically lies between 78°47' E to 81°20'42" East longitudes and 24° 25'32" to 26° 26'48" North latitudes. It lies in the South-western part of Uttar Pradesh and consists of Jalaun, Hamirpur, Banda (excluding the Manikpur Block of Karwi and Mau Block of the same tahsil) Lahar Tahsil of Bhind and Laundi tahsil of Chhatarpur districts both in Madhya Pradesh (Fig.14)

Geographically, the river Yamuna bounds the region to the North; the Bundelkhand Transition belt between the Bundelkhand Plain in the North and Bundelkhand upland in the South and the river Sindh in the West which separates it from the Malwa region. In the East it is bounded by the Mau Block of the same tahsil in Banda District. Etawah, Kanpur, Fatehpur and Allahabad Districts are in its Northern vicinity, while in the South lies the districts of Jhansi, Chhatarpur, Satna, Panna and Rewah. In the West lies the district Datia and Bhandara tahsil in Gwalior district. In the East, Mau and Manikpur Blocks make its Eastern boundary.
Geographically, it is known as trans-Yamuna Plain, the maximum East-west extent of which is about 260 Kilometers and North South width is about 178 Kilometers. It covers the geographical area of 20430.40 Sq. Kms. and has a population of 3628612 persons. The following Table gives the Tahsilwise detail of area, population and its density.

**TABLE - 1.1.**

**AREA AND POPULATION OF BUNDELKHAND PLAIN.**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>TAHSL</th>
<th>Area in Kms.²</th>
<th>Total Population on (1981)</th>
<th>Density Per Km.²</th>
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### TABLE 1.1

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<th>TAHSIL</th>
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**SOURCE:** CENSUS HAND BOOKS OF THE DISTRICTS - 1981.

Bundelkhand Plain covers nearly 5.97% area of Uttar Pradesh and 0.65% area of Madhya Pradesh, and has 2.94% population of Uttar Pradesh and 0.69% population of Madhya Pradesh and it possesses about 0.53% population of India.

The administrative structure of Bundelkhand Plain comprises of five districts, seventeen tahsils and thirty-three development blocks and nearly 3987 villages. About 595 villages are in Lahar and Laundi tahsils and 3392 villages in the U.P., part of Bundelkhand Plain.

Its district-wise administrative organization has been shown in the Table 1.2 which depicts the districts, tahsils and development blocks (Fig. 1.1).

### TABLE 1.2

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**Total** | 10  | 89  | 619 | 1021 | 813 | 208. | cont'd.
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<td>80</td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>Bisanda</td>
<td>08</td>
<td>53</td>
<td>57</td>
<td>57</td>
<td>--</td>
</tr>
<tr>
<td>BANDA</td>
<td>Jaspura</td>
<td>06</td>
<td>43</td>
<td>45</td>
<td>45</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Tindwari</td>
<td>09</td>
<td>58</td>
<td>89</td>
<td>80</td>
<td>09</td>
</tr>
<tr>
<td></td>
<td>Barokhar Khurd</td>
<td>08</td>
<td>60</td>
<td>76</td>
<td>72</td>
<td>04</td>
</tr>
<tr>
<td>MAU</td>
<td>Ram Nagar</td>
<td>05</td>
<td>52</td>
<td>93</td>
<td>73</td>
<td>20</td>
</tr>
</tbody>
</table>

**TOTAL** | 111 | 836 | 129 | 1104 | 115 |

<table>
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<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LAUNDI</td>
<td>-</td>
<td>19</td>
<td>64</td>
<td>256</td>
<td>32</td>
</tr>
<tr>
<td>LAHAR</td>
<td>-</td>
<td>12</td>
<td>48</td>
<td>290</td>
<td>17</td>
</tr>
</tbody>
</table>

**BUNDELKHAND PLAIN** | 312 | 1390 | 3987 | 3402 | 585 |

**SOURCE:** District Statistical Magazines, 1989.
(i). Geology :-

The geology is one of the most important elements in Geographical studies, because the development of human beings directly or indirectly depends on geology. D.N.Wadia\textsuperscript{30} in his book 'Geology of India' has highlighted the importance of Geology. In his words, "The Geology of a region plays an important role in determining the activities of man, the development of transport and communication and the way of agriculture." In the Bundelkhand Plain a large number of population is engaged in agricultural activities whereas the output is quite low.

Two types of rocks are found in Bundelkhand Plain, i.e. old rocks and new rocks. The Geology of these two types of rocks may be divided into three groups as given below. (Fig. 1.2 A)

(A). The Archaean System represented by Bundelkhand Gneisses and Granites.

(B). The Vindhyan System, and

(C). The recent deposits represented by Trans-Yamuna Alluvium.

A. The Archaean System :-

The oldest rocks of the earth's crust of Archaean are found in the Southern part of the Bundelkhand Plain. According to Jhingarah\textsuperscript{31} the age of this rock group of Bundelkhand Plain is about 1300 million years old. The origin of granite massif of the region is a question of great controversy. Saxena\textsuperscript{32} believes that the Bundelkhand granites of the region were formed in the process of replacement of non-igneous matter, crystal by
crystal hydro-thermal effects and not by magmatic emplacement. "
According to him the so-called black xenoliths of Kabrai area
in Hamirpur District, contain a complete sequence of granitiza-
tion which supports the aforesaid view. Dubey assigns an age
of 2300 million years to the granites of this region. They are,
in his view, pre-Dharwarian and are next to or contemporaneous
with the oldest Aravalli Schists.

A major part of Mahoba tahsil of Hamirpur district is
covered with Bundelkhand granites and gneisses. A geological
survey of Ken and Betwa river basins reveals that there is a
great diversity in texture as well as mineralogical composi-
tion of rocks, varying from extreme fineness to coarseness in
grains and ranging from purely felsitic to varieties rich in fer-
romanganesian minerals. The coarse grained granite is usually
rich in ferromanganesian minerals but the medium grained varie-
ty is not so. The gneisses are often found associated with
granite and they do not show any regular pattern in their dis-
tribution. The common minerals of these granites and gneisses
are potash, felspar, white plagioclasic quartz, parthite
chlorite, red orthoclase and mica.

Now, the granites and gneisses are utilized in form
of 'gitti' for paving the roads and the building purposes, and
where granite rocks are absent, they are used for laying the
foundation of the huge structures also. These areas are mostly
unproductive and people are poor who depend upon local hills
for their livelihood. These hills employ a large number of
labourers for quarrying work. In this way these rocks are the
backbone of the poor.
B. The Vindhyan System:

According to Kabir\textsuperscript{34} gazetteer of India, in the Algu-

nkian age, about 600 to 700 million years ago, there was an an-
cient geosyncline called the 'Vindhyan Sea' in which the sedi-
ments from the Aravalli ranges were deposited. The present evi-
dence of fluviomarine deposits indicates the remoteness of sys-
tem. The two powerful forces had reacted in the formation of
Vindhyachal and Bhandar range i.e. (i). the tectonic movement
which came from the West, and (ii) the isosastic adjustment
which came from the South. The system has been sub-classified
into two broad divisions as under :-

(i). The Upper Vindhyan, and
(ii). The Lower Vindhyan.

Oldham (1913) has further sub-divided the upper Vindh-
yan series into three sub-series as given below :-

(a). Bhandar Series,
(b). Rewah series, and
(c). Kaimur series.

The rocks of Bhandar and Rewah series lies outside the
Bundelkhand Plain. The out crops of Kaimur series are located in
the East-southern part of Kalinjar, Chitrakut and Mau hills in
Banda district. They form the wall sides of sand stone and lime
stone.

C. Recent Deposits:

The major part of Bundelkhand Plain consists of the
recent deposits. The districts of abundant alluvials depo-
sits are Jalaun, Hamirpur (excluding Mahoba tahsil) and
Banda (excluding Southern parts of Naraini and Karwi tahsils).

These alluvial deposits consist of fluviatile and subaerial formations of sand, silt and clay. The texture of sediments becomes more and more refined as one proceeds towards the river Yamuna from the Southern central granite region. In fact, the Bundelkhand plain is very fertile, that is why it is predominantly an agricultural part of the region.

(ii). PHYSIOGRAPHY.

The Bundelkhand Plain can physiographically be divided into two main parts. (Fig. 1.2 B).

(A). Transitional Belt or Zone.

(B). Alluvial Plain.

(A). Transitional Belt:

In the South of Bundelkhand Plain their lies a transitional belt. It covers the parts of Charkhari, Kulpara, Mahoba and Lamlodi tahsils and Sheorampur Block of Karwi tahsil. In the North of transitional belt, the surface boulders are absent, while in the significant.

(B). The Alluvial Plain:

The alluvial plain, often termed as trans-Yamuna plain, is a low lying elongated tract with Yamuna river making Northern boundary. The region suffers from imperfect drainage in the central part which is often inundated during the rainy season. It has been composed of soft and unconsoli-
dated materials brought down by the tributaries of Yamuna, Betwa, and Ken rivers. These deposits stretch over the granite surface for about 110 Kms. The contour line of 150 metre makes its Southern boundary.

The Bundelkhand Plain can be sub-divided into five Sub-region as given below:

1. Sindh Plain,
2. Ravine Belt,
3. Jalaun Plain,
4. The Hamirpur Plain,
5. The Banda Plain.

1. **Sindh Plain.**

   The river Sindh is the Western Tributary of Yamuna river system making the boundary between Lahar Tahsil of Bhind district and Jalaun tahsil of the same district at some places. The Sindh Plain is a rolling plain rising upto 228 metres from its confluence point to the Southern end. The Plain is fertile tract with Kabar, Mar and Parua soils. At some places, it is sandy and requires good irrigation. It is a dry farming plain.

2. **Ravine_Belt.**

   The Northern most part is the Ravine belt which is about 2 to 3 Kms. broad, developed along the main stream, especially along their confluences with the Yamuna river. They are fully developed along Pahuj, Betwa and Ken rivers. This is a narrow belt of bad land topography dissected by unnumerable gullis cutting into soft and erosive deposits.
(3). Jalaun Plain.

The Jalaun Plain covers the Western tract between Pahuj and Betwa rivers. The whole of the tract is a rolling plain excepting some of the hummocks.

(4). The Hamirpur Plain:

The Hamirpur Plain is a vast flat plain consisted of alluvial deposits brought by the Yamuna and Betwa Rivers. The Do'ab of the rivers is highly fertile. The Kachhar and Tar areas give a bumper production of Rabi crops.

(5). The Banda Plain is roughly a triangular area bounded by the Ken Basin in the West and the Yamuna ravine belt in the North. The Bagain divides it into two parts, namely Banda Plain East and Banda Plain West.

1.3. DRAINAGE:

The Bundelkhand Plain is drained by the Yamuna system of rivers. In this plain, Yamuna is the biggest and largest river and it has Sindh, Pahuja, Betwa, Ken and Bagain as its main effluents. (Fig. 1.3 B). Betwa's tributary is Dhasan. These streams are fed by numerous seasonal torrents. Other minor streams of the region are Non and Melunga in Jalaun district. With 15 to 45 metres high Southern bank of the Yamuna does not permit the diversion of its natural flow Southwards.

In this way, the Betwa, Ken, Pahuj and Dhasan streams are more important than the Yamuna for irrigation purposes. The average annual discharge of Betwa and Ken is 1,85,000 Qusecs
and 800 cusecs respectively, but their seasonal fluctuations are abnormal i.e. the discharge of river Ken in Winter is reduced to only 300 cusecs and in the month of May it dwindles to nothing.

The main water bodies of Bundelkhand plain are Kirat Sagar, Madan Sagar, Bijanagar, Jhana Dhasanpur, Tikamau, Kalyan Sagar, Arjun Dam, Raipura Sagar, Majhgawan Tal, Salarpur and Kamalpur Tal and some important water bodies are found in Lahar and in Laundi tahsils. The location and area of main water bodies have been shown in Table 1.3 given below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of water bodies</th>
<th>Location</th>
<th>Area Sq.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kirat Sagar</td>
<td>Mahoba (Hamirpur Distt)</td>
<td>986 Sq.m.</td>
</tr>
<tr>
<td>2.</td>
<td>Madan Sagar</td>
<td>&quot;</td>
<td>423 &quot;</td>
</tr>
<tr>
<td>3.</td>
<td>Bija Nagar</td>
<td>&quot;</td>
<td>3948 &quot;</td>
</tr>
<tr>
<td>4.</td>
<td>Jhana</td>
<td>&quot;</td>
<td>1833 &quot;</td>
</tr>
<tr>
<td>5.</td>
<td>Dasarapur</td>
<td>&quot;</td>
<td>1739 &quot;</td>
</tr>
<tr>
<td>6.</td>
<td>Tikamau</td>
<td>&quot;</td>
<td>247 &quot;</td>
</tr>
<tr>
<td>7.</td>
<td>Arjun Dam</td>
<td>Charkhari</td>
<td>182300000 &quot;</td>
</tr>
<tr>
<td>8.</td>
<td>Salarpur</td>
<td>&quot;</td>
<td>2370000 &quot;</td>
</tr>
<tr>
<td>9.</td>
<td>Kamalpur</td>
<td>&quot;</td>
<td>2080000 &quot;</td>
</tr>
<tr>
<td>10.</td>
<td>Kabrai &amp; Majhgawan</td>
<td>&quot;</td>
<td>2460000 &quot;</td>
</tr>
<tr>
<td>11.</td>
<td>Raipura</td>
<td>Banda District -</td>
<td>2950000 &quot;</td>
</tr>
</tbody>
</table>

1.4. CLIMATE.

Climate occupies the central position in the study of the discipline of geography. It determines to a large extent, the production of crops on the one hand and controls and creates market for them according to the requirement of the people on the other. In no other country the production of commodities is so much dependent upon climate as in India. Millions of poor farmers gaze at the sky during the summers with the hope of seeing the clouds that bring them the rains which makes start the agricultural operations. Even in these days of economic progress untold misery is the lot of the Indian farmers. If the rains fail, or some other climate phenomenon occurs, it destroys his crops. Climate affects not only the agriculture but all other aspects of India's Socio-economic life. Our clothings, houses, roads and railway, food and health and capacity to work depends upon climate. The Bundelkhand Plain represents the features of transitional climate between the maritime of the East coast and the tropical continental dry type of the West.

The average annual temperature of the region is uniformly high, generally over 25°C. The mean annual temperatures of two meteorological stations in the region i.e. Banda and Orai are 26.20°C. and 25.8°C. The mean seasonal temperature in Summer in the region varies from 29.5°C. to 32°C. but the actual temperature raises upto 38°C. when the sun rays become scorching. Banda tahsil often records the highest number of sun strokes every year. Nights are also very hot in the summer with temperature seldom going below 15.5°C. The minimum temperature is recorded during the month of January which
which goes down up to 4.6°C. but the maximum temperature is experienced during the month of June which goes as high as 47°C. (Fig.1.4 b). Except a few early hours whole of the day is very hot and oppressive due to scorching winds. In the night, slight decreases in temperature given much relief and the late hours becomes pleasant.

The Tables 1.1 and 1.2 in Appendix-I show average annual temperatures experienced in the Bundelkhand plain.

By the third week of June, the summer monsoon arrives here and temperature falls very abruptly. The temperature ranges from 26.49°C. to 30.2°C. and relative humidity varies from 70 to 80% (Fig. 1.4 b). The nature of rainfall is uncertain and unreliable which some times creates the fear of droughts. July and August are usually the rainiest months of this plain.
BUNDEL KHAND PLAIN
DISTRIBUTION AND VARIABILITY OF RAINFALL

COEFFICIENT OF VARIABILITY IN PER CENT

<table>
<thead>
<tr>
<th>35</th>
<th>30</th>
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</thead>
<tbody>
<tr>
<td>25</td>
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</tr>
</tbody>
</table>

AIR TEMPERATURE

BANDA

MAX

MIN

ORAI

MAX

MIN

MAHOBAY

MAX

MIN

CLOUD COVER

PART OF SKY

0 2 4 6 8

JAN FEB MAR APR MAY JUN JLY JULY AUG SEP OCT NOV DEC

BANDA

ORAI

MAHOBAY

RELATIVE HUMIDITY

BANDA

ORAI

MAHOBAY

Fig. 1-5
From October the monsoon goes back and weather gradually becomes clear, cold and pleasant which symbolises the arrival of Winter Season. In Winter Season the temperature vary from 16.65 to 19.85°C. In December and January nights are often chilly and frost occurs from time to time. From the middle of March the severity of cold normalises and from April, the hot and summer season sets in. (Fig. 1.5B).

1.5. **SOILS.**

Soil is the most important resource of the region. The whole economy of this region depends upon the quality and fertility of soils.

Bundelkhand soils may be grouped into the following main categories: (Fig. 1.6 A).

(A). Low Land Soils, Sub-classed into:

 I. Black Soils (Mar & Kabar),
 II. Red & Yellow Soils (Parua, Rankar).

(B). Riverain Soil. (Kachhar and Tari)

A. THE LOW LAND SOILS:

The important soils of Bundelkhand plain are mostly found in the Northern Low Land. These are Mar, Kabar, Parua and Rankar. They are formed partly in situ and partly by transportation agencies, chiefly the streams. They exhibit a mosaic pattern. Mar is calcareous soil predominantly blackish in colour mixed with lumps of rankar and hence friable and aerated. It is highly moisture retentive which makes it highly
priced for cultivation of wheat, gram and sugar-cane. On the other hand, Kabar is highly diffused soil and it is similar to Mar in many physical characteristics except that it is extremely compact and tenacious without lime concretions.

The red or Yellow soils are characteristic of rocks in which large quantities of iron are present under uniformly high temperature. The iron disintegrates and spreads uniformly in the soil giving it a red or yellow colour. In the Eastern and Southern Bundelkhand Plain red or yellow soils have developed over sandstone. Parua, the best known variety of degraded red and yellow soil group, is well aerated, friable and receptive to irrigation; and as such, a prized soil for various types of crops. Chemically, however, it is deficient in iron, Phosphate, Nitrogen (and humus) as its alkali contents is high. Over irrigation in it is harmful. They are poor also in lime.

B. RIVERAIN SOILS:

Riverain soils have been divided into Tari, Kachhar and Rankar. Tari is found along the channels and the shelving banks are covered with Kachhar or low land alluvial soil. On the other hand, Rankar soils are associated with higher flood plains subjected to gully-ing and erosion so that calcium nodules are exposed at the sloping surface rendering them unsuitable for cultivation.

The findings of Bundelkhand soils are of considerable importance. The organic matter in the soil and the Nitrogen
reserve is medium.

Phosphate content is also medium but potassium content in the soil is poor.

The soils of Bundelkhand plain are classed as fertile soils. This does not mean that the yield of crops from them is necessarily very high. It only means that they are suitable for crop production. High yields of crops always go with intensive farming applying efficient manuring at suitable intervals. No soil, however, fertile, it may be, can show large yield without the addition of suitable manures.

C. SOIL EROSION AND CONSERVATION.

Nothing is more serious among the agricultural problems of Bundelkhand plain that the lack of realisation of the loss that the plain is suffering through soil erosion. Hundreds of tons of good soil are being washed away every year without the slightest attempt being made to check it in some measure. This loss is greater in Bundelkhand plain than in most other plains because of the nature of its relief and rainfall. The huge rainfall of the plain which ultimately causes great flood in the big as well as the small rivers of plain carry away large quantities of soil from one part to the other.

Of course, soil erosion is a serious problem. For soil erosion varies from place to place according to the character of soil, according to the slope of ground, according to the vegetation covers, according to the nature and the amount of rainfall, due to its undulating topography, high velocity streams and unconsolidated soil texture in the ra-
vines of Betwa, Ken Dhasan, Pahuj and Bagain rivers and in the area of Ranker and Parua soils.

The districts of Hamirpur (with 9,20,000 Hectares) and Banda (with 8,40,000 Hectares) and Jalaun (with 6,00,000) Hectares, Laundi (4,00,000 Hectares and Lahar (2,40,000 Hectares) are badly affected by soil erosion. (Fig 1.6 B).

A soil conservation programme was launched during 1957–58 in the region. Some effective measures for soil conservation were taken after the first five-year-plan. The solution of the problem lies, therefore, not in anyone fixed method but in adopting several methods that will take into consideration all the important factors, such as, retarding the spread of run-off, planting of trees, regulating grazing, building dams across the ravine land and contour terracing.

1.6. FLORA:

Flora includes all the trees, plants, bushes and grasses which are naturally grown without any planned afforestation.

In Jalaun District and Lahar tahsil some jungles and thin grass lands are found. In the Northern part of district mango and Mahua trees are very common.

In Hamirpur district chief trees are Babul, Dhak, Saja, Tendu, Mahua, Teak, Semal, Mango, Neem and Jamun. The State Government has set up a plantation programme in the district to promote afforestation. In Mahoba of Hamirpur
district, there are found some jungles and scattered grasslands.

In Banda district, spars jungles are found in every tahsil, mainly in Mau, Karwi and Naraini. The important trees of these jungles are Kareel, Dhak, Sahjan, Mahua, Karunda, Ingota, Palash, Tendu, Chamrait, Dhawa, Haldu, Bamboo, Tinsa and Khair.

In Laundi tahsil some patches of jungles and grasslands are found. The bushes of Jharberi are very common. Neem, Mahua, Kardhai, Amla, Sharifa and Jamun are main trees.

The main grasses grown in the plain are Musel, Ora, Gunna, Karta, Pasai, Dula Kans, Dhak and Gandar. These grow profusely in the rainy season. All these grasses are mostly used as fodder for animals and building material. They have no commercial and industrial use till now.

1.7. **FAUNA**:

Fauna includes all types of wild and untamed animals. Wild life in the plain is very poor because the forests are not dense. Whatever wild life is found in the plain is not in large number and is vanishing day by day. Even then Hiran and Chikara are mostly found in the plain. Tiger is rarely found in the forests. But panther or leopard called Tendua is still very common in the dense ravine tracts. Stripped Hyaena is found in the most parts of jungles. Chikara, Sambhar of the order carnivora, deer and chetals of artodactyla are occasionally seen in the forests. Porcupi-
nes locally known as Sahi and squirrel of the order Rodentia are frequently seen in the fields. Snakes and scorpions are extremely numerous. Crocodiles of both the varieties i.e. Ghariyal and Magar are found in the Yamuna river and in all the big streams.

The most common birds found here are peacock, parrot, duck, crow, vulture eagle, pigeon, Grey partridges, sand-groves, crane, coco, papiha, kathfora, neel-kanth, gal-galia, dauki, saras etc. etc..

A large number of fishes found in the big rivers like Yamuna, Betwa, Ken, Bagain, and Dhasan. Manseer and Fulabi Machhi are very common. Bachua, Naini, Baikri, Roha, Tenga, So'ur, Buwali, Baji, Arwari, Parhin and Chilida are also found in the rivers.

After knowing the geographical personality of the region it becomes relevant to assess the potentials of the vegetative resources.
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20. RAO, R.H.


21. RAO, R.S.


22. RANGAPPA, K.


23. MAJID, S.A.


