CHAPTER : II

GEOGRAPHICAL PERSPECTIVE

KEYWORDS:

(A) Physical Aspects :- Relief; Climatic conditions; Rivers and Streams; Waterfalls; Canals; Waterbodies; Vegetation;

(B) Cultural Aspects :- Settlement; Communication and Transport.
CHAPTER - II

GEOGRAPHICAL PERSPECTIVE

(A) PHYSICAL ASPECTS

The story of human progress, both in space and time, is a process of man's adaptation to his geographical milieu. "Look at the materials used to build the old houses, the palaces, castles, forts, temples and tombs; you will soon learn to read more meaning into many of the changes of scenery when you find that you can explain them, at least in part by the steady long continued influence on man of the rock on which he lives."1 Geological structure of rocks are the sources of minerals of economic importance. Bedrock strongly influences shapes, size and development of the erosional landforms. The ecological effect of geology, rock and soils on the distribution of vegetation offers an interesting field of study which is of great importance to the students of human geography.

RELIEF

Landforms of the earth are primary concern to the human geographers because they exert far-reaching and fundamental influence on the pattern of human activity.

Relief exercises a lasting effect on the economic life of man. Indirectly, the relief of the land effects the economic life, because of raw material is dependent on the soil. It also directly limits the
Their influence on the life of man is, therefore, very important. Most plains in the world are endowed with a fertile soil. The climatic conditions also favour, together with the fertile soil, the development of the earliest agriculture on the face of the earth.

Alluvium deposits are found over the entire Bihar Plain including the South Ganga Plain in Bihar. The olden alluvium (or BHANGAR) occupies the higher ground and contains coarse gravels with often much surface KANKAR. The newer alluvium consists of silts and clays coupled with fine sands.3

"Unlike the North Ganga Plain, the South Ganga Plain is not only restricted in its extent by projecting hills in Monghyr and Santhal Parganas but is also sprinkled with numerous outliers of Chotanagpur highlands. The Barabar hills with multicaves, Rajgir - Jethian (446 mts. at Rajgir) hills, hogbacks of Sheikhpura, the small hill near Biharsharif known as Pirpahari (120 mts. high), Jamalpur - Kharagpur hills appear as islands in the very bed of the Ganga at Monghyr, Sultanganj and Sahebganj.4 The extensive triangular hill of Kharagpur in Monghyr rises from 500 to 1000 ft. (160 mts. to 320 mts) and its northern sub - alluvial projection is responsible for the sharp bend of the Ganga near the town of Monghyr.5 This plain has greater regional contrast than the North Ganga Plain. "The Shahabad Plain (Presently Bhojpur and Rohtas Plains) with its levee and "CHHARAN" (abandoned) meanders, hether (adjoining gently sloping levee), Denarbharki lowland and canal irrigated plain of the South depicts
FIG-2

SOUTH GANGA PLAIN: GEOLOGY

A

ALLUVIUM

B

RELIEF

HIGHLANDS

KMS.

20 0 40 80
its varying plain features. The Ganga levee varying in its width forms a significant flood plain which is breached by rivers of the South at convenient points, otherwise the rivers flow parallel to Ganga following the same direction.\textsuperscript{6} The Ganga Plain is the superficial expression of a thick body of alluvium which has been gradually accumulating in the vast depression limited in the north by the Himalayas and in the South by the Chotanagpur Plateau and its outliers.\textsuperscript{7}

"With the exception of a small area of hills and jungles in the South - East near the junction of the districts of Patna, Gaya, and Monghyr (old), the whole district is a rich alluvial plain sloping gently northwards."\textsuperscript{8}

Within the old Gaya District, or the core of Central Bihar, "the northern portion, which is highly cultivated and extensively irrigated, was in very early times a civilized country and the home of Aryan races; It was part of Magadh, the nucleus of the first great empire in India and the centre of Buddhism for many centuries in later years, it was the area of the conflicts of contending armies".\textsuperscript{9} Presently the area is witnessing the so called, "Caste Wars" or "Naxal activities " in a big way.

**CLIMATIC CONDITIONS**

Climate is a factor of the environment which makes itself felt through the primitive wants of food and shelter at every step. Our clothing, our houses, our roads and railways, our food and our very health and capacity to work depend upon climate. Actually climate
affects not only the agriculture but all other aspect of human life. Climate is also the controlling factor in trade. Climate affects not only the human activities but its effect is particularly marked on landforms. It powerfully affects the character of the vegetation, which in turn, affects erosion. Climate occupies the fundamental position in the study of human geography.10

The climatic conditions of Bihar is governed by its location and relief features. The climate of the district of old Patna district is characterised by pleasant cold season, a hot and somewhat dry summer and the monsoon season with its moist heat and oppressive nights.11 The district of Gaya (old) enjoys a continental monsoon type of climate owing to its great distance from the sea. Summers are very hot (Gaya city is the hottest place) and winters cool.12

The climatic features of the study area, as also to India, can be better understood with reference to the three seasons the region experiences. The months of a year is commonly divided into three broad seasons: -

(A) Cold - weather season (November to Mid March)

(B) Hot - weather season (Mid - March to Mid June) and

(C) Season of general rains (Mid - June to September)

The month of October is a sticky transitional month between rainy season and cold season.

(A) The Cold Weather Season : This season arrives from the
month of November and continues up to the last week of February or first week of the month of March. The mercury starts recording lower temperature from the month of November and reaches the minimum in the month of January or February (see table no.1) Generally the month of January is the coldest month which is clear from the following table showing temperature data. "The weather is one of the finest in the month of January and February, being comparable to English Spring or Summer." It is may be observed that range of temperature is highest between the months of December and January which is due to the great variability of temperature of the atmosphere during day and night. The days are bright and pleasant whereas nights are often chilly.

This season is in general rainless or months of scanty rain. The total amount of rainfall falling in this season is on the average less than 40 mm. The weather condition is in general mild and dry with light and pure air. "The serenity of the weather is however, broken by the passage of western disturbances, which give some rainfall in the Winter Season. These disturbances or depressions are similar in character to the extra-tropical cyclones marked by various sectors and fronts." The speed of the wind is slow as the cyclones over the country are in an occluded stage (or waning stage) The winter shower is very beneficial for agricultural works. It is very healthy and stimulating as well as economically the most active season. In general, this season is ideal from the health point of view.
(B) The Hot Weather Season: With the commencement of the month of March mercury rises rapidly till the maximum of temperature is reached in May (29.9°C Patna; 31.8°C Gaya; 30.9°C Bhagalpur; 29.7°C Ara; 31.1°C Munger. May or June is the hottest month of the year. During the day, the temperature goes up more than 45°C. Though the days begin to get hot in March, the nights and early mornings continue to be comparatively cool and pleasant. The gentle blowing wind gradually changes into strong wind.

Rainfall is meagre in March and April even less than 13 mm. (see table no.e), which increases slightly in May due to Norwester. The actual rains arrives by the middle of June and Summer season gradually changes into Rainy season with the bursting of Monsoon. This is the season of water scarcity and drought.

Table No.- 2
TEMPERATURE CONDITIONS: AVERAGES: 2002 (IN °C)

<table>
<thead>
<tr>
<th>Month</th>
<th>Patna and Biharsharif</th>
<th>Gaya</th>
<th>Bhagalpur</th>
<th>Ara</th>
<th>Munger</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>15.5</td>
<td>13.9</td>
<td>14.6</td>
<td>15.0</td>
<td>15.4</td>
</tr>
<tr>
<td>February</td>
<td>19.5</td>
<td>19.0</td>
<td>18.3</td>
<td>19.3</td>
<td>19.2</td>
</tr>
<tr>
<td>March</td>
<td>23.8</td>
<td>24.9</td>
<td>24.1</td>
<td>23.6</td>
<td>25.0</td>
</tr>
<tr>
<td>April</td>
<td>27.9</td>
<td>33.1</td>
<td>28.8</td>
<td>26.8</td>
<td>29.0</td>
</tr>
<tr>
<td>May</td>
<td>29.9</td>
<td>31.8</td>
<td>30.9</td>
<td>29.7</td>
<td>31.1</td>
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<td>June</td>
<td>34.8</td>
<td>36.2</td>
<td>32.5</td>
<td>33.6</td>
<td>34.3</td>
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<tr>
<td>July</td>
<td>28.6</td>
<td>30.6</td>
<td>29.2</td>
<td>28.5</td>
<td>30.1</td>
</tr>
<tr>
<td>August</td>
<td>29.4</td>
<td>30.0</td>
<td>28.9</td>
<td>29.3</td>
<td>28.8</td>
</tr>
<tr>
<td>September</td>
<td>28.5</td>
<td>28.6</td>
<td>28.9</td>
<td>28.6</td>
<td>29.1</td>
</tr>
<tr>
<td>October</td>
<td>26.1</td>
<td>25.9</td>
<td>26.4</td>
<td>26.2</td>
<td>25.9</td>
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<tr>
<td>November</td>
<td>21.0</td>
<td>20.9</td>
<td>21.0</td>
<td>21.1</td>
<td>22.0</td>
</tr>
<tr>
<td>December</td>
<td>15.3</td>
<td>16.3</td>
<td>15.03</td>
<td>15.4</td>
<td>15.0</td>
</tr>
</tbody>
</table>
Source: Biharsharif has no recording station, hence it follows the climatic data (temperature and rainfall) of Patna.

Table No.- 3

RAINFALL: AVERAGE (MEAN MONTHLY): 2002: (IN MM)

<table>
<thead>
<tr>
<th>Month</th>
<th>Patna and Biharsharif</th>
<th>Gaya</th>
<th>Bhagalpur</th>
<th>Ara</th>
<th>Munger</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>22.2</td>
<td>28.0</td>
<td>13.9</td>
<td>24.0</td>
<td>12.9</td>
</tr>
<tr>
<td>February</td>
<td>6.0</td>
<td>6.0</td>
<td>19.8</td>
<td>6.3</td>
<td>20.1</td>
</tr>
<tr>
<td>March</td>
<td>10.1</td>
<td>5.5</td>
<td>12.5</td>
<td>10.2</td>
<td>10.3</td>
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<td>46.9</td>
<td>13.5</td>
<td>57.4</td>
<td>45.8</td>
<td>59.1</td>
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<td>June</td>
<td>46.9</td>
<td>33.8</td>
<td>173.0</td>
<td>47.1</td>
<td>170.1</td>
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<td>July</td>
<td>728.2</td>
<td>420.0</td>
<td>245.6</td>
<td>710.1</td>
<td>235.6</td>
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<tr>
<td>August</td>
<td>185.8</td>
<td>135.0</td>
<td>268.2</td>
<td>190.7</td>
<td>271.3</td>
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<tr>
<td>September</td>
<td>205.7</td>
<td>119.7</td>
<td>194.8</td>
<td>206.9</td>
<td>199.7</td>
</tr>
<tr>
<td>October</td>
<td>0.0</td>
<td>0.1</td>
<td>71.6</td>
<td>1.0</td>
<td>38.4</td>
</tr>
<tr>
<td>November</td>
<td>34.3</td>
<td>6.5</td>
<td>9.1</td>
<td>33.8</td>
<td>8.1</td>
</tr>
<tr>
<td>December</td>
<td>6.0</td>
<td>0.8</td>
<td>2.0</td>
<td>7.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Source: Meteorological Station, Patna, Gaya, Bhagalpur, Ara and Munger.

(C) The Rainy Weather Season or the Season of General Rain: In course of time, the hot weather season changes into the season of general rains by the sudden bursting of the Summer Monsoon. The rainy seasons arrives from the 3rd week of June and continues till the month of October. The month of June, in spite of being hot, records lower temperature because of the precipitation which occurs due to the bursting of the Monsoon. Temperature lowers down from this month, due to the heavy rainfall, which makes the earth-surface cool.

It is obvious from the table no.2 that slow and steady decrease of temperature occurs during this season. Temperature of June is
CLIMATIC CONDITIONS

FIG. 3
recorded for Patna 34.8°C; Gaya - 36.2°C; Bhagalpur - 32.5°C; Ara - 33.6°C; Munger - 34.3 and 26.1°C, 25.9°C, 26.4°C, 26.2°C and 25.9°C in the last month of October in this season for the cities.

The change in weather from the dry hot season is marked not only by the facts of temperature and high humidity of atmosphere but also by the reversal in wind direction. The winds are very strong possessing a speed of upto 25 kilometres per hour (25 kms/hours).

The mean (average) monthly precipitation for the month of July is 728.2 mm for Patna; 420.0 for Gaya; 245.6 for Bhagalpur; 710.1 for Ara and 235.6 mm for Munger (see table no.3). About 85 percent of the total precipitation is recorded during the Monsoon rains from June to September. In fine, it can be said, that the rainy season is marked by three HIGHS - rainfall, humidity and temperature.

RIVERS AND STREAMS:

Rivers are closely linked with the past history of mankind and with its present life and pursuits. The rivers are useful for navigations, for watering the dry lands by irrigation, as a water supply for many purposes, as a source of water powers, as a home of valuable food, fish and for other purposes.

Significance of drainage: "Drainage lines hold particular significance in the region. They not only provide redeeming break in the existing topography of the flatness of the plain and provide sub-regional or even local uniqueness and individuality to the different parcels of land, but they also govern to great extent, the human
occupance of land, particularly the agricultural lands and settlements". One may witness the old settlement which are situated along the rivers and streams for several beneficial aspects e.g. for easy means of water-communication, defense etc. The typical linear city of Patna, about 20 kms. long east-west with less than two kms. width, is due to the occupance of elongated Ganga Levee and its stie advantages. The city of Gaya has sprawled on the left bank of river Phalgu. Bhagalpur enjoys its significance from the the riverine situation. River Panchane flows through Biharsharif. Munger is also on the river Ganga-side.

Rivers:

Most of the rivers of the South Ganga Plain in Bihar debouches from the Southern Highlands, except river Ganga which originates from the Himalayan region.

Ganga:

River Ganga is the master-stream in Bihar and is the most sacred. This snow-fed river Ganga is characterised by a considerable discharge of water during the Winter Season falling to a minimum in the months of March and April, after which the melting of the snow in the Himalayas gradually raises the volume till it is complemented by the Monsoon showers when the river at Patna in spate during late June, July and September. The river at Patna is about 550 metres wide in dry season, and the stream is then sluggish until it is joined by the Gandak. The country to the north is very low, and is flooded every year, but there is only one major channel during
the cold weather, while the main stream is impinging upon one bank (right) the stream on the otherside is comparatively gentle, so that before the flood subsides, it ordinarily deposits a certain amount of the detritus with which the water is heavily loaded.\textsuperscript{21} The confluence of the Ganga with the Son is near the village of Hardi Chapra, from there the river flows in a single stream to Digha. Here a side channel of the Son, the last remnant of its ancient easterly course, enters the Ganga. The Patna - Gaya Canal joins the Ganga by this stream. In certain years due to insufficiency of water, this becomes unnavigable. The Punpun joins the Ganga at Mohsingpur Kurtha. At Barh the river turns to the north in a "Horse - Shoe" course.\textsuperscript{22} Leaving Surajgarha the Ganga flows to the north - east creating a sharp bend, on reaching the highland near Munger. It than turns almost due South for 12 miles, and next to the eastward for 5 miles till it reaches the boundary of Bhagalpur.\textsuperscript{23}

\textbf{The Son:}

This is another significant river of the Study area. It rises near the sources of Narbada and Mahanadi in the elevated plateau of Central India near Maikal Hills. After entering its valley stage the river attains a great width all through its journey along the western boundary of the old Gaya district the river is nowhere less than two miles wide and in places the width extends to three miles. This river receives no tributary of any importance from the point where it enters old Gaya district until it joins the Ganga. The river can be crossed at many points during the dry season but ferry boats generally ply
for eight months in the year. Navigation is carried on in the lower reaches of the river but it is of little commercial importance.24

The Poonpun or Punpun:

Another important river is Poonpun. It flows to the east of the Son and almost parallel to it towards the Ganga. This river originates from the lower reaches of the highlands of old Palamu district. The river receives several small feeders on its right bank all rising from the South. These tributaries are Ram Rekha, Barki, Batane, Adri, Madar and Bilaro. The river has some other tributaries also. These streams dry up in the hot weather and even when full the greater part of their water seldom reaches the Poonpoon because several artificial channels disperse their water over the fields. The water of Poonpoon is extensively used for irrigation by the adjacent villages and it is dammed at several places for this purpose, the main Bandh or dam being at Kussreh in the Jehanabad district.25

The poonpoon is very sacred for the Hindus, specially for the SRADDAHA observing pilgrims.

The Phalgu:

Phalgu or the river of Gaya city is very sacred to the Gaya Pilgrims. It loses its very existence as soon as it enters Patna district. It is formed by the confluence of the Nilajan and the Mohana some 8 kilometres South of Gaya. These two large hill streams debouch from the Hazaribagh Plateau. The streams which are about 100 metres wide unite near Mankosi Village and then the united stream.
is known by the name of river Phalgu. This Phalgu flows to the north. By the side of Gaya city, it attains a breadth of over 300 metres. "The Phalgu here impinges on a high rocky bank on the steep side of which are many GHATS leading to the river bed, while above high water is the Vishnupad temple with many minor shrines and the houses of the Gayawals."26 A number of sacred centres, the most important the Vishnupad Temple, are situated on the left bank of the river. The portion of its course flowing by the city of Gaya is considered very sacred by the Hindus.

Others:

The Karamnasa, the Sakri, the Kiul, the main and their tributaries drain the area of South Ganga Plain in Bihar and lastly meets with the Ganga. "The Sonbhadra is no less notorious river in causing floods along Shahabad - Gaya - Patna borders. The Phalgu augmented with Lilajan and the Mohane is an threatening as its another rival, the Poonpun. The rivers coming from the Chotanaqpur Plateau join and flow parallel to the Ganga to find an outlet through the Harohar. The floods in Central Bihar (South Bihar Plain) reach their climax only when the Ganga is full to the brim and the rivers flowing from the South are also carrying maximum volume of water and load. They create no less a formidable Ganga from Barahiya Tal to Patna, flowing in the same direction leaving elongated jet of levee between them. The Dakra Nala likewise presents a similar portrait of flood water between the Jamalpur scarps and the Ganga."27

The course of river Ganga is continuously shifting and islands
appear and disappear year after year. Again, the water of the river is also lowering during the last few years.

**WATERFALLS:**

A few picturesque waterfalls in the Rohtas Plateau e.g. Karamanasa waterfalls (100 mts) near Chhanpathar Village, Durgawati Falls (100 mts) heading the deep glan of Khadar Khoh, Zibhar Kund falls (150 mts) on the Phulwari a stream and Kako Nadi Fall (40 mts.) three kilometres above Tarachandi Pass.28

**CANALS:**

**Son Canal**

It is very useful for irrigation. "During the famine of 1873-74, the Son Canal works out only gave employment to number of labourers, mostly local amounting at the fullest time to over 40,000 persons, but the water which was passed through the unfinished channels irrigated nearly 1.60,000 acre, according to the estimate of the Department of Public works".29

**Patna Canal:**

This Canal was laid for irrigation to the area lying to the east of the Son. "The earth work of this canal was completed in March 1875. Its length is nearly 127 kilometers, of which 58 kilometers lie within the district of Patna. It commands an area of 780 sq. miles or 4.49 lakh acres. For irrigating this area, the water is conveyed through distributaries. The course of the Canal from its commencement is, in general, parallel with that of the Son".30
WATERBODIES:

One may find a large waterbody in the eastern part of Patna. This is in use mainly by the washermen for washing the clothes of the people of Patna.

A number of ponds or water tanks may be seen within the bounds of Gaya city. The construction of these tanks may be attributed to the reasons that the city is the hottest place in India. The tanks or ponds which are locally called SAGARS as these exert ameliorating effect on summer heat. These are considered much sacred for Gaya-pilgrims for SRADDHA performance.

Bhorang JHEEL near Shivanarayanpur in Bhagalpur district is a fairly large water-logged tract now overgrown with weed which is used to be a good spot for game birds.

During olden days, river Panchane flowed in five branches in and in the environs of Biharsharif forming tree-like pattern. It is characterised by a shifting courses and at present it may be seen in the city a number of redundant courses of Panchaney in the forms of water bodies or ditches full of sand. The water-logged or lowlands areas are the bed of old river courses.

VEGETATION:

Vegetation here means 'natural vegetation' grown in accordance with soil and climate in natural way. In Bihar natural vegetation are forest not grasses.

In the areas of Study the main type of natural vegetation is
the "Tropical Dry Deciduous". This type of vegetation has the following features.34

(a) It grows in areas with less than 125 cms. of annual rainfall,

(b) It covers the forests of the Kaimur upland and some northern fringe areas of Chotanagpur,

(c) It has a stunted growth, the canopy rarely rising above 16 meters.

(d) A species of deciduous bamboo is found,

(e) The leafless period is more pronounced than in the moist type of Chotanagpur,

(f) It includes a dry SAL forest, but apart from SAL there are other important species.

In the Kaimur plateau poorer forests are found. Patches of SAL are occasional in Shahabad. The common forest is a mixed stunted growth incorporating bamboos, AMALTAS, SEMAL, HARRA, ABNUS or TEND, KHAIR, PALAS, ASAN and MAHUA. The grasses include SABAI and KUS.

In the areas of the South Gaya, South Munghyr and South Bhagaipur (all old districts) the forest is generally replaced by scrub in which SAL is relatively small in number while PALAS, ASAN, SEMAL, HARRA, GULAR, BER, SHISHAM, BABUL, SIRIS and bamboo increase in importance. Again, the other areas of Tropical
Dry Deciduous type of vegetation is largely supplanted by cultivated vegetation of field crops and fruit gardens and orchards. SOIL:

Soil is the fundamental raw material of agriculture. It is the natural medium for plant growth. According to Wilcox, "the history of civilization is the history of the soil and the education of the individual begins from the soil".

The land of the Central Bihar has been built of the alluvium brought from the Southern hills, with some isolated hills and hill ranges. "The Ganga Plain in Bihar is the superficial expression of a thick body of alluvium which has been gradually accumulating in the vast depression." The soil is very fertile on which a number of crops are grown. It supports the thick population residing the area.

(B) CULTURAL ASPECTS:

SETTLEMENT

The area under study appears to have been occupied by human settlements deep down during the pre-historic times. Fifteen thousand years ago, man in this region was in the palaeolithic age, with a nomadic way of life. Civilization based on rudimentary agriculture and crude metal working dates back to about 10,000 years. Even as late as "3500 - 2500 B.C. man eked out a precarious existence, and there was hardly any trade in essential commodities. Indeed there was no surplus; man lived on the edge of the needs." Resourceful Magadh which was not fully aryanized
even up to Buddha and which became "one of the earliest homes of Buddhism and remained a centre of that faith until the Muslim conquest." Among the sixteen states of North India in Buddha's time, Magadh and Anga were powerful kingdoms. "Magadh, with some alternating vicissitudes, rose several times as the greatest regional and national power by annexing the neighbouring territories in the north, east and west and superimposing on others, as in the reigns of Bimbisar, Ajatsatu, Mahapadmananda, the Mauryas and the Guptas etc." Pataliputra, the Magadhan Capital, became the political centre indicating the "growing strength and confidence of Magadh and of the growing importance of the Ganga both for trade and politics." Cities had become the centres of trade and commerce. The spatial growth of the cities under study passed through several vicissitudes with the growth of various functions added to them which have been delineated in chapter first.

**COMMUNICATION AND TRANSPORT:**

Communication and Transport are an integral thread of the urban fabric. These permeating elements affect and sustain town's/cities location, growth, rank-size and morphology. For the reasons it is not possible to understand or explain many of the characteristics of urban function, structure, location or internal pattern without a knowledge of areal differences in transportation with which such differences in cities are associated. Transportation is as much the key to the land-use pattern it ever was. A town comes into being either at a point having those characteristics of nodality which enable
it to discharge that particular function to the best advantage or at a point artificially endowed with nodality.\textsuperscript{44} Towns are nodes of route systems and their importance closely reflects the degree to which they possess the property which has been called nodality.\textsuperscript{45} The most important role of transportation is in the evolution of the internal structure of the city, the essence of which is the geographical specialization and the functional organization of the urban community.

"The basic structure of the transportation system of the region consists of a network of roads of diverse nature and capacity, railways operated in the area is insufficient, a rather incomplete net of airways, and navigable rivers by country boats of various sizes and ferry steamer services at important points mainly along the Ganga."

For maintaining the external relations the cities under study have waterways, roadways, railways, airways, postal and telecommunications.

\textbf{Waterways}:

The rivers and canals which are navigable throughout the year by country boats are the Ganga, and three Son Canals viz. Patna Canal, Arrah Canal and Buxar Canal in the study area. The rivers which are navigable during the monsoon only by country boats is only the Son below Dehri Anicut.\textsuperscript{46}

"Early in the present century, the Ganga used to be the chief waterway of the region, but owing to the diversion of its upper waters
for irrigation purposes, it could only be navigated above Digha by small steamers of light draught. The Indian Navigation and Railway Company jointly with the Rivers Steam Navigation Company, maintained regular steamer services along it.\(^{47}\) From 1968, the North-Eastern Railway run steamer services between Paleza and Mahendru (Patna). Besides a private steamer also plies to and from Bansghat (Patna) and Paleza Ghat. Presently, there are eight GHATS in Bankipur and Patna. There are two bridges at the Ganga in the region - Rajendra bridge (both rail and road) at Hathidah (Mokarnah) and the recent Mahatma Gandhi Setu - Connecting the region to North Bihar. These have imparted a great impetus to trade linking the area to North Bihar and in turn to Calcutta market.\(^{48}\)

"Navigation on Son river is intermittent and of little commercial importance".\(^{49}\) The most important ferry is across the Son from Daudnagar to Nastiganj in Rohtas district.

The river of Gaya i.e. Phalgu is a confluent stream of Mohana and Nilajan, the two large hill streams which debouch from Hazaribagh Plateau. The stream suffers from a lack of perennial supply of water in it and hence it is turbulent and devastating during the rains but is reduced to tiny rivulets winding in tortuous course soon after the rainy season is over. "When it is in flood, they quickly become unformidable, and, as a rule, no boats are obtainable, except at the ferries which are few and far between. The country people provide a ready substitute in the shape of light rafts, called
GHARNAIS, made of light framework of bamboos supported on inverted earthenware pots (GHARA).^50

"The first steamer that plied on the Ganges in Bhagalpore district came up from Calcutta about 1928. There used to be a regular steamer service of the I.G.N and R.S.N Company Limited between Buxar and Calcutta, touching the GHATS of Sultanganj, Barari and Colgong in Bhagalpore district and passengers and merchandise used to be transported to the various steamer stations in Assam, Bengal, Bihar and U.P. But in 1957 the company closed down this steamer service on the ground that it has ceased to be an economic proposition. Besides the North-Eastern Railway Steamer Service between Barari GHAT and Mahadeopur GHAT, there are two private steamer services for passenger and goods traffic from the one bank of the Ganga to the other and these ferries are situated at Sultanganj and at Bhagalpore."^51

The Arrah canal, leaving the Son at Dehri, runs for 60 miles to Arrah, whence it is connected with the Ganges by the Gangi Nadi. Traffic moves locally in Son Canals by country boats. On the average the number of boats plying on Arrah Canal per year is about 1000 boats."^52

"There used to be a regular steamer service of the I.G.N. and R.S.N. Co., Ltd. between Buxar and Calcutta touching two GHATS of the district of Monghyr, e.g. Simaria and Monghyr from which passengers and merchandise used to be transported to the various
steamer stations in Bihar, West Bengal and Assam. This steamer service after working for about one century had closed down its services in 1957 on the ground that it had ceased to be an economic project. There is also a ferry steamer service all the year round from Monghyr to the opposite bank of the river Ganga connecting Monghyr GHAT railway station on the NORTH EASTERN RAILWAY. There is also a similar and regular steamer service at Mokameh GHAT in the district of Patna connecting Simaria GHAT railway station in the district of Monghyr on the North Eastern Railway. This steamer service is under the management of the North Eastern Railway. These two steamer services provide link between the Eastern and North Eastern Railways.

Roadways:

Roads help in the growth of trade and other economic activities in and outside the town. Roads help in keeping the culture and educational contact with strangers and thus they broaden the outlook of the population keeping such contacts. The function of commercial area of the town depends upon excellent road.

During the Vedic period, development of roads were very few. During the Ramayan period the general condition of the route was not commendable. The developed road conditions during the MAHABHARAT period, may be known by the PATHA followed by Bhima and Krisna, when they were going to Rajagriha from Hastinapur for combat with Jarasandha. This route is the offshoot of
PHOTO PLATE NO.I View of the double-lane four-track Gandhi Setu (1982) road bridge over river Ganga joining South Ganga Plain to North Ganga Plain. This link brought prosperity to both the Plains on the one hand and dynamics of urbanization of Patna City and Hajipur (a town of Northern Plain) on the other.
the great Uttarapatha between Hastinapur and Vaisali via Sravasti.54

There has been much extension of routes during the period from 600 B.C. to 300 B.C. The urban centres under study were linked with the main urban centres of Northern India. Francis Buchanan who toured the Magadh area in 1811 - 12 presented a vivid picture of the deficiency of communication at that time. The actual development of roads had taken place in the second half of the 19th century. Actually the period from 1851 to 1947 was the era of transport revolution.54 In the post - independence period, there had been a tremendous development of roads in and around the cities and towns. Presently, the cities and other urban centres are linked with wide metalled roads to all urban centres of Bihar.

Establishment of Bihar State Road Transport Depots took place on the 26th January 1953. On this day, a nationalised road passenger service under the State Government was came into existence by the name of "Bihar Rajya Transport" upto the 30th April, 1959, when it was renamed as "Bihar State Road Transport Corporation" (B.S.R.T.C.) . This organisation is entirely owned and operated by the State Government. A State Transport Depot was established at Gaya on the 1st April, 1954; and at Monghyr on the 26th January, 1956. It was also established in Bhagalpur, Biharsharif and Arrah in different years.

Of the Seven cities, only Patna has local (intra - urban) bus - service. Besides the State buses, several private buses, including
The luxury coaches, Video coaches are on the road to the important urban centres of the State and to West Bengal, U.P. and Orissa. The Cities are well-linked with all the industrial, mining and commercial centres of the State with all weather good roads. Besides the different types of buses, the cities are well-connected with other mechanically propelled and power driven vehicles. The Patna, and Gaya Regional Development Authorities (P.R.D.A. and G.R.D.A.) and the Municipalities of Bhagalpore, Arrah and Monghyr are maintaining the internal roads and traffic properly.

The traffic flow within the city of Patna is maximum on Bankipur - Chowk, Bankipur - Danapur, Bankipur - Malsalami and Patna Junction - Danapur routes; G.B. Road, Phalgu bridge at Gaya; main Bazar road to station at Bhagalpore; Ranchi road; Garhpar Chowk at Biharsharif; Chowk area, Court area and Station area at Arrah; road from bus-stand and auto-rickshaw stand to Jamalpur railway station and market area of Monghyr.

Buses, trucks, 407, Matadors, Taxies, Cars, auto-rickshaws, Motor - Cycles, Cycles rickshaws, Cycles, Thelas, Bullock-carts, etc. are the vehicles on the roads of the cities and towns. Bullock - Carts is the vehicle int he countrysides.

Problems of road transportation and accidents - major or minor exist in all the cities of the world, though on a varying magnitude. If we let our glance sweep over time and space we see that the heart of the Indian city is a maze of narrow streets made narrower by the
PHOTO PLATE NO. II  View of century-old narrow road bridge over river Phalgu in the mid of Gaya city, joining, Manpur, an integral part of the city. Notice the heavy traffic over it.
encroachment of open shop fronts and booths, the blocks of buildings traversed by narrow back lanes, unspeakably fetid, serving for the collection of refuse. Outward from the business centre, streets degenerate into ill-kept lanes and alleys. The outer fringe is usually revolting, a chaos of mud or matting huts, market gardens, stables, cowsheds, muddy ponds and waste ground, the dusty breeding place of clouds of flies, the haunt of snakes and scorpions and half-starved cattle.56

Traffic problem is caused by a flagrant violation of the municipal laws by shopkeepers, hawkers and vendors, who encroach upon the public footpaths.

The attempt made to increase the road mileage in these cities during recent years was negligible. Neither the existing roads were properly (only patch-work done) repaired, nor the new roads were constructed.

**Railways:**

The area of South Ganga Plain in Bihar is well served by railways, which have made Patna, Gaya and Bhagalpore the headquarters station, the centre of a number of radiating lines and of a busy railways system. The history of the development of railways of Patna, Gaya and Arrah dates back to the 19th century. The mainline connecting Patna, traverse the north of the region parallel to the Ganga from east to west. "The work for a single line of rails commenced in 1855 and after many interruptions during the revolt
of 1857, was completed in 1862; the second line was begun in 1868 and finished in 1870. The Patna - Gaya line was laid in 1876. Patna junction has four railway stations on the Mainline from the West are Phulwari Sharif, Patna Junction, Gulzarbagh and Patna Saheb. Between Patna Junction and Gulzarbagh, there is a small flag station at Rajendra Nagar.

The first Railway line was constructed joining Gaya to Patna in 1876 A.D. for connecting it with the mainline of the Eastern Railway. Thus, Gaya, the poppy producing district was linked with Patna, the riverport city. The South Bihar Railways was laid in 1895, which linked Gaya with Kiul providing an easier approach to Gaya from Calcutta. The Western part of Grand Chord Section of the Eastern Railways joining Gaya with Mugalsarai was started in 1900 A.D. Further, the Grand Chord was extended to Gomoh linking with Dhanbad and Asansol, the coal mining centres in 1906 A.D.

Bhagalpur has four zones of railways - East of Bhagalpore - Bhagalpore - Sabour - Colgong - Ghogha - Pirpainti, West of Bhagalpore - Bhagalpur - Nathnagar. Akbarnagar - Sultanganj, South of Bhagalpur - Bhagalpur - Bousi, and North of Bhagalpur - Bhagalpur - Barari.

The first railway line was laid at Bihar Sharif in 1903 A.D. by M/s Martine Company running from Bakhtiarpur to Rajgir mainly for goods transport, which was largely a result of British, Colonial Policy.

Arrah is served by the mainline of Eastern Railway. But more
PHOTO PLATE NO. III View of Jamalpur, the nearest Railway junction of Munger. Munger, the sleepy town has only a branch-line to Jamalpur.
to Kathmandu in Nepal. The airport is located in the Western Patna. This is mainly used by the Indian Airlines Corporation, Royal Nepal Airlines, Bihar Flying Club Ltd. and the aircrafts of Bihar Government. The aircrafts of Tata Iron and Steel Co. and Indian Air Force, etc. also occasionally land at theis place.

The Gaya aerodrome is 9 kilometres South - West of the city. It is situated about 92 kilometres south of the air - track of Scheduled flight - between Calcutta and Delhi. It is also joined to Patna, the capital city of Bihar and with Ranchi, the summer capital. The aerodrome of Gaya has got an inernational imprtance for the reasons tha Lord Buddha got enlightenment at BodhGaya about 15 kilometres South from Gaya. It has two days in a week regular service lirking Columbo in Srilanka and Bangkok in Thailand, both the Buddhist countries.

The landing ground at Bhagalpore is situated at a distance of 3 miles (5 kms) from Bhagalpur railway station and is to the South of Bhagalpur Central Jail. It is serviceable throughout the year. But the landing ground of the aircraft of Biharsharif is serviceable only in fair weather and is used occasionally for small aircrafts of State Government.

Arrah is possessed of a spacious landing ground at the distance of 2.5 kilometres north of Civil Courts. It has no regular service.
The landing ground of Monghyr is at Safiabad (Monghyr) at a distance of about 6.5 kilometres from Monghyr Court on Monghyr - Jamalpur road. It is suitable only for small and light planes.

**Postal and Tele-Communication**

Though the Postal Communication existed even before the 19th century and "Bihar State" found its place in the modern postal system introduced in India in 1854, largely based on the British pattern but the real expansion was accelerated by the 1st Great World War.

Presently cities and other towns with large growth centres under study are well facilitated with postal services. The postal delivery includes letters - ordinary, registered, moneyorders, parcels and telegrams, whose number is increasing constantly.

Now, STD/ISD services in public booths are widespread. It has also got home facilities.

**Hybrid Mail Service:**

The Department of Posts has introduced a Hybrid Mail Service from January 14, 1995. The services envisages that a message brought to the post office manually can be sent electronically to another post office for delivery through postman at the premises of the customers. This service is prevalent in many advanced countries. Initially, the Hybrid Mail Service will be introduced in a network comprising Delhi, Bombay, Bangalore, Madras, Patna, Lucknow and

Landing ground area = It is the part of the movement area which is primarily intended for landing or take off the aircraft.
Shimla. A customer will have the option of presenting the material either in manuscript or typed form or in a floppy diskette. After the message is recorded on computer, the system will automatically calculate the service charge.  

In spite of the tremendous stride of the tele-communication facilities in the nine cities and other urban centres under study during the last few years, the services rendered is not up to the mark. The Booths of STD/ISD have ameliorated the position to an extent.

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