CHAPTER-II
PHYSICO CULTURAL LANDSCAPE
I Physical Landscape
II Cultural Landscape
(A) PHYSICAL LANDSCAPE

The district lies in the South-East of Haryana State and bounded by districts of Jind and Sonipat on northern side, Hisar district on northern-western side, Bhiwani district on western side, Jhajjar district on southern side, Sonipat district on eastern side. The district occupies an area of 1745.00 sq. kms. The district comprises 02 tehsils, 05 community development Blocks and 03 towns namely Rohtak, Maham and Kalanaur.

GEOLOGY

Geology is closely related with the study of the materials, structure of the earth, configuration of the earth’s surface and the internal and external forces which have served to modify the earth through geological changes with the passage of time.

On the geology of the district Mr. H.H. Hayden writes, 'With the exception of a few small outliers of Alwar quartzite belonging to the Delhi system there is nothing of geological interest in the district which is almost entirely covered by alluvium'.

Thus the study area being formed of the Punjab plain, sedimentary rocks are consolidated here with brown sand. However, the area covered by sandy loam deposits of Quarternary period of the Cainozoic era is a little over a million years old and has just begun.
On the basis of geology Rohtak district may broadly be classified into two sub-micro units Fig. 2.1(A).

(i) **The Upland plain:**

Geologically, the region belongs to alluvium, loam. While the main soil sub order association is ochrepts, orthids fluvents and Aquepts-Ochrepts.

(ii) **Sandy region:**

This region belong to sandy loam and Kankar. While the main soil sub order associates is auepts – ochrepts. There are only three mineral in the district.

**Salt:**

There are several villages in South-west of study area where a long time ago people were engaged in manufacturing of salt by solar evaporation. The production of salt was stopped due to levy punitive tax and inferior quality of salt as compared to Sambhar Lake's salt. The portion of salt in the water varies from about 0 to 16 per cent in this area.

**Saltpeter:**

Most of the saltpeter of Rohtak district is manufacture in the villages of Gohana tehsil (now in Sonipat district).

**Kankar:**

Lime occurs a number of places, important being Kaliawas and Birohar in Jhajjar tehsil. Kankar deposits are also found along the high bank of river sahibi.
DISTRIBUTION OF GEOLOGICAL STRUCTURE & RELIEF

GEOLOGICAL STRUCTURE

A

RELIEF

B

INDEX

BM

BENCH MARK

SPOT HEIGHT

CONTOURS

Fig No -2.1

UPLAND PLAIN

SANDY PLAIN
The depth of water table is lowest in Gohana Tehsil and north eastern part of Rohtak and Meham tehsil's area where it is nearly 10 feet. It increases 40 feed to 60 feed or even more in the Jhajjar Tehsil and in the Western and Southern-Western parts of Jhajjar district. The Groundwater conditions indicates that the district faces the problems of occurrence of brackish water, water logging in eastern part.

**Seismicity:**

The history of past earthquakes experienced in and around the Rohtak district shows that Rohtak is situated in a region line to earthquakes of moderate intensity. Some of the important earthquakes which effected the region occurred on July 15, 1720, September 18, 1903 and April 4, 1905.³ No major earthquake which had its epicentre near about Rohtak, has been located in the recent past.

**RELIEF**

The entire Rohtak district is a part of the Punjab plain, but the area is not level as shown in Fig. 2.1 (B). There appear marked variations in district's surface configuration making it possible to divide the district into several distinct localities. Over most of the district, the soil is fine loam of rich colour. The plain, much of which has a gradual slope to the south and East, is traversed by three broken lines of sandhills running roughly North-South. The Eastern most of these sandhills is within a few kilometres of the Delhi territory, the central passes besides Rohtak, whereas the westernmost is along the
border of Bhiwani district. In addition, there are some rocky hills also running North-South. On the basis of topography, Geology, soils climate and natural vegetation, it may be roughly divided into two region as under.

(i) **Upland plain:**

It consists of whole Rohtak and Maham tehsil of the district excluding south-western part of the Kalanaur block. As a whole, the region is slope towards south. A closer examination of the spot height levels indicate that with in a local area of about 16 to 18 kms radius, the town of Rohtak with an altitude of 216.39 metres situated in the centre of a saucer at the low spot. Within this short distance to east and west the altitude increases to 222.80 metres. Due to this, during heavy rains large quantity of water accumulate in and around Rohtak town, create a serious drainage problem and caused heavy damage to the old city during 1962, 1983 and 1995.

The upland plain, as a whole, is covered with old alluvium which if properly irrigated, is highly productive.

(ii) **Sandy plain:**

Only south-western part of the district belongs to this area. Maximum part of this plain spread in neighbouring Jhajjar district.

**DRAINAGE**

The pattern of drainage system has got special relevance in the above context. There is no perennial river in
Rohtak district because it is situated on the tail end of western Jamuna Canal.  

CLIMATE

Although the study of weather and climate focuses on the envelope of gases, continuous interchanges among the 'Spheres' produce an integrated environment and no component can be understood adequately without reference to the others.  

The most important meteorological observations for the geographers are those of temperature, pressure, winds, humidity and precipitation, since they are the factors which cause and influence the different seasons, control the precipitation and distribution of rainfall, and give rise to vegetation characteristics of particular region. Meteorological factors influence the movements of the atmosphere and the hydrosphere and consequently cause variations in weather and climate.  

The district enjoys a semi-arid monsoon type of climate, owing to a long distance from the seas the region fails to get the full benefits from monsoon currents. It is characterized by a deficiency of rainfall over it's greater part, high summer temperature and evaporation. It experiences the usual three seasons- the winter, the summer and the rainy. Both the heat in summer and cold in winter are extreme. Moreover, there are not only considerable differences in the weather from season to season, but also from year to year. These changing
weather conditions, though have repercussions on its agriculture, have produced a hardy people of good physique.

**Temperature:**

The temperature conditions observed throughout the year, demonstrate that there is marked difference between yearly maximum and minimum temperature which are 36.9°C and 13.55°C respectively. The mean annual temperature is 24.8°C. Mean monthly temperature ranges between 14.2°C (January) and 34°C (June) as shown in Fig. 2.2 Table 2.1. The day temperature is higher in June and night temperature is slightly lower.

**Table 2.1**

Temperature Data for District Rohtak- 2003

<table>
<thead>
<tr>
<th>Months</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>26.8</td>
<td>3.4</td>
<td>14.2</td>
</tr>
<tr>
<td>February</td>
<td>33.6</td>
<td>5.5</td>
<td>14.8</td>
</tr>
<tr>
<td>March</td>
<td>31.8</td>
<td>8.6</td>
<td>20.5</td>
</tr>
<tr>
<td>April</td>
<td>43.8</td>
<td>10.3</td>
<td>27.2</td>
</tr>
<tr>
<td>May</td>
<td>45.5</td>
<td>20.1</td>
<td>34.0</td>
</tr>
<tr>
<td>June</td>
<td>46.5</td>
<td>22.2</td>
<td>34.0</td>
</tr>
<tr>
<td>July</td>
<td>40.9</td>
<td>23.5</td>
<td>30.2</td>
</tr>
<tr>
<td>August</td>
<td>38.4</td>
<td>24.9</td>
<td>31.3</td>
</tr>
<tr>
<td>September</td>
<td>35.7</td>
<td>21.2</td>
<td>28.6</td>
</tr>
<tr>
<td>October</td>
<td>36.7</td>
<td>12.4</td>
<td>25.5</td>
</tr>
<tr>
<td>November</td>
<td>33.7</td>
<td>7.0</td>
<td>20.6</td>
</tr>
<tr>
<td>December</td>
<td>29.4</td>
<td>3.6</td>
<td>16.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>442.8</strong></td>
<td><strong>162.7</strong></td>
<td><strong>297.7</strong></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>36.9</strong></td>
<td><strong>13.55</strong></td>
<td><strong>24.8</strong></td>
</tr>
</tbody>
</table>

*Source: Regional Meteorological Centre, New Delhi.*
DISTRICT ROHTAK
TEMPRATURE AND RAINFALL
2002 - 03

Fig No - 2.2
In almost every part of the world, winds of a certain intensity, from a certain direction, or with certain characteristics of temperature and humidity have received specific names. In fact, there are probably several hundred with local names. Whatever their characteristics or names may connote, they are caused, like all winds, by difference in air pressure. Month of April onwards the hot westerly winds locally known as 'Loo' begin to blow and the heat is intense. In May and June, the maximum day temperature may sometimes reach about 45.5° and 46.5°C respectively. With the advance of the south-west monsoon into the district towards the first week of July day temperatures drop appreciably while night temperatures continue to be as high as in the summer.

**Rainfall:**

The below table shows the annual rainfall of study area.

**Table 2.2**

<table>
<thead>
<tr>
<th>District</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rohtak</td>
<td>4.5</td>
<td>2.2</td>
<td>1.6</td>
<td>0.8</td>
<td>-</td>
<td>4.9</td>
<td>13.5</td>
<td>39.5</td>
<td>33.2</td>
<td>-</td>
<td>-</td>
<td>0.7</td>
</tr>
</tbody>
</table>


The average annual rainfall in the district is 8.4 cms in 2003. The rainfall generally increases from the south-west to north-east. The rainfall in the south-west monsoon season which reaches its peak in the month of August and September
constitutes 39.5 cms and 33.2 cms respectively Fig. 2.2. The annual rainfall in the district varies considerably. In the last century, the highest annual rainfall were in 1933, 1962, 1983 and 1995.

The district receive 85 to 90 per cent of rainfall during three monsoon months from July to September every year. That is why the area of the district which is low lying get flooded.

**Winds:**

During the summer and monsoon season, the winds are relatively slow and not speedy. In the morning the breezes blow generally in south-western and north-south directions. While in the afternoon they blow in north west directions in the form of rectangle. The winds blow during the whole year in

<table>
<thead>
<tr>
<th>Table 2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direction of winds (2003-04)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Directions</th>
<th>Movements of winds (in days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northerly (N)</td>
<td>23</td>
</tr>
<tr>
<td>North-easterly (NE)</td>
<td>38</td>
</tr>
<tr>
<td>Easterly (E)</td>
<td>26</td>
</tr>
<tr>
<td>South-easterly (SE)</td>
<td>20</td>
</tr>
<tr>
<td>Southerly (S)</td>
<td>33</td>
</tr>
<tr>
<td>South-westerly (SW)</td>
<td>84</td>
</tr>
<tr>
<td>Westerly (W)</td>
<td>70</td>
</tr>
<tr>
<td>North-westerly (NW)</td>
<td>25</td>
</tr>
<tr>
<td>Calm</td>
<td>46</td>
</tr>
</tbody>
</table>

*Source:* District Research Office, Rohtak.
DISTRICT ROHTAK

DIRECTION & WIND VELOCITY

Fig No 2.3
this direction. In the summer season, the dust storms are quite common. The below table 2.3 and Fig. 2.3 shows the direction of winds.

**Special weather phenomena:**

April to June with the highest incidence of thunder storms and dust storms. Violent squalls often accompany such storms. While some of the thunderstorms are dry, others are accompanied by heavy rain and occasionally hail. Rain during the monsoon months is often accompanied by thunder. Fogs, sometimes dense appear in the winter months and thunderstorms also occur in association with western disturbances.

**Relative humidity:**

The below table 2.4 and Fig. 2.4 reveals the relative humidity and wet bulb temperature the district.

**Table 2.4**

District Rohtak

<table>
<thead>
<tr>
<th>Months</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet-bulb Temp °C</td>
<td>14.5</td>
<td>18.0</td>
<td>22.5</td>
<td>28.3</td>
<td>33.0</td>
<td>36.7</td>
<td>32.0</td>
<td>33.5</td>
<td>30.0</td>
<td>24.2</td>
<td>21.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Relative humidity %</td>
<td>29.5</td>
<td>35.8</td>
<td>41.4</td>
<td>43.9</td>
<td>53.0</td>
<td>68.7</td>
<td>70.9</td>
<td>84.3</td>
<td>82.7</td>
<td>40.6</td>
<td>16.7</td>
<td>25.5</td>
</tr>
</tbody>
</table>

CLIMOGRAPH OF DISTRICT ROHTAK

2003-04

Fig No -2.4
After analysis we find that the air is dry during the greater part of the year. In the monsoon months, the humidity is high that is 84.3 per cent in August but it is minimum in the month of November i.e. 16.7 per cent.

SOILS

The soils of all countries are, humanly speaking, the most valuable part of the regolith or surface rocks and constitute in many cases their greatest natural asset.\(^7\)

In the Rohtak district the soils are quite suitable for the kinds of crops grown here. These may be classified according to their texture as (1) sandy (teeba) or raitali (ii) sandy loam (iii) loam (rausli) (iv) clay loam (kardi) (v) clay (dakar or cheekni).

The main soil of the district, a good light coloured alluvial loam\(^8\) which with sufficient moisture yield splendid crops in return for little labour, is termed rausli, the light sands of the ridges are called teeba, soil with light texture are termed as bhur while the two clayey soils distinguished according to their tenacity are called kardi and dakar, the latter splitting into fissures after irrigation. The clay soils exist only in depression to which the greater part of their argillaceous matter has been washed by rain from the surrounding higher lands and are generally found along the drainage lines or in the naturally flooded (dahri) depressions as shown in the Fig. 2.5.
DISTRICT ROHTAK

SOIL
(A)

INDEX
ZONE OF ARIDIC & TRODIC SOIL GROUP

P.H VALUE
(B)

ZONE OF ESTIC GROUP

Fig No - 2.5
The soil of the district with regard to its reaction may be classified as (i) natural or normal (PH 7 to 8) (2) saline or rehi (PH 8 to 8.5) and (3) Alakaline (PH 8.5 to 10) are shown in Fig. 2.7(B) on the basis of PH value. Broadly three types of soils are available in the district namely:

(i) Loam (Bhangar and Nardak)

(ii) Course loam (Dahar and Chacknote)

(iii) Sandy loam

The soils as classified by the National Bureau of soil survey and land use planning (ICAR) Nagur, the district has mainly ochrepts, orthids – fluvents and Aquepts – ochrepts types of soils. Low lying areas in the district have been seriously affected by the water logging, saline efflorescence alkalinity and similar activities.

VEGETATION

Flora produce a clear picture of physical environment and the nature of topography. The climate of the region being of uniform nature, the type of natural vegetation depends on soil, sub soil water and minor topographical features.  

Due to heavy growth of population and shortage of cultivable land, natural vegetation has been cleared and a large area has been brought under agriculture in the whole district. The district is almost devoid of forest amounting to only 1.46 per cent where as in Haryana state it is 3.8 per cent of total
geographical area. The district has no reserved and unclassified forest. There are only protected forest found on 78 square kilometres under state forest while an area under private forest is only 5 square kilometres.¹⁰

Forest in the district is found along the road and canals side. The important trees are found throughout the district such as – Shisham (dalbergia Sisoo), Siris (albizzia lebbek) of two kinds, tun (cedrela toona), mulberry (tut-morus), mango (am-mangifera indica), pipal (ficus religiosa), guler (F. indica), Lasura (Cordia myxa) and Shimbal (bombax heptophylla) are to be found. On the newer lines where planted at all only shesham and kikar (acacia arabica) are to be seen. The neglected opportunity of planting these banks, despite constant remonstrances, is a standing discredit to the irrigation department.

Groves of mangoes and Jamanas (Zizygius Jam bolanum) are not uncommon. All these tree are found in the district. The further south we go the scantier are the trees, and the presence of anything more than a few solitary trunks is a sure sign that a habitation is close by. It grows readily from cuttings and needs little water and should be planted on roadside for more than it is. Of small trees and shrubs, kair and Beri on Jhapala grow abundantly in unweeded fields provide valuable fodder. However, efforts to improve irrigation facilities and to provide encouragement to horticulturists have
led to useful results. Garden Colony at Lahli in Rohtak district has been established to grow more fruits.¹¹

(B) CULTURAL LANDSCAPE

POPULATION

Though nature has not been evolent in endowing the district with adequate natural resources, yet it has gifted the land with one of the finest stock of people. Rohtak district having a population of 940128 and geographical area 1745 sq. kms. according to census 2001 which is 4.45 per cent and 3.95 per cent of population and area of the state respectively. Out of this total population of the district 509038 are males and 431090 are females. These persons are distributed among 149 settlements of which 146 are rural and 03 are urban. The share of rural population is high in comparison to urban population.

Growth of population:

The growth of population is often, but not always, related to economic conditions. The growth of population in any region, whether it is positive or negative, undoubtedly does reflect the history of man's response to the environmental possibilities present in the region.¹² Davis has concluded that India's population was about the same at the beginning of the modern period as it was two thousand years earlier. In his view the population tended to grow slightly in normal times, because the birth rate was usually slightly higher than the death rate. Inevitably, however, catastrophe followed in the form of
warfare, famine or epidemic and wiped out the accumulated increase of population. Thus, the long run trend was one of virtually unchanging numbers.\textsuperscript{13}

'However, with the establishment of the British rule and restoration of a measures of internal peace in the sense of averted wars and setting up of skeleton of health and medical services, the population began to grown slowly up to the turn of the twentieth century and rapidly after 1921.\textsuperscript{14} According to Huxley\textsuperscript{15} (1969)- population growth appears to pass through a serious of stages. In the first stage both the birth and death rates are high, and the population increase only slowly. In the second stage, the death rate fall sharply but the birth rate stays high. The population therefore expands more or less explosively. In the third stage, the birth rate also falls sharply, so that the increase of population is slowed. C.F. Kohn\textsuperscript{16} in his work on population trends in U.S.A. employed the six categories.

\textit{Growth trend and decadial variation:}

The total population of the Rohtak district has increase more than two times, from 8.5 lakhs in 1901 to 18.08 lakhs in 1991, over a period of 90 years. This increase in population is inspite of decrease in its population area. In 1966 the district's area was 6040.4 sq. kms. while in 1991 it has 4411 sq. kms. and it was much more in 1901. So the increase in population in
reality is many times. The growth of population is shown in Fig. 2.6 and table 2.5.

**Table 2.5**

District Rohtak

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Census year</th>
<th>Persons</th>
<th>Growth variation</th>
<th>Variation in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1901</td>
<td>8,58,184</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>1911</td>
<td>7,40,319</td>
<td>-1177865</td>
<td>-13.73</td>
</tr>
<tr>
<td>3.</td>
<td>1921</td>
<td>7,98,105</td>
<td>+57786</td>
<td>+7.80</td>
</tr>
<tr>
<td>4.</td>
<td>1931</td>
<td>8,33,837</td>
<td>+35732</td>
<td>+4.47</td>
</tr>
<tr>
<td>5.</td>
<td>1941</td>
<td>9,87,065</td>
<td>+153228</td>
<td>+18.37</td>
</tr>
<tr>
<td>6.</td>
<td>1951</td>
<td>11,22,046</td>
<td>+134981</td>
<td>+13.67</td>
</tr>
<tr>
<td>7.</td>
<td>1961</td>
<td>14,20,391</td>
<td>+298345</td>
<td>+26.58</td>
</tr>
<tr>
<td>8.</td>
<td>1971</td>
<td>17,72,169</td>
<td>+351778</td>
<td>+24.76</td>
</tr>
<tr>
<td>10.</td>
<td>1991</td>
<td>18,08,606</td>
<td>+292334</td>
<td>+19.28</td>
</tr>
<tr>
<td>11.</td>
<td>2001</td>
<td>9,40,128</td>
<td>-868478</td>
<td>-48.02</td>
</tr>
</tbody>
</table>

(iii) Statistical Abstract, Haryana, 2003-04

The above table and figure indicates that the maximum increase in population is 26.58 per cent during these 90 years occurred in the third part covering 1951-61. The position is easily explained by the fact that a number of natural catastrophes such as drought, famine and epidemic resulted in
high mortality during 1901-31. Famine and plague were rampant in 1901-11 and during the decade 1921-31 plague again took a heavy toll in the year 1924 and 1926. On the other hand the three decades after 1931 recorded a steady rate of growth. Only the middle decade 1941-51 recorded a lower rate of growth owing to the fact that the Hindus, Sikhs and others who migrated to this district after the partition were 40361 less than the Muslims who left for Pakistan. The health measure taken by the Government in the post-partition years reduced the death rate while the birth rate remained almost unchanged. This explains the increase of 26.58 per cent in the third decade 1951 to 1961 which was the highest in this period of 90 years. But during 1971-81 the population decrease 14.49 per cent instead of increasing. This decrease in population during this decade is due to the transfer of two tehsils Gohana and Sonipat which were a part of the district at the time of 1971 census were transferred to Sonipat district on its formation in 1972. Therefore the population i.e. 351778 Persons decrease during this decade. But it is important to note here that in 1981-91 decade the growth rate of population is 19.30 per cent which is less than the decade growth rate of 1961-71. It is due to the controlled birth rate during the same period with the help of various methods of family planning, government policies and awareness of the people.
During the decade 1991-2001 population decrease 48.02 per cent instead of increasing. This decrease in population during this decade is due to again partition of the Rohtak district. Jhajjar tehsil, Bahdaurgarh, Gohana which were a part of the district at the time of 1991 census were transferred again to nearby district at the time of 1.1.2000. Hence to know the real facts about the growth rate in this decade. District-wise population figures relating to 1991 are adjusted figures according to the boundaries of the district as on 1.1.2000. Therefore, data reveals that in the year 1991-2001 variation in population is +163162 persons i.e. 21.00 per cent increase. In Haryana state it was 28.06 per cent in (1991-2001). Out of its N.C.R. neighbours Faridabad and Gurgaon district occupies second (48.47%) and third (44.64%) place in growth of population, whereas Rohtak district stands at 17th position occupies 13th status in the State and 424th place in the country. This shows Rohtak is not a preferred centre of growth.

**Spatial distribution and density pattern:**

Data reveals that the population of the district is unevenly distributed. Mostly in urban centres and in the surrounding areas population pressure is high, specially in Rohtak.

The density of population (2001) in the district is 539 persons/sq.km., which is considerably higher than that of the state average of 478 persons/sq.km. The density is 328
persons/sq.km. in rural areas while it is 5329 persons/sq.km. in urban areas of the district. The position among the tehsil is that the density of population is highest in Rohtak tehsil 667 persons/sq.km. while it is lowest in Meham tehsil 354 persons/sq.km. The Rohtak district stand 8th in the state and 188th in the country.

Density of population is one of the important criterion for determining the level of economic development achieved by a region under study. The concept of population density is related to the number of persons in an area occupied by them. This is the most extensive method to analyse the correlation of the area to its population.

**Rural and urban population:**

In the year of 1981, the rural and urban population of the district was 1223922 and 292282 or 80.72 and 19.28 per cent of the total population respectively while in 1991 the rural and urban population is 1423133 and 385473 or 78.70 & 21.31 per cent of the total population respectively. While in 2001 the rural and urban population is 610524 and 329604 or 64.94 per cent and 35.06 per cent of the total population respectively. It means that the rural population has declined in 1991 and 2001 census inspite of good increase in their number. Urban areas have recorded a high growth in their population because they have attracted the rural population due to their socio-economic facilities.
Sex ratio:

Sex ratio is calculated as number of females per 1000 males, was 849 in Rohtak district in 1991 census. The sex ratio decline to 847 during 2001. The state sex ratio was 856 in 1991, which has also declined to 861. The rural sex ratio in both tehsils of the district has increased. In Maham Tehsil it is 839 and in Rohtak Tehsil 840. The reason for decreasing sex ratio is National capital Delhi which is situated nearby. In terms of sex ratio, the rank of Rohtak district in the state is 15th, such sex ratio will see many males not getting their partner which may create a social evil and is a serious matter for the society.

LITERACY

The literacy rate of Haryana is 68.59% in which 79.25% male and 56.31% female. The literacy is higher in Rohtak district at 74.56% of which 84.29% are male and 63.19% females. The 0-6 age-group population has not been included in this.

In Maham tehsil 80.11% males and 54.14% females were literate and in Rohtak tehsil 85.28% males and 65.32% females literate. Rohtak district stands at 4th position in literacy in the state. 35.06% population of the district lives in the urban areas, of this 89.38% population lives in Rohtak urban agglomeration because Rohtak has better facilities provided to the people in respect of education and medical facilities etc.
Table 2.6

Literacy rates in the C.D. blocks of Rohtak district (Excluding children in the age of below 6 years)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>C.D. Blocks</th>
<th>Percentage of literates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Persons</td>
</tr>
<tr>
<td>1.</td>
<td>Sampla</td>
<td>61.69</td>
</tr>
<tr>
<td>2.</td>
<td>Kalanaur</td>
<td>58.14</td>
</tr>
<tr>
<td>3.</td>
<td>Rohtak</td>
<td>57.23</td>
</tr>
<tr>
<td>4.</td>
<td>Lakhan-Majra</td>
<td>55.99</td>
</tr>
<tr>
<td>5.</td>
<td>Meham</td>
<td>53.64</td>
</tr>
</tbody>
</table>

Among the C.D. Blocks, in Sampla, and Rohtak, literacy rates are higher than the district rural literacy rate of 69.53 per cent. Only Sampla C.D. Block is noted for its highest literacy rate of 72.73 per cent. As is the general trend, male literacy rate is higher than the female literacy rate in all the C.D. Blocks.

But it is important to note that female literacy growth rate is higher than males in rural areas during the decade 1991-2001 (Table 2.6).
**Occupational structure:**

Occupational structure means working population engaged in any kind of productive work. The total population of the district is 940128 out of this only 30.66 per cent are main workers, 0.88 per cent are marginal workers and 60.53 per cent are non-workers. Occupational break-up of the working force has been presented in the table 2.7.

**Table 2.7**

Occupational Structure (District Rohtak)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total working population</td>
</tr>
<tr>
<td>A. Primary Sector</td>
<td></td>
</tr>
<tr>
<td>1. Cultivator</td>
<td>1,43,314</td>
</tr>
<tr>
<td>2. Agricultural Labourer</td>
<td>45,462</td>
</tr>
<tr>
<td>B. Secondary Sector</td>
<td></td>
</tr>
<tr>
<td>Household industry</td>
<td>9,733</td>
</tr>
<tr>
<td>C. Other services</td>
<td>1,72,564</td>
</tr>
<tr>
<td>Total workers</td>
<td>3,71,073</td>
</tr>
</tbody>
</table>

The above table reveals that the economy of the district Rohtak is predominantly agriculture oriented. The cultivators and agricultural labourers together constituting agricultural workers i.e. 50.87 per cent of the total workers, which is below than the state average of 51.29 per cent.
30.66 per cent of its population constitutes main workers. This is in agreement with the fact that roughly one-third of the total population of the state 29.52 per cent constitute the work participation ratio. The variation in the percentage of main workers between rural and urban areas in the district is 5.93 per cent as against 26.81 per cent main workers in urban area, there are 32.74 per cent in rural areas.

The work participation rate comes to 49.33 per cent for males and 27.83 per cent for females in the district. From this, it can be observed that the percentage of male participation rate is slightly below the state average 50.30 per cent. But in case of female participation rate, it has gone slightly above the state average of 27.22 per cent. Here it is also important to note that work participation rate of the district in rural and urban areas has increased in 2001.

The proportion of cultivators to total main workers i.e. 38.62 per cent in the district, is more than the state average 36.03 per cent. But the trend is reverse in the case of agricultural labourers, whose proportion to total main workers in the district 12.25 per cent which is less than the state average of 15.27 per cent.

The proportion of main workers engaged in house hold industry is 2.62 per cent in the district which is little more than the state average 2.56 per cent. Other workers are those engaged in livestock, forest fishing hunting and plantation,
orchards and allied activities, in mining and quarrying and
activities other than house hold industry i.e. manufacturing
processing, servicing and repairs; in construction trade and
commerce, storage and communication and also in other
services. They claim 46.51 per cent of the total workers in the
district against the state figure of 46.15 per cent.

**Population projection:**

The estimated trend of future population is known as
population projection. It is not only the background data for
planning but itself targets of planning activities. So, the
population projection is very useful in socio-economic
planning. Mainly in determining the mode of employment,
education, medical and other social and economic facilities.

The following formula\(^{17}\) has been used to calculate the
relative rates of natural increase of population.

\[ r = \frac{P2 - P1/t}{P2 + P1/2} \times 100 \]

- \(r\) = the rate of change
- \(P1\) = the population size at one point
- \(P2\) = the population size at other point
- \(t\) = the number of years taken between the two
  sizes for the period 1981-91 will continue and
II) that the population groups similarly as an amount grows at the rate of compound interest, calculated by the formula,

\[ A = P \left(1 + \frac{r}{100}\right)^n \]

Where

\[ A \] = projected population

\[ P \] = present population

\[ r \] = annual growth rate of population

\[ n \] = number of years in between A & P

On the basis of above formula table has been completed.

**Table 2.8**

Projected population and per capita cultivated land of District Rohtak

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Net Area sown in Hectares</th>
<th>Per capita land in (Hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>1808606</td>
<td>300000</td>
<td>0.16</td>
</tr>
<tr>
<td>2001</td>
<td>2157301</td>
<td>&quot;</td>
<td>0.14</td>
</tr>
<tr>
<td>2011</td>
<td>2573224</td>
<td>&quot;</td>
<td>0.12</td>
</tr>
<tr>
<td>2021</td>
<td>3069336</td>
<td>&quot;</td>
<td>0.10</td>
</tr>
<tr>
<td>2031</td>
<td>3661097</td>
<td>&quot;</td>
<td>0.08</td>
</tr>
</tbody>
</table>

The above table reveals a more interesting fact, that is over 39 years or 2030 A.D. the population of Rohtak district
would be double. Consequently per capita cultivated land is decreasing. It is an alarming signal for the planners and Govt. policy makers etc.

(C) SETTLEMENT

It is true that settlements are the most distinctive form of the cultural landscape, representing an organized colony of human being including the buildings in which they live or work or store or use them otherwise and the tracks and streets over which their movements takes place.¹⁸

There is more comprehensive spatial frame-work comprising settlements and population, which provides a basis for regularly in the organisation of some settlements as central place.¹⁹ The distribution of settlement is defined as the frequency with which they occur in a given space. The nature of all distribution depends upon the scale of which it can be observed, 'A real variation in distribution, spatial differences in occurrence pattern, intensity and density are characteristics of almost all distributions in terrestrial space.'²⁰

Spatial distribution of settlements according to their population size:

According to population size the settlement of the district may be divided into the following seven categories as shown in table 2.9.
DISTRICT ROHTAK

SPATIAL DISTRIBUTION OF SETTLEMENT

(ACCORDING TO POPULATION SIZE)
Table 2.9

Distribution of Settlements and Population in the Rohtak District (2001)

<table>
<thead>
<tr>
<th>Population size group</th>
<th>No. of settlements</th>
<th>% of settlements</th>
<th>Total Population</th>
<th>% of population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 500</td>
<td>08</td>
<td>5.37</td>
<td>1925</td>
<td>0.20</td>
</tr>
<tr>
<td>500-1000</td>
<td>04</td>
<td>2.68</td>
<td>3415</td>
<td>0.36</td>
</tr>
<tr>
<td>1000-2000</td>
<td>20</td>
<td>13.42</td>
<td>30661</td>
<td>3.26</td>
</tr>
<tr>
<td>2000-4000</td>
<td>50</td>
<td>33.56</td>
<td>150971</td>
<td>16.06</td>
</tr>
<tr>
<td>4000-8000</td>
<td>50</td>
<td>33.56</td>
<td>280451</td>
<td>29.83</td>
</tr>
<tr>
<td>8000-16000</td>
<td>14</td>
<td>9.40</td>
<td>143101</td>
<td>15.23</td>
</tr>
<tr>
<td>16000 &amp; above</td>
<td>03</td>
<td>2.01</td>
<td>329604*</td>
<td>35.06</td>
</tr>
<tr>
<td>Total</td>
<td>149</td>
<td>100.00</td>
<td>940128</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* Urban population

Size pattern of numeral distribution:

Computed statistics (Table 2.9), shows that 5.37 percent settlements are small in size each having a population of less than 500 persons and sharing with only 0.20 percent population of the district. There are 4 settlements (2.68 percent) in this group, it shelters about 0.36 percent population of the district. 20 settlements (13.42 percent) of 1000-2000 population size group sharing with 3.26 percent population of the district. There are 67.12 percent settlements having 45.89 percent population of the district. Such settlements fall in the medium size category of population ranging between 2000 and
DISTRICT ROHTAK

DISTRIBUTION OF SETTLEMENT ACCORDING TO POPULATION SIZE GROUP

2001

Fig No -2.10
8000 persons. The large size villages and urban settlements accommodate about 15.23 per cent population and 9.4 per cent settlements. Only 35.06 per cent population of the district lives in all the urban centres.

Therefore, it is apparent that the distribution pattern of settlements based on the size group of population is not homogenous because of the differential distribution patterns of physical, social and economical attributes in the district.

Nearest neighbour analysis of settlements:

The measurement of the spatial patterns of settlements distribution in Rohtak district (Table 2.10) determined by computing the value of nearest neighbour distances.

Methodology:

The concept of nearest neighbour is quite recent and development only during the fifties. Clark and Evans\textsuperscript{21} were the first who contributed to this theory. Thompson\textsuperscript{22} Dacey\textsuperscript{23}, Thoms\textsuperscript{24}, and King\textsuperscript{25} worked in detail in favour of this concept and applied it to situation. Getisa\textsuperscript{26}, Venugopal\textsuperscript{27} have also favoured this concept.

Two mean distances i.e., observed mean distance and excepted mean distance are required for this analysis. 'R' value can be computed by using the formula developed by plant ecologists Clark and Evans as follows:
\[
\frac{D\bar{O}}{DR} \\
\text{\text{here } } D\bar{O} \text{ is the actual mean distance between nearest neighbour settlements in a given area.}
\]

\[
D\bar{R} = \frac{1}{\sqrt{N/A}}
\]

\[
\text{\text{It is apparent from the following Table 2.10 that the distribution of settlements in the district is mostly semi-clustered.}
}\]

**Table 2.10**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Settlement Size</th>
<th>No. of settlements</th>
<th>Actual Mean Distance</th>
<th>Excepted Mean Distance</th>
<th>(\frac{D\bar{O}}{D\bar{R}})</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Below 500</td>
<td>8</td>
<td>5.27</td>
<td>17.15</td>
<td>0.31</td>
<td>Semi-clustered</td>
</tr>
<tr>
<td>2.</td>
<td>500-1000</td>
<td>4</td>
<td>3.53</td>
<td>10.37</td>
<td>0.34</td>
<td>-do-</td>
</tr>
<tr>
<td>3.</td>
<td>1000-2000</td>
<td>20</td>
<td>1.95</td>
<td>6.28</td>
<td>0.31</td>
<td>-do-</td>
</tr>
<tr>
<td>4.</td>
<td>2000-4000</td>
<td>50</td>
<td>1.66</td>
<td>4.52</td>
<td>0.38</td>
<td>-do-</td>
</tr>
<tr>
<td>5.</td>
<td>4000-8000</td>
<td>50</td>
<td>2.98</td>
<td>7.88</td>
<td>0.39</td>
<td>-do-</td>
</tr>
<tr>
<td>6.</td>
<td>8000-16000</td>
<td>14</td>
<td>5.60</td>
<td>20.04</td>
<td>0.28</td>
<td>Pure clustered</td>
</tr>
</tbody>
</table>
ECONOMIC

The mainstay of the study area is agriculture and about 50.87% (of total workers) persons are engaged in this activity. As per 2003-04 records the net sown area in the Rohtak District formed 83.23 percent of the total reported area. It is higher than the figure for total Haryana which stands at 79.06 per cent. The highest percentage of N.S.A. is in Kalanaur block (86.58%).

The district alone produces about 3.13% of the total food production of the state.

Per capita N.S.A. in 2001 stood 0.15 hectare in the district. Where in the state this figure is 0.16 hectare.

Out of G.C.A. (215000 hect.) almost 70.79% i.e. 152200 hectares were under food crops including wheat, jowar, bajra, rice barley, maize, pulses etc. among the commercial crops the only important one is sugarcane.

INDUSTRIES

In the study area urban centres are registering of fast development of small and large scale industries. The speed of development of small scale units is much more pronounced. Most of the industries which have developed are market oriented rather than export oriented. The demand for their products is largely boosted up by the unprofitable cost distance relationship of other markets in the country with Delhi and also
due to the functioning of Delhi as whole scale centre for the entire north-west India.

Among the important industrial activities in the Rohtak are those dealing with food products and beverages, textiles, chemical and chemical products, rubber and plastic products, non-metallic minerals products, basic metals and fabricated metal products, electrical machinery and apparatus etc.

The deficiency of local resources in the area has resulted in setting up import based industries rather than resource based industries. The faster growth of industries is aided by the skill man power in the area, nearness of Delhi and National Highway No. 10 passes through the district. Manufacturing industries in general area of considerable importance in the local economic growth and provide the key to the future growth and welfare of this area. The study area has vast possibility of agricultural improvement and the present efforts to achieve self-sustenance in agricultural field would have a deep impact on related agro-based industries both as booster for employment potential as well as to provide a fill up to the growth of manufacturing industries.

The growing agricultural population of the area and the resulting the diminution in the capacity of land to absorb agricultural workers would call for the diversification of the regional economy. The external economies of the urban centres and rapid improvement in communication and
transport and the agglomeration effects in the various sectors of economy will promote industrial development in the area.

TRADE AND COMMERCE

In the 19th century, trade was confined to movement of grains, cotton, raw sugar, ghee and hides to the near by markets of Delhi and Meerut (U.P.) by small traders and agriculturists. These goods were mostly carried in large carts. The imports were chiefly cloth, tobacco, sugar, salt and hardware, but the nature and direction of trade have since under gone a tremendous change. In 1966, the usual articles of export from the district were wheat, cotton, gram, jowar, bajra, gur, shakkar, oil seeds, cotton seeds and fodder, but with the growth of industries in the recent past, the district has also started exporting many products like glassware, biscuits, nut bolts, sanitary-ware, steel pipes, ceramic glazed tiles and niwar etc.

So in these days trade and commerce plays an important role in the field of economic activity in the district. The district is well advanced in terms of trade and commerce. The major centres are Rohtak and Meham. In addition to these centres there are sub-centre such as Sampla, and Kalanaur.

Most of the whole sale as well as retail trade of the district concentrated in towns located on the high ways and railway routes.
Table 2.11 shows the import, export and manufactured commodities of the study area through important trade centres.

**Table 2.11**

Trade and Commerce
Import, Export and Manufactured Commodities

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of Trade Centres</th>
<th>Import Commodities</th>
<th>Export Commodities</th>
<th>Manufactured Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Rohtak</td>
<td>Timber, electric equipment, iron rods, wool and woolen garments, medicines, agriculture implements and stone</td>
<td>Sugar &amp; cera, vanspati oil, milk and ghee, wheat, timber, gur</td>
<td>Nut bolts, telecommunication items, steel strips, cattle feed</td>
</tr>
<tr>
<td>2.</td>
<td>Meham</td>
<td>Stone, timber, tractor and chemical</td>
<td>Sugar, wheat, cereals, pesticides</td>
<td>Sugar, chemical</td>
</tr>
</tbody>
</table>

**Import commodities:**

The chief import commodities are cloths, diesel, petrol, lead, iron rods, steel strips, fertilizer, pesticides, medicines, timber, stone and other essential commodities.

**Export commodities:**

The chief export commodities are:- Nut bolts, sugar, sanitary wares, ceramic glazed tiles, biscuits, steel tubes, glass ware, agriculture implements, gur and khandsari, rice, wheat, oil seeds, fodder, milk, ghee, cattle feed, (cera a by product of sugar) are exported to other places.
To facilitate the trade and commerce the state government provides several facilities to the traders in the form of credit and financial help. Almost all scheduled banks and other financial institutions exist here to facilitate the trade community. Trade is no longer confined to a particular area but due to efficient telecommunication facilities, availability of good means of transportation the traders have started sending their goods all over the country.

**TRANSPORT**

Infrastructure plays a vital role in the overall development and growth of economy. Road network has to be widespread and reliable. We are, therefore, determined to provide a better and more efficient road network throughout the district.

Transportation planning is, therefore, one of the most effective tools for achieving balanced regional development. Socio-economically, it accelerates the interreliance of urban and rural areas, facilitating the movement of various commodities and services and allow development and maintenance of specialized activities in urban centres of a regional complex. The inter-dependence of producers and consumers may accelerate or de-accelerate depending on the efficiency of network road and rail transportation, which directly defines the mobility of goods, services and passengers within a specific area or region.
The means of transport and communications are provided in every town and village of the district as shown in Fig. 2.10.

**Roads:**

The roads have been classified as national highways, state highways, district major and minor roads and village roads.

The district is sufficiently connects by roads. All towns and important villages have been connected by metalled roads. Delhi-Hisar-Sulemanki National High Way No. 10 which runs through the district for 70 kms passes through Bahadurgarh, Sampla, Rohtak and Meham. In the year 2003-04 the total roads length in the district is 984 kms out of which metalled roads 953 kms and unmetalled 31 kms. Length of metalled road per lakh of population is 101.37 kms where as the length of metalled roads per thousand square kms area is about 546 kms. While in the state, length of metalled roads per lakh of population and per thousand square kms area is 109.24 kms and 522.24 kms. Besides construction of new roads, widening of state highway and important roads has been taken up. The district ranks IIInd according to its road length.

The district has a good network of passenger buses which have been interlinked almost every village. 99.58 per cent of the village connected with metalled roads. State transport and private buses are available for all the big centres
and town after a short interval. The state depot runs many interstate routes in Punjab, Rajasthan, Delhi, Uttar Pradesh and J & K. The number of different types of motor vehicles on road are given in the table.

**Table 2.12**  
Different Type of Vehicles in Rohtak District (1992-93 and 2002-03)

<table>
<thead>
<tr>
<th>Type of Vehicle</th>
<th>Rohtak</th>
<th>Haryana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Autocycles Motor/ cycles/ Scooters</td>
<td>20195</td>
<td>51852</td>
</tr>
<tr>
<td>2. Auto Rickshaws</td>
<td>54</td>
<td>6546</td>
</tr>
<tr>
<td>3. Jeeps</td>
<td>828</td>
<td>7834</td>
</tr>
<tr>
<td>4. Private motor car</td>
<td>2410</td>
<td>7011</td>
</tr>
<tr>
<td>5. Other Public Service Vehicle</td>
<td>109</td>
<td>1159</td>
</tr>
<tr>
<td>6. Taxi</td>
<td>-</td>
<td>706</td>
</tr>
<tr>
<td>7. Goods Vehicles</td>
<td>2826</td>
<td>18613</td>
</tr>
<tr>
<td>8. Tractors</td>
<td>13673</td>
<td>17181</td>
</tr>
<tr>
<td>9. Miscellaneous</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>40105</td>
<td>110902</td>
</tr>
</tbody>
</table>

Railways:

District is fairly well served by railways. There are four main sections of northern railway in addition to railway station. Station on each section are given here under and shown in Fig. 2.10.


(b) Rohtak – Jind- Samargopalpur- Kharaini.

(c) Rohtak – Gohana – Panipat – Makrauli Kalan – Jassia.

(d) Rohtak – Bhiwani – Dobh – Lahli – Kalanaur.


Gohana, Rohtak, Bahadurgarh, Sampla and Kosli are the important stations for loading and unloading of goods traffic, wheat, gram, mustard oil, steel pipes, glass bottle. Live stock are the main item loaded from the district where as salt, coal, gunny, bags, diesel, kerosene oil, cloth, timber, iron, building stone and various raw materials are unloaded at the district.

COMMUNICATION

Communication is the transfer of information and understanding from one person to another person. It is a way of reaching others with ideas, facts thoughts, feelings and values. It is an important tool in overall development. Haryana has a state of wide net work and efficient telecommunication
facilities. Today all major industrial towns and district headquarters of Haryana have international subscribers, dialing, telex, fax facilities and cables. There are 120 post offices, 97 printing press, 33 newspapers and periodicals, 05 telegraph offices, 53 telephone exchange, 1410 public call centres, one radio station and faxes facilities are available in the district.

Radio station of Rohtak is a strong mean of communication because all regional and other agricultural programmes are relayed from this station, it also plays an important role to develop the culture of the state.
REFERENCES


8. The physical and chemical characteristics of loam soil which represents the major parts of the Rohtak district were analysed at the government agricultural farm Rohtak and are given in appendix one.


10. Forest Department, Haryana, 1971.


population division, series 'A' population studies No. 17, United Nations, New York, p. 8, 1953.


