### Chapter II

**GEOGRAPHICAL SETTING OF THE REGION**

| 2.1 | Introduction |
| 2.2 | Location and Boundries |
| 2.3 | Historical Background |
| 2.4 | Physiography |
| 2.5 | Drainage |
| 2.6 | Climate |
| 2.7 | Humidity |
| 2.8 | Cloudiness |
| 2.9 | Wind |
| 2.10 | Soil |
| 2.11 | Natural Vegetation |
| 2.12 | Animals |
| 2.13 | Geology |
| 2.14 | Ground Water |
| 2.15 | Useful Minerals and Rocks |
| 2.16 | Fish |
| 2.17 | Density of Rural Settlement |
| 2.18 | Routs and Communications |
| 2.19 | Summary |
|        | References |
Chapter II

GEOGRAPHICAL SETTING
OF THE REGION

2.1 Introduction:
In the previous chapter meaning of agriculture, agricultural geography, place of agriculture in Indian economy, agricultural development in India, Maharashtra, choice of the region, aims and objectives, data base, methodology, review of literature and chapter scheme these points are discussed. This chapter is mainly concerned with location and boundaries, historical background, Physiography, Geology, Drainage, Climate, Soil types and the Natural Vegetation of the study region. Physical features are discussed in this chapter from the view point of agricultural development of the study region.

2.2 Location and boundaries.
Parbhani district with east-west extension of 128.72 Kilometers and a north-south one of 104.58 kilometers lies between 18°58’ and 20°2’ North latitudes and between 76°4’ and 77°42’ East longitude, with an area of 12561sq.km. There were eight tahsils in Parbhani district but Partur tahsil was included in Jalna district in 1981. During 1981 the total area of the Parbhani district was 11031sq. km. It occupies 3.6 per cent are of the state.
In Geographical shape, Parbhani is a compact district administratively; it is bounded on the North by Buldhana and Akola, on the east Yeotmal and Nanded, on the South by Latur and Beed and on the west by Jalna districts. On the 13th August 1992 reorganization of seven tahsil took place and new five tahsils like Sailu, Purna, Sengaon, Aundha Nanath and Palam were formed during 1999. Hingoli district was formed, with the formation of Hingoli district, new tahsils like Sonpeth and Manwat were declared. Due to non availability of the respective data from 1980-81 new tahsils are not considered for the study. In the year 1999-2000 Hingoli district has been separated from Parbhani district. But the study period was 1980 to - 2005 so Hingoli district and tahsil in it are included in Parbhani district.

2.3 Historical Background:

In ancient times the town Parbhani was known as prabhavati on account of the existence of a beautiful and massive temple of goddess prabhavati. It being the principal town of the district, the district also came to be called after the same name. During the times of the Khiljis the temple was forcibly turned is to a Masjid. At what period of history and exactly how the change of name took place cannot be ascertained in the absence of factual data. But it is quite likely that the present name Parbhani is a corrupt form of prabhavati.

2.4 Physiography:

As a part of the Deccan plateau, the land of the district has a general elevation of about 457.5 meters
Fig. No. 2.2
above the sea level its highest and lowest levels being 579.73 meters in the Jintur range about 12.87 kilometers north of Charthana and 366 meters above sea level on the Godavari bank near the point where the river crosses over the district boundary. Pathri (except its northern part) Gangakhed and Parbhani tahsils have plain topography. But Jintur, Hingoli, Kalamnuri and the northern and eastern part of Basmat tahsils is hilly and mountainous in nature physiographically Parbhani district is divided into three divisions (Map 2.2) i)Hilly area ii) Plateau region iii) Plain region.

i) **Hilly area**

There are four different hills in the district

A) **Jintur hills**

The Jintur range is the more prominent portion in the heights of the district. The scrap lands lying to the north of the Purna area are counterparts of the Jintur hills but they are more continuous and have an undulating plateau extension towards the north. Both the Jintur hills and these northern counterparts have several gaps or passes which allow communications and favours the growth of 'gap' town.

B) **Malhura hills**

A low range of hills generally trending west-east separates the Penganga valley from that of the Kayadu to it's south. The tops record ranging height between 141.37 meters in the west and 488 metres in the east. Hingoli-Akola railway and the road cross these hills near Malhura. The scrap face is dissected and stony.
C  Balaghat hills
   In the south a section of the Balaghat range a transverse member of the Sahyadris belongs to this district. In fact the district boundary runs for a stretch of about 4828 km quite close to its watershed. Its general elevation is 533.75 meters with a few peaks recording heights above 549 meters.

D  Isolated hills
   These stand out prominently in the undulation black soil plain of the Godavari and Purna. Between the towns of Walur and Bori such a remnant has an elongated form and a height of 467.56 meters. The other two lie in the doab of Dudhana and Godavari to the west of the Parbhani town.

II  Plateau Region
   The prevailing tone of the landscape in Parbhani is that of plateau forms having eroded scarps and detached remnant. In place, the plateau is wide it assumes the appearance of an undulating remnant plain, with its scarp face overlooking broad river basins. These scarp lands present a much eroded appearance and so intense is the erosive action of streams that their deeply entrenched valley courses and flanked by broken and bare scrub lands as in the region north and east of Kalamnuri.

   The Jintur range is the more prominent portion in the heights of the district. It is a remnant plateau with a general trend from west north - west to south - east and forms a part of the Ajanta ranges emanating from the Sahyadris. The crest like consists of flat tops at an
average elevation of 533.75 meters above sea level but here and there rounded peaks record heights up to 549 meters and 579.5 meters above sea level.

III Plain region:

The river basins are found in the study region

I Godavari basin:

River Godavari covers the south - west, south and south -east part of Pathri and north- west, northern part of Gangakhed tahsils. Godavari and its tributaries have made fertile land in above mentioned parts of the study region soil erosion and monsoonal floods are the twin major problems all along the Godavari banks. Hence, agriculture is not well developed as it should be in a black soil tract. The deeply entrenched course renders canal irrigation difficult. The river side villages are necessarily small and precarious in both form and activity. However, the fertile black soil plain on either side makes many roads unmetelled again. Jowar, oilseeds and cotton are the main products. Gangakhed is the only town in the study region that is situated on the bank of Godavari River.

ii The Penganga Basin:

The orientation of the north- eastern portion of Parbhani is towards the Penganga which drains the land with the help of its main tributary Kayadhu. The topography is indicating with gully erosion locally intensified along the banks of the main river and even in streams as those near Kalamnuri. Underlain by the Deccan basalt the soil is black and is for a major part denoted to agriculture. But enclosing hill ranges and
plateau tops which have a cover of poorer soils restrict the agricultural land. River Penganga drains the north-eastern part of Hingoli tahsil northern and eastern border area of Kalamnuri tahsil. Particularly Bhat sawangi, Bori, Ganjapur, Wagdora, Kathargaon and Phalegaon these villages are benefited by Penganga River.

iii Purna basin:

This basin is found in north-western, northeaster and north stream part of Jintur tahsil, eastern part of Parbhani and western part of Basmat tahsils. The narrow and winding Purna valley is still to a large extent and economically developed belt. With isolated patches of cultivation and small river side hamlet. Only in recent years this economic development has taken place on account of the Purna irrigation and power project. This central belt is economically a well developed part of Parbhani district.

The Marathwada Purna in its lower reach lands shows some individuality to the local landscape after its emergence from the Jintur hills. This basin is a richer agricultural zone with cotton, oilseeds, pulses and Jowar as the main crops. There is wide scope for the development of agro-based industries in Purna river basin.

In addition Dhudhana river basin and Karpara river basins are found in the study region and they are also having wide scope for agro-based industrial development.
2.5 Drainage:

Drainage is comprehensive expression in geography. It includes surface as well as ground water flow. It is the result of a combination of numerous factors including climate particularly precipitation, insulation, humidity, cloudiness, wind force and direction structure and type of rocks, vegetation, soil and human utilization, human obstruction to natural waterfall such as roads, railways, dams and reservoirs also change its nature.

However, drainage is one of the most important components of physical environment which affects agriculture directly and indirectly. Groundwater influent becomes the base flow that maintains the flow of streams in fair weather when we speak of surface water we mean stream flow regardless of its source. Hence surface water is by for the most important means for providing substantial irrigation which stabilizes and improves agro-economic life in an area that has otherwise plenty of land potential. Because of the uncertainty in the flow of surface water it is probable that any attempt to improve agricultural techniques and landuse planning without combating the problem with the help of shallow and deep water tables is bound to be absorptive.

Generally rivers of the Parbhani district are from North-West to South-East direction (Map2.3) the drainage of the area is of the ordinary denratic Pattern because rivers have developed a branch like system. The rivers of the Parbhani district are useful for the
agricultural development of the region. In monsoon season most of the rivers are having huge water in their beds.

I  Godavari:

Rising from the Tryambak complex of the Sahyadris the Godavari flows for about 273.53 km to enter the Parbhani district. In this district it runs for a stretch of about 152.88 km the south-central and southern belt of the district and forming its boundary with Beed district for a length of 56.31 km. In Parbhani district the Mahatpuri Changatpuri on the road from Beed to Ashti is the first fording point. Down stream the river a wide meandering course held by high alluvial banks that are crumbling under gully erosion and from its left bank which is in Parbhani district. Godavari receives many small and deasonal streams. The only major tributary river is the Purna. From the right bank to receive the Sindhphana and the wan, the Macchili the Galati and the Dhond streams.

II  Penganga

This major tributary of the Wardha system drains the north-eastern lands of the district. Rising in the Ajanta range a little to the South-West of Buldhana town the river has a South-Eastern course of about 80.45 km draining the land of Buldhana and Akola districts is that all along its course of about 80.45 km. The river acts as a district boundary. Another feature is its deeply entrenched and meandering nature as in the fashion of a superimposed stream Penganga crosses in a very meandering from the hilly belt of the Ajanta range.
to join the Wardha about 321.8 km. down stream. The land of the Parbhani district belonging to Penganga River and its chief tributary the Kayadhu belonging to Penganga River and its tributary the Kayadhu is uneven and deeply dissected.

III Kayadhu:

The Kaid or Kayadhu is the main tributary of the Penganga in the Parbhani district. It rises in the hill scrapes south of the Risod Township in Akola district and flows south-westwards for about 80.45 km. before it leaves the district limits. Down stream it flows for another 16.99 km. before it joins the Penganga in Parbhani district. In general, its upper valley is broad and undulating flanked by scarp lands. A little west of Hingoli town or river slows and its tributaries develop entrenched courses and a hummocky landscape with knolls and isolated ranges. In its upper reaches it is intensely seasonal in flow but from Kandhar village sown stream it has a broad bed and perennial characteristics. Hingoli city is situated on the Kayadhu river bank.

IV Purna

The Marathwada Purna takes its rise in the Ajanta range about 56.31 km to the north of Aurangabad town and is the same district In Parbhani district it has a length of about 144.81 km. In the region of the source water which lies in Aurangabad district the river is fed by three main tributaries Khelana, Ajanta and Girja but in the lower middle portion which lies in Parbhani district it has a deeply entrenched and meandering
course flanked by enclosing scrap lands on either side. The tributaries are small and seasonal. The whole drainage pattern is of a superimposed type with narrow gorges, occasional rapid bouldery beds and high banks.

V Minor Rivers:

Minor rivers of the several minors stream courses in the district the more important are the wan the Masuli, the Galhati and the Dhond all the tributaries of the Godavari draining the land of the Gangakhed tahsil. These are mostly perennial in their flow and derive source waters from the Balaghat range, which for a good length marks the boundary of the district.

2.6 Climates:

In a large measure climate determines where man may live and thrive, what crops he may raise? What type of home he may appropriately build? What sort of clothing he may wear? And what pests and diseases he must combat?

The potential crop producing capability of a given area is dependent mainly on the existing climatic and soil conditions. Since, climatic factors exert mainly a regional influence on plant life, the difference in the behaviors on a crop or a group of crops over extensive area as in a given state or a group of states may be considered as due primarily to determine in climatic rather than soil conditions. It is obvious that climatic dictates the range of crops, which a country can economically produce. This it wishes it’s propel to live a full life in the modern sense?
The success or failure of the cropping season is determined by the intensity of the climatic factors. The three most important factors of climatic factors from the standard of plant response are temperature, water supply and light and they may be treated as primary determinates of crop growth. Climate plays an important role in affecting the characteristics of agricultural economy in a region. It can influence the choice of farming system either indirectly through its impact on soil formation or directly through such as the length of the rowing season, the occurrence of forest and the availability of water for crop growth.

The climate of the district is generally dry except during the south-west monsoon season. The year may be divided into four seasons. The cold season from December to February followed by the hot season from March to May, the south-west monsoon season from June to September and the post monsoon season from October to November.

2.6.1 Temperature

Each crop plant needs a certain number of effective heat units for germination, growth, stalking, maturity and ripening. This is called the thermal constant and varies from crop to crop. Temperature above the minimum is therefore, effective in furthering the growth of a plant towards maturity and ripening. The crucial air temperature is $6^\circ\text{C}$ (September 1903) at and above which plant grow 10. It is also known as the crucial limit. Ideal temperature conditions for crop production are between $18.3^\circ\text{C}$ and $23.9^\circ\text{C}$.
Without suitable temperature conditions, germination of seeds and growth of plants are retarded. Temperature regulates all the chemical and physical processes of plant metabolism. The metabolic processes begin at a variation minimum temperature and increase with rise of temperature in till they reach a maximum at a temperature called the optimum. Further with rise in temperature above the optimum level are metabolic activity is slowed seen instill ceases at a temperature called the maximum. Each species has its own minimum and maximum temperature beyond which its life activity ceases.

For the agricultural geographer two of the best indicators of regional difference in temperature currently available or derived are i) length of the growing season and ii) accumulated temperature above the maximum for plant growth12. The only meteorological observatory in the district is at Parbhani. The temperature and other meteorological data at this station may be taken as representative of the conditions over the district as a whole. The cold weather commences towards the end of November when the temperatures begin to fall. December is the coldest month with the mean daily maximum temperature at 12.6°C and mean daily maximum temperature at 29.3°C. The temperature is slightly higher in January and February. In the cold season the district is sometimes affected by cold waves which are associated with the passage eastwards so western disturbances across north India. On such occasion the minimum temperature may drop to 5°C.
The period from March to May is one of continuous increase in both day and night temperatures, May are the hottest month with the mean daily maximum temperature at 43.16°C. With the advance of the south-west monsoon into the district by about the second week of June temperatures fall appreciably and the weather is pleasant throughout the southwest monsoon season. By about the first week of October the monsoon withdrawn and the day temperatures show a slight increase in October. Year wise average temperature in 1981 Maximum temperature was 37.33°C and minimum temperature was 18.71°C and 1991 maximum temperature 43.16°C and minimum temperature 14.16°C and 2001 maximum temperature 42.2°C and minimum temperature 13.14°C

2.6.2 Rainfall:

Rainfall as the primary ecological parameter has created a variety of farming enterprises, types or systems in the world. It is the dominant single weather element influencing the intensity and location of farming systems of the farmer's choice. It also becomes a climatic hazard to farming when it is characterized with scantiness concentration, intensity, variability and unreliability. It is all the more important in the minimal regions where average or normal rainfall is generally necessary for successful crop production. In such area the system of crop production must be correlated more or less to the moisture factor. Records of rainfall in the district are available for the entire region from 1980-
2005. The statements of the rainfall at these stations and for the district as a whole are given in table 2.1. The average actual rainfall in the district is 916.87 mm. But the rainfall at Gangakhed is lowest (840.6 mm) and that at Basmat (1043.6 mm) much higher than, what should be expected from the pornography. There are appreciable variations in the rainfall from year to year (Map No.2.4 & 2.5).

Rainfall has control and for this reason is a seasonal rhythm of conditions influencing the patterns of landuse14.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil</th>
<th>Mean annual Rainfall</th>
<th>Co-efficient of rainfall variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Parbhani</td>
<td>861.6</td>
<td>28.5</td>
</tr>
<tr>
<td>02</td>
<td>Jintur</td>
<td>858.2</td>
<td>32.0</td>
</tr>
<tr>
<td>03</td>
<td>Hingoli</td>
<td>977.2</td>
<td>27.9</td>
</tr>
<tr>
<td>04</td>
<td>Kalamnuri</td>
<td>913.8</td>
<td>32.3</td>
</tr>
<tr>
<td>05</td>
<td>Gangakhed</td>
<td>840.6</td>
<td>31.5</td>
</tr>
<tr>
<td>06</td>
<td>Basmat</td>
<td>1043.6</td>
<td>36.6</td>
</tr>
<tr>
<td>07</td>
<td>Pathri</td>
<td>923.1</td>
<td>27.4</td>
</tr>
<tr>
<td></td>
<td>Region</td>
<td>916.87</td>
<td>30.88</td>
</tr>
</tbody>
</table>

Source: Computed by the Authors
Tale 2.1 indicates that the Hingoli tahsil was leading in mean annual rainfall while, Gangakhed was having less rainfall below 900 mm rainfall was found in Parbhani, Jintur and Gangakhed tahsil. Whereas 900 mm to 950 mm average rainfall was recorded in Kalamnuri and Pathri tahsils during the period of investigation. Above 950 mm average rainfall was found in Hingoli and Basmat tahsil (Map 2.4)

The coefficient of rainfall variability is calculated by the following formula.

\[
S_{\text{Co-efficient of rainfall variability}} = \frac{S}{X} \times 100
\]

Where,
S = the standard deviation
X = the Arithmetic mean of rainfall during the 25 years

It will be seen from table 2.1 that the variability of rainfall in the Parbhani district ranges from 30.88 per cent. Below 30 per cent rainfall variability was observed in Hingoli, Pathri and Parbhani tahsils whereas 30 per cent to 35 per cent rainfall variability was notice in Jintur, Kalamnuri and Gangakhed tahsils from 1981-2005. Above 35 per cent rainfall variability was observed in Basmat tahsils during the period of investigation. There is a guarantee of crop production in Jintur, Hingoli and Pathri tahsils as compared to other tahsils of the study region because these tahsils are having less variability of rainfall during the period investigation.
Fig. No. 2.5

INDEX

Above 35%
30 - 35%
Below 30%

PARBHANI DISTRICT
CO-EFFICIENT OF RAINFALL VARIABILITY
1980-2005
2.7 **Humidity:**

The relative humidities are high during the southwest monsoon season ranging between 30 per cent and 80 per cent after Septembers. The humidities decrease gradually and in the cold season and summer the air is generally dry, in the summer, which is the driest part of the year relative humidity, specially in the afternoon is less than 30 per cent.

2.8 **Cloudiness:**

Skies are heavily clouded to overcast in the southwest monsoon season. The cloud amount decreases rapidly in the post monsoon months. In the rest of the year skies are generally clear or lightly clouds.

2.9 **Winds:**

Winds are generally moderate in force in the latter half of the summer and in the south-west monsoon period. In the rest of the year winds are light. During the south-west monsoon the direction of the winds is predominantly from the west or south west in the post monsoon and winter months winds blow from directions mainly between east and north. From about the beginning of summer, winds from detections, between south-west and north-west appear and these predominate till the onset of the monsoon.

2.10 **Soils:**

Unlike climate, soils should not be regarded as part of the natural endowment of an area. In fact, in agriculture that modifies soil, our standard of living which, predominantly depends on agriculture is often determined by a combination of the physical, chemical
and biological characteristics of the soils and the corps and livestock raised on them. Thus soils endowed with a proper combination of texture, structure, salts and humus yield good results (Map No. 2.6).

Soils provide essential material on which agriculture is based and therefore any comprehensive survey of the geography of agriculture should include a fairly thorough treatment of soils. Even at the beginning of his work on political geography, Ratzel made a statement of great significance and insight: "Jeder stat ist ein stuck mainsheet" (Every nation is a bit of soil and humidity) (Quoted by Klages 1958). Therefore no student of civilization can afford to forget even for an instant the crucial importance of soils. These are the source of practically the entire stock of man's food, clothing and our ever increasing list of other needs. So that man gets nearly all of his food from the soils less than one per cent of what he eats being fish. Of the long list of nature's gifts to man productive soils and water are the most basic to human life. The top or upper layer of soils has an average thickness of between 15 and 20 cm depending upon local conditions.

The district of Parbhani is one of the main agriculturally useful areas of Marathwada and Maharashtra. This is mainly because its major portion belongs to the rich alluvial Godavari valley. Local variations in relief and landuse however, introduce regional changes in landscape which lands themselves to a classification of the district geographical sub regions. Out of the total soil nearly 65.17 per cent soil
medium black soil, 20.88 per cent deep black soil and
13.95 per cent coarse and shallow soil. Light medium
black soil is found in Basmat, northern part of the
Parbhani, Gangakhed, northern part of Kalamnuri,
Pathri and Jintur tahsils.

Deep black soils are found in the river valley of
Purna, Penganga and Godavari. The most of the soils in
Parbhani district is very good from the view point of
agricultural development. Hilly tracks like Jintur,
Malhura, Balaghat and isolated hills have coarse type of
soils and figid topography hence, these hilly slopes are
not usefull for agricultural activities.

2.11 Natural Vegetation:

Vegetation of some sort of the other is the natural
covering of the land surface of the earth. The forest of
the district includes Jintur, Hingoli, Parbhani,
Kalamnuri and Basmat tahsils (Map No. 2.7).

Natural Vegetation is important to maintain the
rate of rainfall and to provide the wood for agricultural
implements. It is also important for fodder purpose.
In the years 2000-2005 total area under forest of
Parbhani district was 3.21 per cent (Fig. No. 4.1). In
comparison with 1980-85 it decreased by -0.13 per cent
(Appendix III) in it 0 per cent area under forest was
found in Gangakhed and Pathri tahsil. Whereas, 0.01
per cent area under forest was found in Parbhani tahsils
respectively. In Kalamnuri tahsil 3.63 per cent area was
under forest.
Fig. No. 2.7
2.12 Animals

1) Wild Animals:-

The forests of Parbhani district are open and of poor quality. Moreover, they are in comparatively small patches confined to the hills surrounded by cultivated lands. Sources of natural water-supply are also rare in these forests. Consequently these forests are not rich in wild animals and birds. The 'Bombay Wild Animals and Wild Birds Protection Act, 1951' was made applicable to this area from June 1, 1961 and now efforts are made to preserve and foster the growth of the existing fauna and also to introduce new ones.

2 Panther: -

The tiger is not found in these forests. The people, however, often refer to panthers as tigers. Panthers are quite common in these forests as well as on rocky scrub-covered hill sides. They are often destructive to goats, dogs and cattle in the outlying villages.

3 Hyaena and Jackal: -

The hyaena and the jackal act as forest scavengers and profound throughout the district. The Indian fox (Vulpes bengalensis) also occurs in the plains.

4 Wolf: -

The wolf is also found in the forest and particularly in Pathri tahsil; it has been often found to have caused trouble.

5 Wild Boar: -

Wild boars (sus indices) exist in the forests of Jintur, Hingoli and Kalamnuri tahsils. They do much
harm to the crops, especially to the groundnut crop in the fields adjoining the forests.

Of the deers, the sambhar occurs in forest areas along the Penganga and Purna rivers. Spotted deer is probably extinct as it is not seen anywhere.

The mouse deer (Moschiola Meminna) and chinkara (Gazelle Bennett) are also found but there has been a considerable reduction in their number due to poaching. The black buck (Antelope cervicapra) is also rarely seen.

i Wild Birds:-

As stated earlier, the sources of natural water-supply are few and hence the bird life in the district is not very rich. The following birds are found.

ii Pigeons:-

Pigeons including green pigeons collect in large numbers to feed on ripe fruits of wild fig trees (Ficus spp.)

iii Peafowl:-

Peafowl (Pavo cristatus) is particularly found in the neighborhood of rivers and streams.

iv Partridges:-

Partridges of all the three kinds, viz., black (Francolinus Vulgaris), painted (F.Pictus) and grey (Ortigorns pordcerianna) and many other common birds like woodpecker, king-fisher, jungle fowl, etc., are found.

2.13 Geology

Parbhani district has not been geologically surveyed in sufficient detail so far and hence the
information available on the geology of the district is meager. A large part of the district is occupied by rocks similar to the Deccan trap formation represented by almost horizontal lava flows for basaltic composition though to have been emplaced from fissures towards the close of the Mesozoic era on to the lower tertiary era. There are referred to as Deccan traps owing to their prevalent occurrence in the Deccan and the step-like appearance of their exposures. They have a general tendency to form flat-topped hills giving rise to plateaus comprising several lava flows rich ranging from a few meters upon 50 meters in thickness.

The traps give rise to either deep brown to rich red on to black cotton or regur soil. Such belt of soil is noticed around Parbhani, Lasina, Vasmath, Kanhergaon, Gangakhed, Pathri, Jintur, Hingoli, and Kalamnuri. Another product of weathering is laterite, which is occasionally noticed capping the high hills in the district. It is a porous pitted, clayey rock with red, yellow, brown mottled colours and with a thin limonitic coating on the surface. The district of Parbhani is one of the main agricultural useful areas of Marathwada. This is mainly because its major portion belongs to rich alluvial Godavari valley. Local variations in relief and Landuse however, introduce regional changes in
landscape which level themselves to a classification of the district's geographical sub regions.

2.14 Groundwater:

The hilly countries receive the maximum rainfall. The groundwater is mostly tapped from percolation in wells and springs. The plains comprising the Pengaga, Godawari, Kanad, Karpara and Dudhana river valleys, have sufficient water supply and may be said to be well irrigated tracts of the district. Presence of scoriaceous flow and closely spaced system of joints in hard and massive basalts help the percolation of water and wells situated near either of these suitable conditions, have adequate water supply.

2.15 Useful Minerals and Rocks:

i) Building stones:

Being hard, compact, durable and wear resisting, the fine grained basaltic rocks are extensively used as building stones. They are used as aggregates in cement concrete, and as road metal in view of their being resistant to attrition. The ferruginous laterites also form good building stones. Small irregular pieces of kankar are seen scattered in the fields of black cotton soil and are locally burnt for lime.

Zeolites occurring in the traps may find use in water-softening processes. A few translucent varieties of amorphous and crystalline silica, viz., chalcedony, agate, jasper, plasma, blood-stone, etc., serve as raw material in lapidary industry for making decorative articles, lockets, tinkers, and other forms of cheap jewellery.
2.16 Fish:-

Prospects of development of fisheries in the district are rather limited on account of the absence of large number of perennial water sheets such as big reservoirs and irrigation tanks. But the Purna project which consists of two reservoirs, viz., Yeldari and Siddheshwar and minor irrigation projects at Kalamnuri and Zori. Would afford an adequate scope for the development of cultural fisheries in the district.

At present fisheries in the district are mostly confined to major rivers, viz., Godavari, Purna, Dudhana and Penganga and to minor rivers viz., Kaura, Kapura, Pimpalgad and Ashna, which, however, dry up in summer thereby restricting the scope for the development of fisheries. There are a few tanks in charge of Government as well as local bodies. These have been stocked with rapidly growing varieties of major Crops brought from Bengal, so as to augment the fish-supply. This has provided an additional source of gainful employment to the fishermen in the area.

2.17 Density of Rural Settlement

\[
\text{DRS} = \frac{\text{Total Number of inhabited villages}}{\text{Total Rural Area}} \times 100
\]
Table No.2.2
Density of Rural Settlement of Parbhani District. (1991)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil</th>
<th>Density of settlement per 100 km²</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Parbhani</td>
<td>12.81</td>
</tr>
<tr>
<td>2</td>
<td>Jintur</td>
<td>13.78</td>
</tr>
<tr>
<td>3</td>
<td>Hingoli</td>
<td>12.29</td>
</tr>
<tr>
<td>4</td>
<td>Kalamnuri</td>
<td>15.71</td>
</tr>
<tr>
<td>5</td>
<td>Basmat</td>
<td>15.04</td>
</tr>
<tr>
<td>6</td>
<td>Gangakhed</td>
<td>13.56</td>
</tr>
<tr>
<td>7</td>
<td>Pathri</td>
<td>11.34</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td>13.43</td>
</tr>
</tbody>
</table>


There are seven tahsil in the region under study and density of Rural Settlement in them ranges between 11.43 and 15.714 per hundred km² (1991). Tahsilwise density of rural settlement of the region is given in table no. 2.2 & Map No. 2.8.

Highest density of rural settlement per 100 km² is observed in Kalamnuri tahsil (15.71 to per 100 km²) and lowest density of rural settlement is found is Pathri tahsil.

Kalamnuri tahsil is located in fertile Purna river basin where the resources are favorable and concentration of population is relatively. More resulting high density of rural settlement where as Pathri tahsil per capita land is high.

2.18 Routes and Communication:
There are no national highways in the district. Length of state routes in district is 1232 km main district and other district length of road is 3893.17 km.
PARBHANI DISTRICT
RURAL DENSITY IN PARBHANI DISTRICT
1991
(Per 100 km\(^2\))

INDEX
- Above - 14
- 12 - 14
- Below 12

Fig. No. 2.8
Parbhani city is the central place of district. Parbhani-Mumbai, Parbhani-Kachiguda, Parbhani-Bangalore are railway routes and in Parbhani, Purna, and Hingoli. There are Railway Junctions. In district there are broad-gauge and meter gauge railway routes. Recently meter gauge is trains formed into broad-gauge (Map No.2.9).

Roads are the veins of district. From that point of view Parbhani is known as Punjab of Maharashtra. Fertile land. More Productivity chances, good rainfall condition, good drainage pattern are here so the development of roads should be there. Due to development of roads, big market, development of industries and health facilities we can provide. There are route links everywhere spread in the district and with simple and hot mix roads rural and urban area is connected.

2.19 Summary

Four hills like Jintur range, Malhura, Balaghat hills and isolated hills are not suitable for agricultural activities due to rough topography. These hilly regions are also having steep slope along the all sides, therefore it is very difficult to cultivate these areas.

Agricultural activities are mainly concentrated on plateau region and in the river valleys of Godavari, Purna, Kayadhu and Penganga rivers and their tributaries due to favorable drainage pattern, fertile soil and climatic conditions. The whole drainage pattern is of a superimposed type with narrow gorges, occasional rapid boundary beds and high banks. Drainage pattern
is favorable for the development of agriculture in study region.

Below 30 per cent rainfall variability was observed in Jintur, Hingoli and Pathri tahsils, whereas 30 per cent to 35 per cent rainfall variability was noticed in Parbhani, Kalamnuri and Gangakhed tahsils from 1980 to 2005. Above 35 per cent rainfall variability was recorded in Basmat tahsil (Map 2.5) there is a guarantee of crop production in Jintur, Hingoli and Pathri tahsils as compared to other tahsils of the study region because these tahsils are having less variability of rainfall during the period of investigation.

The district of Parbhani is one of the main agriculturally useful areas of Marathwada and Maharashtra. This is mainly because its major portion belongs to the rich alluvial Godavari Valley. Local variations in relief and landuse however, introduce regional changes in landscape which land themselves to a classification of the district geographical sub regions.

The most of the soils in Parbhani district is very good from viewpoint of agricultural development. Hilly tracts like Jintur, Malhura, Balaghat and isolated hills have coarse type of soils and frigid topography hence, these hilly slopes are not useful for agricultural activities.

Tahsils like Jintur, Hingoli, Parbhani, Kalamnuri and Basmat are having 3.21 per cent land under forest. Natural vegetation is maintaining rainfall in the study area and provides the wood for agriculture. It also checks the erosion of running water to a greater extent.
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Gazetteer of India, Maharashtra state, Parbhani district 1967 p. 19

Gazetteer of India, Maharashtra state, Parbhani district. P. I.


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2) Different statements of district statistics offices.


5) Annual loan scheme Agriculture Bank, Parbhani.