CHAPTER III

SPATIAL DISTRIBUTION OF RURAL SETTLEMENTS AND THEIR TYPES
CHAPTER 3

SPATIAL DISTRIBUTION OF RURAL SETTLEMENTS AND THEIR TYPES

The settlement is a system of complex organization with man and his occupation units. It is a man made habitat on the earth's surface representing an organized colony of human beings including the buildings in which they live or work or store or use them otherwise, and the tracks and streets over which their movements take place. The occupance of rural landscape is the outcome of diverse physico-cultural, socio-economic and historical factors of the region. The distribution of settlements is defined as the frequency with which they occur in a given place. A rural settlement is relatively small and simple agglomeration of houses at a favourable site primarily associated with agriculture and related processes. Such settlements vary from region to region in types and in patterns of distribution, and each one of these settlements is unique having its own personality. However, in the present study general conclusion from specific facts and indices of measurements have been made to interpret the distributional pattern and interrelationship among the rural settlements with the help of size (population and area), spacing (observed, expected and

index of randomness), and other characteristics. On the basis of these findings an attempts has been made to measure the degree of concentration and dispersion and to classify the rural settlements in to different types.

1.0 RURAL AREA / VILLAGE AND HAMLET

Though the village has been important form of the settlements fabrics of each and every country of the world from the ancient times, yet no universally acceptable definition has so far emerged. The term 'village or rural area' is usually refers to revenue mauza as defined in 1961 Census, according to which a rural area, generally follows the limits of a revenue village, which has a definite surveyed boundary and is a separate administrative unit of separate village accounts. It may have one or two hamlets, each bearing a different name. Thus a village is a tract of land, inhabited or not, which has been demarcated as a unit for revenue purposes¹. It may be identified as a human aggregation with a definite position and area bearing a particular place-name and usually surrounded by agricultural lands associated within its territory. In the study area a village includes a cluster of houses or more than one such cluster. The main inhabited site is known as Khasgaon or Abadi Khas, while it may have one, two or sometimes more hamlets distinguished by different names,

generally suffixed or prefixed by some words like pura, nagla, tola, toli etc. These hamlets form generally small clusters of homesteads in the village territory situated at a distance of the main settlement site mostly traditionally occupied by mixed or depressed castes or untouchables, who live in relative social isolation and are hired for field operations by well-to-do high caste farmers\(^1\). There are various examples of hamlets inhabited by higher castes also, in which different groups live more independently\(^2\). These units may be considered as settlement cells or sub-villages. Sometimes the village may not have any settlement and may be grouped as 'uninhabited' in the census, locally called as nachiragi or bechiragi (village without light). There are 900 inhabited villages and 90 uninhabited villages in the study area.

2.0 GENERAL DISTRIBUTION AND SITING OF RURAL SETTLEMENTS

The study area forms parts of the Ganga Yamuna Doab, which is a vast area of alluvial plain. The area has almost uniform distribution of rural settlements (Fig. 3.1). This uniformity is locally disturbed by various physico-cultural and environmental factors such as relief, sources of water supply, drainage and social conditions, land use, land tenure, crop

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combination, means of transport and communication, population distribution etc. In the District, Alamgirpur has proved to be the oldest site of human habitation. It dates back to around 1800 B.C. as revealed by recent archeological excavations. It is situated on the left bank of river Hindan. In the early period, settlements developed mostly by the side of water bodies such as rivers and tanks. The glorious city of Hastinapur was also situated on the right bank of river Ganga, but it was inundated by flood in past.

Recently developed markets, roads and tracks seem to have had little influence on the general distributional aspects of rural settlements as almost the entire settlement pattern evolved due to physical conditions of the area. As a response to modern development of communication and transport, some villages and hamlets have added functions as a small market centre along the roads and near railway stations, e.g., Daurala, Mataur, Sakoti, Dadri etc. (Fig. 3.2).

Two rivers the Ganga in the east and the Yamuna in the west bound the District. Both the streams have influenced the selection of sites for human habitation in the study area. The low-lying areas are inundated during the rainy season. So large tracts of lands are very sparsely inhabited, and the sizes of their villages. Fig. 3.2, A, B, F, G clearly show the arrangement of houses along a street running almost parallel to the river course in such villages. Protective embankments erected along the Ganga have provided facilities for settling along the river, thus forming
MEERUT DISTRICT
RURAL SETTLEMENT DISTRIBUTION ACCORDING TO SITE

**A**
- JAGAUS
- ADILABAD
- CHOBLO
- LOKARI, DUSITY
- KATANA

**B**
- KAHOL
- ADIT
- GOBINDPUR
- GOHARH DOHR
- BADHAULI

**C**
- TINKIVA
- JANIKHUR
- JANIBUZURG
- KURALI
- SIWALKHAS
- CHANDORA

**D**
- NURPURMANDY
- CHHATRI
- NARAHNA
- GOHTRA GAGAUL
- PHAPUNDA

**E**
- CHANDLAWAD
- URIF MAHALWALA
- SAJJULAPUR
- NITANANDPUR
- FATEHPUR
- NARAYAN

**F**
- JALALPUR ZORA
- PRATAPNAGAR
- HATIPURA
- MIRAPUR

**G**
- MAHALJANA
- QUTUBPUR
- RIYAWALI
- NAGLA
- NAHALLI
- PITKOKAP

**SOURCE:** SURVEY OF INDIA TOPOSHEETS NO. 53 G 53 H 53 E 53 D 53 C 53 B 12 9 4 13

**SCALE:** 1 cm = 1 Kms

**SYMBOLS:**
- ROAD
- RIVER
- SETTLEMENTS
- TANK
- DOUBLE RAILWAY LINE
- CONTOUR
compact villages like Kishorpur, Bastora Norang etc. (Fig. 3.2 F). Similarly along the Kali Nadi are found a number of semi compact villages showing a linear pattern (Fig. 3.2 B, G). The central low-lying area of the District, which becomes sometimes water logged during rainy season, also contain semi compact villages.

Tank site settlements are the important features in Mawana and Meerut tehsils. The tanks and lakes in the region with various patches of infertile usar lands mainly in Parikshitgarh block have made their impact on the distributional pattern of settlements in such areas (Fig. 3.2 C).

The western part of the region exhibits even distribution of settlements and has large and medium sized compact villages because of high water table, fertile and well irrigated lands in these areas while in Ganga Khadar most of the settlements are small and hamleted owing to the presence of light and poor soil and recurrence of flood.

3.0 SIZE OF RURAL SETTLEMENTS

Size (area and population) and density of rural settlements are closely related with spacing. As the distance between settlements increase, the density of villages will decrease. In the study area the average areal size of villages is 4.15 km², Table 3.1 shows the highest per village areal coverage (6.741 km²) in Chhaprauli block of Baghpat tehsil while the lowest
Table 3.1
Distribution of Area Average Per Village Square Km. (1991)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Blocks</th>
<th>Area in Sq.Km.</th>
<th>No. of Settlements</th>
<th>Average Per Village Sq. Km.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chhaprauli</td>
<td>182.0</td>
<td>27</td>
<td>6.741</td>
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<td>235.8</td>
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<td>Baghpai</td>
<td>187.0</td>
<td>51</td>
<td>3.667</td>
</tr>
<tr>
<td>4</td>
<td>Pilana</td>
<td>203.6</td>
<td>50</td>
<td>4.072</td>
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<td>5</td>
<td>Kheakra</td>
<td>162.7</td>
<td>46</td>
<td>3.537</td>
</tr>
<tr>
<td>6</td>
<td>Binauli</td>
<td>297.9</td>
<td>59</td>
<td>5.049</td>
</tr>
<tr>
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<td>Saroorpur Khurd</td>
<td>204.4</td>
<td>34</td>
<td>6.012</td>
</tr>
<tr>
<td>8</td>
<td>Sardhana</td>
<td>186.3</td>
<td>47</td>
<td>3.964</td>
</tr>
<tr>
<td>9</td>
<td>Daurala</td>
<td>189.2</td>
<td>51</td>
<td>3.709</td>
</tr>
<tr>
<td>10</td>
<td>Mawana Kalan</td>
<td>221.6</td>
<td>57</td>
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<td>Hastinapur</td>
<td>349.4</td>
<td>86</td>
<td>4.063</td>
</tr>
<tr>
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<td>Parikshitgarh</td>
<td>318.7</td>
<td>72</td>
<td>4.426</td>
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<tr>
<td>13</td>
<td>Machra</td>
<td>185.6</td>
<td>48</td>
<td>3.867</td>
</tr>
<tr>
<td>14</td>
<td>Rasulpur Rohta</td>
<td>154.5</td>
<td>45</td>
<td>3.433</td>
</tr>
<tr>
<td>15</td>
<td>Jani Khurd</td>
<td>175.6</td>
<td>56</td>
<td>3.136</td>
</tr>
<tr>
<td>16</td>
<td>Meerut</td>
<td>72.1</td>
<td>25</td>
<td>2.884</td>
</tr>
<tr>
<td>17</td>
<td>Rajpura</td>
<td>163.9</td>
<td>49</td>
<td>3.345</td>
</tr>
<tr>
<td>18</td>
<td>Kharkhauda</td>
<td>197.4</td>
<td>43</td>
<td>4.591</td>
</tr>
</tbody>
</table>

|     | Total                 | 3687.8         | 900                | 4.153                       |

Source: Compiled from District Census Handbook (1991), Meerut.
areal size (2.884 km²) is found in Meerut block of Meerut tehsil. Fig. 3.3 shows areal size of a village in the District per Km² at the block level. The villages located in the Yamuna Khadar and along the tract between the river Hindan and the Ganga Canal, especially in Chhaprauli block of Baghpat tehsil and Saroorpur Khurd and Binauli blocks of Sardhana tehsil.

The average population of a village in the study area is 2534.52 persons. Fig. 3.4 shows the average population of a village at block level. Table 3.2 reveals that only 9.67 per cent of the villages of the District have populations of above 5000 persons. Table 3.3 shows the average population per village in the different blocks of the Meerut District. The highest per village population is found in Chhaprauli block, i.e., (4404 persons) followed by Saroorpur Khurd (3519 persons) and Baraut (3406 persons) blocks. The lowest per village population is found in Hastinapur block (1099 persons) followed by Parikshitgarh block (1860 persons).

The classification of villages of the District based on size of population has also been taken into consideration while studying the spatial distribution of rural settlements in the region. The villages of the District have been categorized into six population groups ranging from less than 200 to more than 5000 persons. Table 3.4 shows the distribution of the population of villages in the District. There are 50 total villages, i.e., 5.56 per cent of the villages in the District inhabited by less than 200 people,
Table 3.2
Classification of Villages by Population Ranges (1991)

<table>
<thead>
<tr>
<th>Range of Population</th>
<th>Number of villages in each range</th>
<th>Percentage of villages in each range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 200</td>
<td>50</td>
<td>5.56</td>
</tr>
<tr>
<td>200-499</td>
<td>53</td>
<td>5.89</td>
</tr>
<tr>
<td>500-1999</td>
<td>361</td>
<td>40.11</td>
</tr>
<tr>
<td>2000-4999</td>
<td>349</td>
<td>38.77</td>
</tr>
<tr>
<td>5000-9999</td>
<td>87</td>
<td>9.67</td>
</tr>
<tr>
<td>10,000 and above</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td>900</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 3.3  
Distribution of Population (Average Village Size) at Block Level

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Blocks</th>
<th>Population</th>
<th>No. of Settlements</th>
<th>Average Per village Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chhaprauli</td>
<td>118932</td>
<td>27</td>
<td>4404.89</td>
</tr>
<tr>
<td>2</td>
<td>Baraut</td>
<td>183945</td>
<td>54</td>
<td>3406.39</td>
</tr>
<tr>
<td>3</td>
<td>Baghpat</td>
<td>128393</td>
<td>51</td>
<td>2517.51</td>
</tr>
<tr>
<td>4</td>
<td>Pilana</td>
<td>128606</td>
<td>50</td>
<td>2572.12</td>
</tr>
<tr>
<td>5</td>
<td>Khekra</td>
<td>112969</td>
<td>46</td>
<td>2455.85</td>
</tr>
<tr>
<td>6</td>
<td>Binauli</td>
<td>169473</td>
<td>59</td>
<td>2872.42</td>
</tr>
<tr>
<td>7</td>
<td>Saroorpur Khurd</td>
<td>119667</td>
<td>34</td>
<td>3519.62</td>
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<tr>
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<td>Sardhana</td>
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<td>2364.17</td>
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<tr>
<td>9</td>
<td>Daurala</td>
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<td>51</td>
<td>2264.33</td>
</tr>
<tr>
<td>10</td>
<td>Mawana Kalan</td>
<td>120274</td>
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<td>2110.07</td>
</tr>
<tr>
<td>11</td>
<td>Hastinapur</td>
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<td>1099.62</td>
</tr>
<tr>
<td>12</td>
<td>Parikshitgarh</td>
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<td>72</td>
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<tr>
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<td>14</td>
<td>Rasulpur Rohta</td>
<td>100759</td>
<td>45</td>
<td>2239.08</td>
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<tr>
<td>15</td>
<td>Jani Khurd</td>
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<td>56</td>
<td>2202.39</td>
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<td>16</td>
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<td>2812.10</td>
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<tr>
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<td>Kharkhauda</td>
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<td>2581.95</td>
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<tr>
<td></td>
<td></td>
<td>2171355</td>
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<td></td>
</tr>
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### Table 3.4
Classification of villages according to size of population 1991

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Block</th>
<th>Total No. of villages</th>
<th>% of the district</th>
<th>Very small villages, below 200 persons</th>
<th>Small villages 200-499 persons</th>
<th>Medium villages 500-999 persons</th>
<th>Large villages 1000-1999 persons</th>
<th>Very large villages 2000-4999 persons</th>
<th>Over growth villages Above 5000 persons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A B C</td>
<td>A B C</td>
<td>A B C</td>
<td>A B C</td>
<td>A B C</td>
<td>A B C</td>
</tr>
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<td>1 2 3.703</td>
<td>-- -- --</td>
<td>-- --</td>
<td>5 2.06 18.52</td>
<td>13 3.72 48.15</td>
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<td>Baraut</td>
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<td>2 3.773 3.703</td>
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<td>21 6.02 38.89</td>
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<td>5 4.29 32.61</td>
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<td>6.55</td>
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<td>1 1.866 1.694</td>
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<td>19 7.85 32.20</td>
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<td>-- -- --</td>
<td>4 3.36 11.76</td>
<td>6 2.48 17.65</td>
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<td>-- --</td>
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<td>Meerut</td>
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<td>2.78</td>
<td>-- --</td>
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<td>1 1.866 2.040</td>
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<td>5 4.2 11.63</td>
<td>7 2.69 16.28</td>
<td>24 6.88 55.81</td>
<td>3 3.45 6.97</td>
</tr>
</tbody>
</table>

Source: Compiled from Primary Census Handbook and village and town directory of Meerut District, 1991.

A = No. of Villages  B = % of the District  C = % of the Block
whereas 53 villages comprising 5.89 per cent contain between 200 and 499 persons. The medium size of villages (500-999) account for 13.22 per cent, i.e., 119 villages, while large size villages (1000-1999) share 26.89 per cent, i.e., 242 villages. Very large villages with populations ranging between 2000 and 4999 are maximum in number and constitute 38.77 per cent. The exceptionally large size villages, inhabited by more than 5000 persons represent 9.67 per cent of the total number of villages in the District.

Very small villages (below 200 persons) are found in Hastinapur block, (14 villages), and Parikshitgarh (11 villages) in abundance while villages (above 5000 persons) are mostly found in Baraut (12 villages), Saroorpoor Khurd (9 villages), Chhaprauli (8 villages) and Binauli (8 villages) blocks.

Fig. 3.5 exhibits the distribution of population size of the villages at block level. It clearly reveals that there is an uneven distribution of the population of villages different categories and different blocks of the District. The proportion of villages of very small size varies from 1.694 per cent in Binauli to 16.27 per cent in Hastinapur whereas the District average is 5.55 per cent. Similar variation between different categories is also seen between the different blocks of the District.

4.0 DENSITY DISTRIBUTION OF SETTLEMENT

Agriculture being the main occupation of the people has resulted in a large number of settlements spread widely over the District. Since the level land is in general preferred for the location of the settlements, the
distributional pattern of settlements bears a direct correlation with the intensity of fertile plain and better communication facilities. The Table 3.5 shows that very low density (<15 settlements per 100 Km²) is found in only one block, i.e., Chhaprauli block (14.84 settlements per 100 Km²). The highest value is found in Meerut block (34.67 villages per 100 Km²) followed by Jani Khurd (31.89 villages per 100 Km²). The village density in the District varies from 14 to 34 villages per 100 Km² (Fig. 3.6).

5.0  SPATIAL ANALYSIS

Spacing is one of the most apparent attributes of rural settlements. It is defined as the locational arrangement of villages with respect to one another. To analyze this dimension the classical geographers have considered the spacing as a basis for the classification of rural settlements in different types. In Sweden, Switzerland France and Poland, the geographers have used fixed spacing as a unit for the measurement of concentration and dispersion\(^1\). Barnes and Robinson\(^2\) first undertook the calculation of spacing of settlements. The formula used here to calculate

---


Table 3.5
Spacing and nature of dispersion of Rural settlements in Meerut District

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Blocks</th>
<th>Area in Sq. Km.</th>
<th>No. of Settlements</th>
<th>A/N</th>
<th>d/km²</th>
<th>D (=1.0746\sqrt{\frac{A}{N}})</th>
<th>(r_o)</th>
<th>(r_E) (=\sqrt{\frac{\delta r_E}{4dn}})</th>
<th>(V) = (\frac{4 - n}{(4dn)})</th>
<th>(C) = (\frac{r_o - r_E}{\delta r_E})</th>
<th>(D_i = \frac{ro}{1.0750/\sqrt{d}})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chhaprauli</td>
<td>182.0</td>
<td>27</td>
<td>6.741</td>
<td>0.148</td>
<td>2.790</td>
<td>1.463</td>
<td>1.300</td>
<td>1.125</td>
<td>0.462</td>
<td>0.131</td>
</tr>
<tr>
<td>2</td>
<td>Baraut</td>
<td>235.8</td>
<td>54</td>
<td>4.367</td>
<td>0.229</td>
<td>2.246</td>
<td>0.967</td>
<td>1.045</td>
<td>0.925</td>
<td>0.298</td>
<td>0.074</td>
</tr>
<tr>
<td>3</td>
<td>Baghpat</td>
<td>187.0</td>
<td>51</td>
<td>3.667</td>
<td>0.273</td>
<td>2.058</td>
<td>0.880</td>
<td>0.957</td>
<td>0.919</td>
<td>0.250</td>
<td>0.070</td>
</tr>
<tr>
<td>4</td>
<td>Pilana</td>
<td>203.6</td>
<td>50</td>
<td>4.072</td>
<td>0.246</td>
<td>2.168</td>
<td>1.003</td>
<td>1.008</td>
<td>0.995</td>
<td>0.278</td>
<td>0.075</td>
</tr>
<tr>
<td>5</td>
<td>Khekra</td>
<td>162.7</td>
<td>46</td>
<td>3.537</td>
<td>0.283</td>
<td>2.021</td>
<td>0.985</td>
<td>0.939</td>
<td>1.049</td>
<td>0.241</td>
<td>0.072</td>
</tr>
<tr>
<td>6</td>
<td>Binauli</td>
<td>297.9</td>
<td>59</td>
<td>5.040</td>
<td>0.198</td>
<td>2.415</td>
<td>1.098</td>
<td>1.128</td>
<td>0.973</td>
<td>0.345</td>
<td>0.076</td>
</tr>
<tr>
<td>7</td>
<td>Saroopur Khurd</td>
<td>204.4</td>
<td>34</td>
<td>6.012</td>
<td>0.166</td>
<td>2.635</td>
<td>1.221</td>
<td>1.227</td>
<td>0.995</td>
<td>0.411</td>
<td>0.11</td>
</tr>
<tr>
<td>8</td>
<td>Sardhana</td>
<td>186.3</td>
<td>47</td>
<td>3.964</td>
<td>0.252</td>
<td>2.139</td>
<td>1.079</td>
<td>0.996</td>
<td>1.083</td>
<td>0.271</td>
<td>0.076</td>
</tr>
<tr>
<td>9</td>
<td>Daurala</td>
<td>189.2</td>
<td>51</td>
<td>3.709</td>
<td>0.269</td>
<td>2.069</td>
<td>1.026</td>
<td>0.964</td>
<td>1.064</td>
<td>0.254</td>
<td>0.071</td>
</tr>
<tr>
<td>10</td>
<td>Mawana Kalan</td>
<td>221.6</td>
<td>57</td>
<td>3.888</td>
<td>0.257</td>
<td>2.119</td>
<td>1.041</td>
<td>0.986</td>
<td>1.056</td>
<td>0.266</td>
<td>0.068</td>
</tr>
<tr>
<td>11</td>
<td>Hastinapur</td>
<td>349.4</td>
<td>86</td>
<td>4.063</td>
<td>0.246</td>
<td>2.166</td>
<td>0.809</td>
<td>1.008</td>
<td>0.803</td>
<td>0.278</td>
<td>0.057</td>
</tr>
<tr>
<td>12</td>
<td>Parakhilgarh</td>
<td>318.7</td>
<td>72</td>
<td>4.426</td>
<td>0.226</td>
<td>2.261</td>
<td>0.975</td>
<td>1.052</td>
<td>0.927</td>
<td>0.302</td>
<td>0.065</td>
</tr>
<tr>
<td>13</td>
<td>Machra</td>
<td>185.6</td>
<td>48</td>
<td>3.876</td>
<td>0.259</td>
<td>2.113</td>
<td>0.955</td>
<td>0.982</td>
<td>0.973</td>
<td>0.264</td>
<td>0.074</td>
</tr>
<tr>
<td>14</td>
<td>Rasulpur Rohta</td>
<td>154.5</td>
<td>45</td>
<td>3.433</td>
<td>0.291</td>
<td>1.991</td>
<td>0.896</td>
<td>0.927</td>
<td>0.966</td>
<td>0.235</td>
<td>0.072</td>
</tr>
<tr>
<td>15</td>
<td>Jani Khurd</td>
<td>175.6</td>
<td>56</td>
<td>3.136</td>
<td>0.319</td>
<td>1.903</td>
<td>0.980</td>
<td>0.886</td>
<td>1.106</td>
<td>0.214</td>
<td>0.062</td>
</tr>
<tr>
<td>16</td>
<td>Meerut</td>
<td>72.1</td>
<td>25</td>
<td>2.884</td>
<td>0.347</td>
<td>1.825</td>
<td>0.18</td>
<td>0.849</td>
<td>1.389</td>
<td>0.197</td>
<td>0.089</td>
</tr>
<tr>
<td>17</td>
<td>Rajpura</td>
<td>163.9</td>
<td>49</td>
<td>3.345</td>
<td>0.299</td>
<td>1.965</td>
<td>0.973</td>
<td>0.914</td>
<td>1.065</td>
<td>0.228</td>
<td>0.068</td>
</tr>
<tr>
<td>18</td>
<td>Kharkhuda</td>
<td>197.4</td>
<td>43</td>
<td>4.591</td>
<td>0.218</td>
<td>2.303</td>
<td>1.3</td>
<td>1.071</td>
<td>1.214</td>
<td>0.313</td>
<td>0.085</td>
</tr>
</tbody>
</table>

| Sum    | 3687.8   | 900  | 2.175 |
the spacing of settlements has been taken from Mather who studied the linear pattern of farm population in USA¹ i.e.,

\[ D = 1.0746 \sqrt{\frac{A}{N}} \]

Where \( D \) = theoretical distance between points or settlements in hexagonal arrangement.

\( A = \) area and

\( N = \) number of settlements per unit area.

On the basis of above equation the computation of the inter village distance for eighteen development blocks of the District have been done. The average inter-village distance for the District is 2.175 Km (Fig.3.7). Six blocks show spacing more than the District average, i.e., Chhaprauli (2.790 Km) Saroorpur Khurd (2.635 Km), Binauli (2.415 Km), Kharkahuda (2.303 Km), Parikshitgarh (2.261 km) and Baraut (2.246 Km) while the rest of the blocks show lesser than the average spacing. Table 3.5 shows the inter-settlement spacing at block level. Inter-village spacing may be grouped into five categories, which has been discussed into sequent manner.

5.1 Very Low Spacing (< 1.900 Km)

This category is found only in Meerut block. The value of its spacing is 1.825 Km. It covers 1.9 per cent of the total area (3687.8 Km²) in the

southern part of the District. It has 2.4 per cent (51277 persons) of the total rural population and 2.8 per cent (25 villages) of the total number of villages of the District. The average village density of this block is (34 villages / 100 Km²). The soil of the block is of excellent quality and the land is highly productive. Since fertile land is found all over the area, small settlements have sprung up in large numbers and the spacing between them is very thin. This is the result of the availability of fertile land, high water table, accessibility to means of transport and communication and presence of cultivators of diverse castes.

5.2 Low Spacing (1.901 – 2.100 Km)

This group is found in Baghpat (2.058), Khekra (2.021), Daurala (2.069), Rasulpur Rohta (1.991), Jani Khurd (1.903) and Rajpura (1.965) blocks. This group covers an area of 1032.9 Km² or 28 per cent of the total area of the District. The lowest spacing is found in Jani Khurd block (1.0903), while the highest in the Daurala block (2.069). It contains 33.1 per cent (718729 persons) of the District's rural population and 33.1 per cent (298 villages). Here average area per village ranges from 3.14 Km² (Jani Khurd) to 3.71 Km² (Daurala), while village density shows variations between 26 (Daurala) to 31 (Jani Khurd) per 100 Km² of area. The agricultural land is fertile as well as development of transport, communication, and irrigational facilities like canal and tube-well are responsible for the growth of semi-compact settlements in these areas.
5.3 Moderate Spacing (2.101 – 2.300 Km)

This group accounts seven blocks of the District, Baraut and Pilana in tehsil Baghpat, Sardhana block and whole of Mawana tehsil, i.e., Mawana Kalan, Hastinapur, Parikshitgarh and Machra blocks. The value of spacing in these blocks ranges from 2.113 Km (Machra) to 2.261 Km (Parikshitgarh) and covers 46 per cent (1701.0 Km²) of the District's area. It has 46 per cent (414) of the total inhabited villages and 40.63 per cent (882,253 persons) of the total rural population of the District. The size of settlement here is slightly bigger where land is cultivable but in Ganga Khadar the settlements are small due to recurrence of flood.

5.4 High Spacing (2.301 – 2.500 Km)

Relatively high spacing is found in two blocks of the District, viz., Banauli (2.415 Km) and Kharkhauda (2.303 Km). This group comprises 13.4 per cent (495.3 Km) of the total area of the District. The areal size of villages in these blocks is 5.04 Km² (Binauli) and 4.59 Km² (Kharkhauda). They together constitute 12.9 per cent (280497) of the total rural population of the District and 11.3 per cent (102) of its inhabited villages. The number of villages per 100 Km² of rural area in these blocks is 19 (Binauli) and 21 (Kharkhauda). The Binauli block is situated in the Yamuna Hindan Doab and on the whole this tract is the fertile portion of the District but is flanked by belts of poor soil and broken relief associated with the two rivers. The
soil is of poor quality, the terrain being generally broken up by small ravines. Lack of cultivable land, irrigational facilities and inadequate means of transport are the main causes for high inter-village spacing in the study area.

5.5. Very High Spacing (above 2.501 Km)

Very high spacing is found in two blocks of the District, i.e., Chhaprauli (2.790 Km) and Saroorpur Khurd (2.635 Km) blocks and both them covers about 10.5 per cent (386.4 Km²) of the total area of the District. These two blocks lie in Yamuna Hindan Doab and is flanked by belts of poor soil and broken relief associated with two rivers. The highest spacing occurs most strikingly along the rivers. Settlements of this nature are mostly concentrated at high or round level for protection from floods. There are a number of bhur mounds along the banks of the rivers. So most of these areas are rendered uninhabited. Besides, lack of irrigational facilities, transport and communication are also responsible for high inter-village spacing in these two blocks. They constitute 6.7 per cent (61 villages) of the total number of its inhabited villages and 10.98 per cent (238,599) of its total rural population. Since spacing in these blocks is very high, the areal coverage of settlements is also high. The average size per village is 6.741 Km² in Chhaprauli and 6.012 Km² in Saroorpur Khurd and
the number of settlements per 100 Km² is 14 in Chhaprauli and 16 in Saroorpur Khurd.

The foregoing discussion reveals a direct relationship between spacing and settlement size in different blocks of the District. It is concluded that were spacing is high villages are of larger sizes with a small number of hamlets having higher densities of population, which results in compact structure of settlements. On the contrary in areas of low spacing, settlements are generally smaller in size with low pressure of population and scattered distributional pattern, viz., hamleted type settlements.

The radial distribution function of rural settlements can be interpreted with the help of plotting theoretical spacing (D) on the one coordinate and village density per 100 Km² (d) on the other (Fig.3.8). The figure shows that as the spacing decreases, the village density will increase and vice versa. Low spacing < 1.900 Km with higher village density (34 villages per 100 Km²) will be taken as the index of hamleted type, medium spacing (< 2.4 Km) with medium settlement density (21-29 villages per 100 Km²) is an indicator of semi-compact structure while high spacing (> 2.4 Km) with low village density < 21 villages per 100 Km² may be taken as an index of compact structure. Since these indices are not sufficient for the classification of rural settlement, other indices may be considered and coordinated with them to classify the rural settlements as discussed below.
6.0 DISPERSION ANALYSIS

Though the agrarian set up, land tenure and human influences have played a major role in modification and transformation of habitat system, yet the forces determining the present rural settlement patterns have been mainly related to physical character of the terrain with their direct and indirect influence. Stone and Hudson have evolved several statistical techniques of measuring degree of dispersion and concentration. They have no precise connotations and their significance levels vary from region to region owing to the presence of physico-cultural diversity. An attempt has been made here to measure the degree of dispersion, taking basis of observed mean of nearest inter-village straight line distance, the method being termed as nearest neighbor distance approximation analysis. In this analysis it is assumed that points are distributed randomly in accordance with Poisson Probability Function, which assumes that each location has an equal chance of containing a point, while in the real world, settlements are neither always evenly spaced, nor are they spaced in strictly random pattern. Thus, dispersion may be defined as the degree of deviation of set of points from random relative to some delimited area. By definition, "complete randomness is the midpoint of the continuum of spatial patterns extending from complete clustering to complete uniformity". The index of

randomness \((R_N)\) can be computed by using the formula developed by plant ecologists, Clark and Evans\(^1\) as

\[
R_N = \frac{r_o}{r_e}, \quad \text{where,} \quad r_e = \frac{1}{2\sqrt{d}}
\]

\[
= 2r_o \sqrt{d}
\]

In the present analysis Development Blocks have been taken as the standard areal unit for measurement of \(R_N\) value, and all the inhabited settlements in the different blocks of region have been taken into consideration for the present analysis.

The \(R_N\) value is used as a measure of the degree to which observed distribution approaches or deviates from random expectation. The value of the statistics ranges from 0.0 (complete concentration) through 1.0 (random) to 2.149 (ideal or normative hexagonal lattice). This index of \(R_N\) value can be correlated with variance \(V\) for further testing, which can be computed by the mathematical formula\(^2\).

\[
V = \frac{(4 - n)}{4dn} = 0.0683086 / d
\]

When the value of \(r_e\) is greater than \(V\), the distribution is termed as regular; when the value of \(V\) is greater than the \(r_e\), it is termed clustered and the term random is applied in case when \(V\) and \(r_e\) are equal, i.e., the


\(^2\) Dacey, M.F. "Order Distance in a Homogenous Random Point Pattern", Canadian Geographer, Vol. 9, pp. 144-152.
variance mean ratio is one. In the present case, the value of \( r_E \) is always more than \( V \), thus representing a regular rather than random pattern. The test of the significance of \( r_E \) is made out with the hypothesis of Poisson Probability on the basis of standard error \( (\sigma r_E) \), which is given as

\[
\sigma r_E = 0.26136/\sqrt{nd}
\]

where, \( n \) denotes the total number of villages in an areal unit, while \( d \) = density of villages per sq km. The significance test of departure can be made through the statistic of standard variate of normal curve\(^2\), the formula being:

\[
C = \frac{(r_d - r_E)}{\sigma r_E}
\]

Where \( C \) is the standard variate of the normal curve, and \( \sigma r_E \) is the standard error of the mean distance to nearest neighbour in a randomly distributed population of the same density as that of the observed population.

The upper and lower ranges of random matching at 95 per cent probability level will be computed by using the following formula.\(^3\)

\[
i.e., = (2\sigma r_E \pm r_E) / r_E
\]

---

1. Clark and Evans, op.cit., p. 450.
The width of the range of randomness depends upon the number of points (villages). The greater the number of points, the smaller the range and vice versa. Fig. 3.9 shows the range of random matching at 95 per cent probability level and reveals that the blocks of the District fall under all the three categories i.e., clustered, random and regular indicating a clear tendency towards regularity.

Table 3.5 shows the result of the RN values and different calculated indices refer to the nearest neighbor analysis for each development block of the District while Fig.3.10 gives the measurement of the spatial patterns of rural settlements in the study area. The RN values ranging from 0.803 (Hastinapur block) to 1.389 (Meerut block) reveal a clear tendency towards regularity. On the basis of the results obtained five categories can be observed (Fig. 3.11).

6.1 Clustered Grouping (< 0.975)

The clustered grouping of rural settlements is observed in seven blocks of the District. They are Baraut, Baghpat, Binauli, Hastinapur, Parikshitgarh, Machra, Rasulpur Rohta, covering 46.88 per cent of the total area of the District (1728.9 sq Km) and 46.1 per cent (415) of the total number of inhabited villages and 42.41 per cent of its total rural population. This area has the clustered form of rural settlements, owing to the presence of rich local agricultural resources and fertile soils.
FIG. 3.9

RANGE OF RANDOM MATCHING

Regularity

Clustering

Range of Random Matching at 95% Probability Level

Number of Inhabited Settlements per Block

R\text{v} Values
6.2 Random Grouping (0.975 – 1.025)

The random distribution of rural settlements occupies nearly 11.06 per cent area (408 sq Km.) and 9.33 per cent (84) of the total rural settlements and 11.43 per cent of its total rural population of the District. It covers two blocks, i.e., Pilana and Saroorpur Khurd. The observed inter village distance of Pilana and Saroorpur blocks are 1.003 Km and 1.221 Km while the expected distance is 1.008 Km and 1.227 Km respectively.

6.3 Low Regularity (1.025 – 1.075)

Areas of low regularity comprises of four blocks, namely Khekra, Mawana Kalan, Daurala and Rajpura, covering 19.99 per cent (737.4 sq km.), 22.56 per cent (203) of the total number of inhabited villages and 22.41 per cent of its total rural population. The area is characterized by varying nature of villages ranging from small to large size, i.e., 162.7 sq Km. (Khekra) to 221.6 sq Km. (Mawana Kalan). The observed inter village distance ranges from 0.973 (Rajpura) to 1.041 Km (Mawana Kalan) while the expected distance varying from 0.914 Km (Rajpura) to 0.986 Km (Mawana Kalan).

6.4 Moderate Regularity (1.075 – 1.125)

It occupies three blocks of the District namely Sardhana (1.083), Jani Khurd (1.106) and Chhaprauli (1.125), which accounts 14.75 per cent
(543.9 sq Km.) area of the District, 14.44 per cent (130) of the total number of inhabited villages and 16.27 per cent of its total rural population. The village density per 100 sq Km varying from 14 (Chhaprauli) to 31 sq km (Jani Khurd). The size of village in Chaprauli is 6.74 sq km per village, 3.964 sq km per village (Sardhana) and 3.136 sq km per village in Jani Khurd.

6.5 High Regularity (above 1.125)

Areas of high regularity comprises of only of two blocks of the District, i.e., Kharkhauda (1. 214) and Meerut (1.389), covering an of area of 7.31 per cent (269.5 sq km.), 7.55 per cent (68) of the total number of its villages and 7.47 per cent of its total rural population. The Density per 100 sq Km for Kharkhauda is 21 while for Meerut it is 34, which is the highest in the whole District. The uniform distribution of the settlements in these areas is the result of monotonous character of topography, uniform distribution of resources, fertility of soil, facilities of irrigation and means of communication and transport etc. The inter village spacing is 1.825 Km (Meerut) and 2.303 Km (Kharkhauda). The observed inter village distance is 1.18 Km (Meerut) and 1.3 Km (Kharkhauda) while the expected inter village distance 0.849 Km (Meerut) and 1.071 Km (Kharkhauda).

On the basis of the foregoing discussion it has been concluded that the trend of dispersion is always towards regularity. So Dacey's Regular
Poisson Probability Law\(^1\) is most appropriate in this case because the empirical variance mean ratio is always smaller than 1 and the mean, in every case, is more than the variance, deviation index of nearest neighbour has also been tested with the use of normalized index of random disturbance whose intensity has been measured by using following mathematical formula.\(^2\)

\[
D_i = \frac{\rho_0}{\sqrt{\frac{1.075}{\sqrt{d}}}}
\]

Table 3.5 shows the normalized index (Di) values, in various blocks of the District ranges from 0.373 (Hastinapur) to 0.646 (Meerut), indicating a clear tendency towards regularity.

7.0 Types Of Rural Settlements

The word ‘type’ used here indicates the relationship between settlements within organized space,\(^3\) which provides a distinctive view of the spatial organization. Most of the settlement geographers have classified the types according to their regional distribution patterns of such habitation on the basis of theoretical, empirical and associational considerations. In

\begin{itemize}
\end{itemize}
Poisson Probability Law¹ is most appropriate in this case because the empirical variance mean ratio is always smaller than 1 and the mean, in every case, is more than the variance, deviation index of nearest neighbour has also been tested with the use of normalized index of random disturbance whose intensity has been measured by using following mathematical formula.²

\[ D_i = \frac{\rho}{\left( \frac{1.0750}{\sqrt{d}} \right)} \]

Table 3.5 shows the normalized index (Di) values, in various blocks of the District ranges from 0.373 (Hastinapur) to 0.646 (Meerut), indicating a clear tendency towards regularity.

7.0 Types Of Rural Settlements

The word 'type' used here indicates the relationship between settlements within organized space,³ which provides a distinctive view of the spatial organization. Most of the settlement geographers have classified the types according to their regional distribution patterns of such habitation on the basis of theoretical, empirical and associational considerations. In

the Indian context, the term signifies the characteristic groupings of rural dwellings in that well-defined parcel of the ground, which is known as 'mauza'. But in regional framework, the term denoted the relationship between settlements within space. Thus, types are to be recognized on a large-scale map through the distribution of houses on one or more sites in a defined village territory. Various scholars have suggested many possible methods for classifying human settlements on the basis of size (e.g., large, medium, small etc.) siting (e.g., valley site, river site, road side villages etc.), functions (e.g., agriculture, fishing, commerce etc.), time (prehistoric, ancient, medieval, modern villages etc.). The present classification of rural settlements is based mainly on the pattern of nucleation of occupancy units in a given space, which is an outcome of different physico-cultural factors. The settlements are classified into three types according to the spatial arrangement of the houses, i.e., compact, semi compact and hamleted (Fig 3.12). The compact settlements, also known by terms such as ‘clustered’, ‘nucleated’, or ‘agglomerated’, show very close spatial organization of the houses, i.e., houses are closely knit together and are separated by passages meant for traffic or circulation. The hamleted settlement indicate scattering of occupancy units along the loose spatial structure. A perusal of the Topographical Sheets of the Survey of India (Scale 1cm = 500m) of the area coupled with field observation of the rural landscape of the Meerut
District reveals that there are wide variations in rural settlement in it. In this way, every settlement has its own distinct and unique personality\(^1\).

Different scholars for the classification of rural settlement have presented a number of methods. Singh has proposed a scheme to identify settlement types taking into account the village and hamlet ratio of a village. If the number of villages are equal to the number of hamlets in a settlement, it is designated as, 'compact', if villages are less than half of the number of hamlets it is called 'dispersed' and if their number is more than half of the number of hamlets it is term 'semi compact'\(^2\).

Villages, where houses are concentrated at central sites have been designated as 'compact'. Such concentration may have only one family or more than one hundred houses. Villages in which the number of hamlets vary between two and four, have been designated as 'semi-compact', whereas those consisting of five or more than five hamlets have been identified as 'hamleted'. Uninhabited villages have been ignored, and therefore the present study covers only 900 inhabited villages of the District.

7.1 Compact Settlements

Availability of water, productive agricultural land, means of communication provides better condition for the growth of compact villages.

The rich alluvial soil attracted people since early historical times to live in groups and follow agriculture. The term ‘compact settlement’ signifies the concentration of almost all the dwellings of a ‘mauza’ (village) in one central site. Compact settlements are found in large numbers throughout the District but they are common in Baraut, Saroorpur Khurd and Rajpura blocks.

Need for security from wild animals, clan solidarity particularly among the Rajputs and the Jats, the Jajmani system and prevailing social conditions, must have forced the people to congregate at one place under the shadow of their respective chiefs or leaders. At present, rural settlements of the area consist of a cluster of buildings in which streets are irregular in width and layout. The houses are irregularly placed with respect to the street frontage. Arable lands, fields, common pastures and orchards surround them. There may exist a common pond, a temple or a mosque in central part of the village. Thus “compact villages” are distinct and separate organism with its individual life and personality, which forms part of the landscape. The advent of modern means of transport such as railways and metalled roads and social customs of castes segregation have played an important role in disturbing the compact nature of such villages (Fig. 3.12 A, B).

7.2 Semi-Compact Settlements

The semi compact, an intermediary stage between compact and hamleted settlement, is characterized by the presence of a main village site along with one or two or more hamlets. The houses are neither agglomerated nor dispersed in numerous detached hamlets. These hamlets have direct linkage with the main site by footpaths or cart tracks. Such settlements are found in all over the District but common in eastern part of the region especially in Hastinapur block.

The development of hamlets around the main inhabited site reflect out growth of later periods by the people of diverse castes during settling process, sometimes as a separate grouping by aboriginals and low caste people in the neighbourhood of the main residential unit. There are examples of several villages where high castes have also formed the hamlets representing one family group (Kula). This process is very common in the villages lying along the roads. Besides, the outgrowth of the main or central site, a hamlet may also be formed due to the inhabitation of labour or service castes, existence of a place or worship or settling of immigrants from other villages. Such hamlets derive their names from the predominant caste residing therein e.g. Chamar Tola, Jatpura, Dhimar Patti etc. (Fig. 3.12 C)

7.3 Hamleted Settlements

The hamleted settlement is characterized by the presence of one
main site and several hamlets standing separate from one another spreading over the entire village area. Footpaths or cart tracks closely link these hamlets with each other. In such villages, physically separated clusters are closely associated with each other by cultural and social ties\(^1\). The division of the Indian villages into caste wards is the replica of the pre-Dravidian system, where different groups live more independently and separately by open interstitial space, but is joined together functionally. Rajput, Muslim and other Zamindars encouraged the system of the establishment of the hamlet. Land grants were made to establish separate ‘purwa’ or ‘toli’ fore various castes especially lower ones. It is also found that sometimes these outgrown hamlets are bigger in size than the main site and it is not easy to distinguish the original or main site from these hamlets. Physical environment, notably, the nature of the terrain and the drainage system, appear to be main factors, which have influenced the growth of hamleted or dispersed settlements in the District. Another important factor in the development of such settlements is agricultural operation. The time consumed in moving from the houses to the agricultural field, the inconvenience in carrying agricultural implements to long distances, the watch and ward arrangements, etc. have also resulted in the emergence of hamlets. This type of transition belt is seen in the Ganga

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Khadar tract of the study area. It covers Hastinapur and Parikshitgarh blocks of the District (Fig. 3.12 D).

8.0 FACTORS AFFECTING RURAL SETTLEMENTS TYPES

The rural settlement types are the outcome of the interplay between various agglomerative and deglomerative factors.

8.1 Factors Leading to Agglomeration

I. Uniformity of Relief and Soil Fertility

Agglomerated type of rural settlement has been the chief characteristic of homogeneous leveled and fertile plains. Although soil variations are found all over the region, and even within the limits of the mauza boundary itself but its general productivity has enabled the rural population to live close together. The homogeneous stretch of fertile well-watered alluvial plains encourages large concentrations of rural settlements. The ever-growing population in such plains leads to intensive farming, which is also conducive to the concentration of settlements. The general sameness of the natural scene, coupled with an almost uniform fertility of the soil over most of the plain has fostered a sense of community life and motivated the people of the study area, to live in compact settlements.

II. Water Resources

The village water reservoirs ponds and jhils carved out with the excavation of earth for house building and even for water supply purposes
are a great source of water accumulation against the seasonal distribution of rainfall for irrigational facilities, bathing and other domestic purposes and are conducive to compact type of village settlement. In the areas of deep water table, owing to the difficulty and high cost of construction, masonry wells are infrequent and population clusters in compact villages around them; while in the zones of high water table, where such wells are more numerous because they can be cheaply constructed and there is no need to concentrate in one site so it is likely to spread out into several outlying hamlets. The need to store water against the seasonal distribution of rainfall and its vagaries is again conducive to the formation of compact settlements over higher and drier interfluves of the rivers. Near the rivers, construction of artificial embankments parallel to the streams as a protection from flood has encouraged the growth of agglomerated settlements along the river Ganga. Collective building of dams and irrigation channels for the storage and distribution of rain water and the construction of tanks for artificial irrigation, have also promoted the evolution of compact villages.¹

III. Cultural Factors

The following are the cultural factors responsible for the establishment of compact settlements:

1. Man is the most gregarious animal and he tends to gravitate towards his fellowmen. Forest clearing, cultivation of land and related activities

centralized at one place and agricultural cooperation and practices of the past as well as present have been conducive to compact settlements. Necessity for cooperation in the regulation and control of water, digging wells, upkeep of certain public works and preparation of the environment to make it favourable to crops.¹

2. Fragmentation of holdings and strip cultivation present disadvantage to the village dweller, which are best, counterbalanced by nucleation where formers avail all the amenities of close and warm communal life. Blache rightly remarks that "concentration of living quarters is necessitated by the diversity of parcels to be cultivated because their only common meeting ground is the village, whither all paths lead."²

3. Rajput clans have helped the settlements to grow into compact habitations enclosed by mud walls, ditch or around a fortress doing the process of occurrence. To these were attracted groups of other people like priests, menials and artisans who aided in maintaining the solidarity, and self-sufficiency of the rural organization.³

4. The reciprocal relationships under the jajmani system have tended to maintain compactness since long. According to Enayat Ahmad the social gathering in the centre of the village usually under some shady tree or near the temple, the mutual rejoicings on festivals, the gathering of neighbours

² ibid.
after the days work near the well in summer and round the fire in winter
when tales are told and talks of friends and crops exchanged, all these
have contributed their influence in the direction of compact settlement.¹

5. Big cultivators or village Mahajan (money lender) exercises
centripetal force for settlers.

6. Unemployed or semi-employed labourers engage themselves in the
subsidiary occupations, which can easily flourish in such villages. Similarly,
a host of intermediaries like petty traders find it convenient to supply
articles of everyday life and purchase grains in times of need in compact
villages.

7. Land system also associated the landlord and cultivator well in
compact villages.

8. Religious centres along rivers and near springs also attract
agglomerations around them. Temples in the middle of such big settlements
still signify their historical role.

9. Some villages grow as compact settlements due to definite political
bias or administrative decision.

10. Defence plays a significant role in agglomerations. During the
eighteenth century no isolated habitation was considered secure unless
protected by a fortification wall and ditch.²

¹ Ahmad, E., 'Rural Settlement Type in UP (United Province of Agra and Oudh)
² Growse, F.S., 'Mathura: A District Memoirs', New Delhi, Asiatic Educational
11. Hall observes that compact village form is well adapted to the mode
of life of a paddy area. Various operations linked with paddy cultivation
generate such centripetal force.

12. According to Mukerjee that the seasonal idleness of the peasant,
especially marked in the rice region contributes to the development of a
large variety of cottage industries, which can thrive only in compact
settlements.

13. During old days, new site was rarely selected to live separately due
to being inauspicious till it was approved of by a group of settlers after
getting confirmation from the priests.

8.2 Factors Leading to Dispersion

I. Physical Factors

1. The dispersion appears to increase in direct proportion to the
ruggedness of the land surface. The uneven nature of relief, soil and
ground water results in the formation of scattered settlements. The Meerut
District is marked by the presence of usar lands, broken terrain by small
ravines, ponds and jhils, which have promoted semi-compact and hamleted
types of settlements.

2. Abundance of surface water and high water table has also influenced
the growth of fragmented settlements. When surface water in the form of

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XXI, No. 1, Jan. 1, (1931), p. 98
tanks and ponds is plentiful, each one of these may have a small hamlet around it. Of course, large tanks or tals may be conducive to large settlements. In areas where water table is high the construction of masonary or non-masonary well is cheap and easy and therefore it may be a suitable location for a small settlement.

3. Flood plains of large streams are also responsible for the scattering of settlements. In low-lying areas which are annually inundated during the rainy season, elevations, within the village are selected as suitable sites for establishing small hamlets, their number depending upon the number of elevated sites. The khadar lands of the rivers Yamuna and Ganga and Kali Nadi are flooded every year during the rainy season. As a result these areas are marked by the presence of semi-compact and hamleted types of settlements.

II. Cultural Factors

1. Socio cultural factors such as castes, prejudices and the existence of low agricultural castes have been partly responsible for the growth of hamleted settlements. The caste system based on social hierarchy divided the population into various social groups. At the lowest level of the social ladder are the supposedly low caste people, the so-called untouchables or Harijans, which include castes like, the Pasis, the Chamar and the Doms. These people have traditionally been forced to live a little away from the main site, often towards the south, while the upper castes occupied the
central site. Thus the caste hierarchy has also been responsible for the dispersion of rural settlements.

2. Land tenancy and absentee landlordism have also made their contribution towards fragmentation of settlements. Landlords used to settle near their holdings, and agricultural labourers, who were bound by loan or by cultivable lands given in return for services rendered, were required to stay a little away from the main habitation. As a result, the fragmentation of settlements took place. Besides this, most fertile fields were occupied by the landlords, while the less productive and poor lands lying away from the central site were under the possession of tenants, who will built their houses near their fields. After the abolition of the zamindari system, the actual tillers of the soil became free to settle anywhere in the village, causing further fragmentation of settlements.

3. Economic factors such as development of roads, railways and opening of new market service centres etc. have stimulated the tendencies towards hamletion of villages.