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RESEARCH ARTICLE

Organization of Settlements in Aligarh District using Nearest Neighbour Analysis

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Abstract

People seldom reside in isolation. They live in settlements which vary greatly in size, composition, location, arrangement, and function. Settlements exercise a powerful influence in shaping the world's different cultural, political, and economic systems. Accordingly, the patterns of settlement across earth's surface differ markedly from region to region, from place to place and from time to time. It is important to analyse the organization of settlements as it helps in knowing the ground reality for providing balanced regional development by giving services according to the spacing of settlements. In this paper an attempt has been made to analyse the organization of settlements selecting Aligarh district as study area using nearest neighbour analysis. The result shows that there is uneven distribution of settlements in the study area which is due to the variations in the physical, socio-economic, and political factors.

Introduction

Settlements are the visible imprint made by the man upon the physical landscape through the process of cultural occupancy. It is manmade colony of human being in which they live, work, and move to pursue their socio-economic activities for sustaining their livelihood. Spatial organization of rural settlements is the logical outgrowth of man's cognition, interactions with their surroundings. The nature of surroundings has direct bearing on the distinct shape, size, distribution, growth, and function of rural settlements. Spatial organization, in fact is an aggregate pattern of use of space by a society (Morrill, 1974), which determines the movement phenomena of men, material and ideas (Hermansen, 1971). Therefore, the study of spatial organization of rural settlement is of prime importance to understand the nature of the space with the relationship of human occupancy and functional activities. In the present study an attempt has been made to examine the spatial organization of settlements using nearest neighbour analysis.

Study Area

For the present study Aligarh district has been selected as the study area. It is one of the district of Uttar Pradesh, which is located in the north western part of Ganga Yamuna doab and forms a part of Agra division. It extends from $27^0\ 27'$ N to $28^0\ 11'$ N latitudes and $77^0\ 27'$ E to $78^0\ 38'$ E longitudes (fig. 1). As per census 2011 the district has a population of 3,673,849 persons, out of which 1,958,536 are male and 1,715,313 are female. The district has witnessed 2,127,592 and 864,649 as the rural and urban population respectively. Based on administrative convenience, the district has been divided into divisions i.e. tehsils namely Koil, Khair, Gabhana, Atrauli, and Iglas. These tehsils are further sub- divided into 12 development block namely Atrauli, Gangiri, Bijauli, Jawan Sikanderpur, Chandaus, Khair, Tappal, Dhanipur, Lodha, Akrabad, Iglas, and Gonda, These sub units are used to analyse the organization of settlements.

Data base and Methodology

The study is based on secondary sources of data which have been collected from Census of India, 2001 and Statistical Magazine of Aligarh district 2001 as well as through field survey of study area. Organization of settlements has been examined using nearest neighbour analysis. Dacey (1958) introduced into geography the

technique of nearest neighbour analysis, which was developed originally by Clark and Evans (1954) for measuring spatial relationships among biological populations. In this analysis it is assumed that points are distributed randomly in accordance with a 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 they are spaced in a strictly random pattern.

Rn value is the measure of the degree of departure from randomness in either of two directions: towards clustering or towards uniformity that ranges from 0 (clustered pattern) through 1 (random pattern) to 2.15 (uniform pattern).

- Statistical method for computing Nearest Neighbour Index is :

$$Rn = do/de \quad \text{and} \quad de = \frac{1}{2\sqrt{N/A}}$$

Where, Rn = Nearest Neighbour Index,

do = mean observed distance of nearest neighbor settlements,

de = mean expected distance of settlements,

N = total number of settlements,

A= total area of the concerned region.

Result and Discussion

For the present analysis, development block has been taken as the standard areal unit for measuring of Rn values. Table 1 shows block wise dispersion of settlements in Aligarh district. On the basis of the results obtained, three regions have been delineated.

Location of Aligarh District

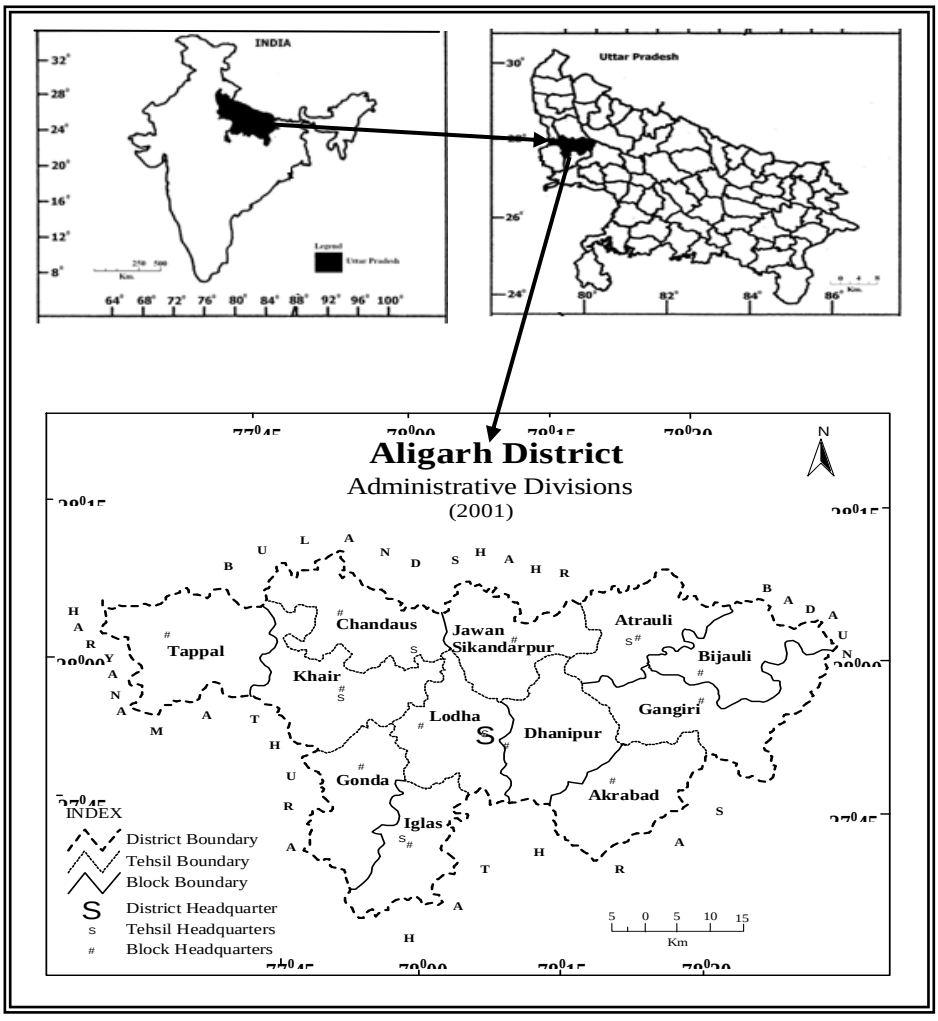


Table 1. Aligarh District: Dispersion of Rural Settlements (2001)

Block	(N)	(A)	(do)	(de)	Rn
Tappal	87	413.25	1.708	1.090	1.567
Khair	96	317.9	1.294	0.910	1.422
Chandaus	92	318.93	1.612	0.931	1.732
Lodha	133	293.15	1.132	0.742	1.525
Jawan Sikanderpur	108	297.88	1.350	0.830	1.626
Atrauli	110	272.79	1.460	0.787	1.854
Bijauli	85	223.19	1.484	0.810	1.832
Gangiri	99	350.48	1.702	0.941	1.809
Dhanipur	98	279.41	1.482	0.844	1.755
Akrabad	86	289.9	1.586	0.918	1.728
Gonda	83	268.83	1.514	0.900	1.683
Iglas	103	253.5	1.268	0.784	1.617
Total	1180	3579.21	1.466	0.871	1.683

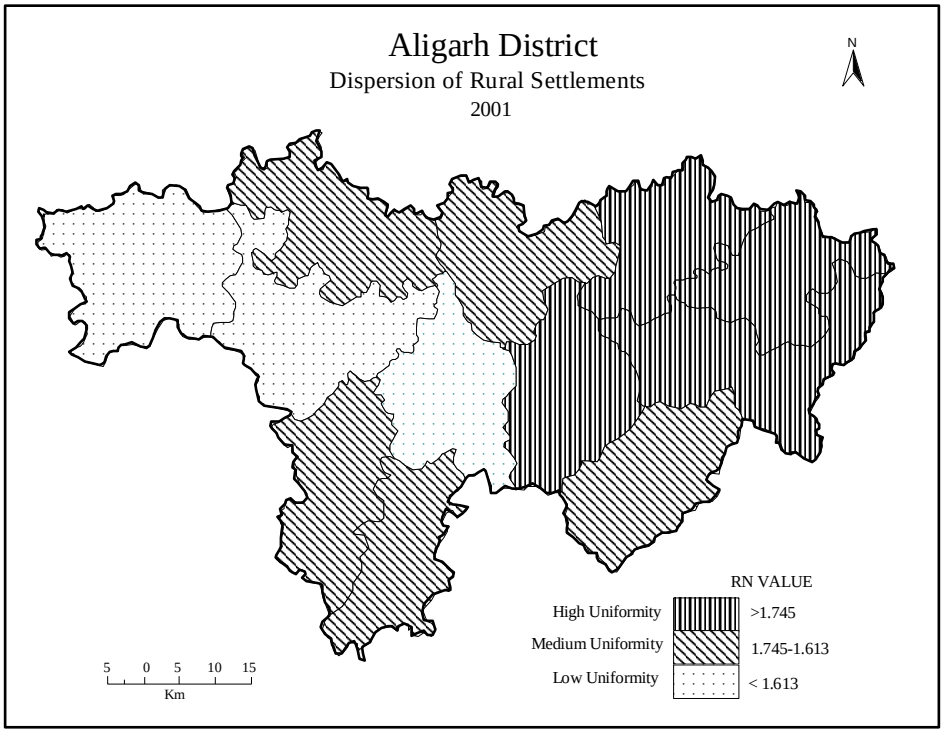
Source: Computed from Census of India (2001), Village Directory (2001)

(i). Low uniformity (Rn value <1.613):

It covers three development blocks i.e., Tappal, Khair and Lodha (Fig. 2). The observed inter village distance (do) of Tappal, khair and Lodha block is 1.708 km, 1.294 km, and 1.132 km respectively. While the expected mean distance (de) of Tappal block is 1.090 km, Khair block is 0.910 km and that of Lodha block is 0.742 km. These three block covers 316 villages i.e. (26.78 % of the total), and area i.e. 1024.30 sq.km (28.62 % of the total area). The density of the villages per 10 km^2 of Tappal, Khair and Lodha block is 2.11, 3.02 and 4.54 respectively. The reason behind low uniformity of settlements is that the region under this category is inundated with water during raining season which causes uneven distribution of settlements.

(ii) Medium Uniformity (Rn value 1.613- 1.745):

This group includes five blocks i.e., Chandaus, Jawan Sikanderpur, Akrabad, Gonda, and Iglas having (Fig. 2) Rn value 1.732, 1.626, 1.728, 1.683, and 1.617 respectively. They cover 39.93 % (1429 .04 sq.km) of



the total area, 40 % of the total number of villages and 40.08 % of its total rural population. The observed inter village distance (do) ranges from 1.268 km (Iglas block) to 1.612 km (Chandaus block). While expected mean distance (de) ranges from 0.784 km (Iglas block) to 0.931 km (Chandaus block).

(iii). High Uniformity (Rn value > 1.745):

This group includes four development blocks i.e. Atrauli, Bijauli, Gangiri, and Dhanipur (fig. 2). They cover 1125.87 sq.km of the total area of the district and 34.71 % of the total rural population. Number of villages per 10 sq.km ranges from 2.82 (Gangiri block) to 4.03 (Atrauli Block). Good availability and accessibility of socio-economic amenities and facilities are the causative factors for the uniform distribution of settlements in this region.

Conclusion

Forgoing analysis reveals that there is uneven distribution of settlements in Aligarh District. Nearest Neighbour Index ranges from 1.422 (Khair block) to 1.854 (Atrauli block) which shows the organization of settlements is moving towards uniformity but not exactly uniform. Tappal, Khair, and Lodha block comes under low uniformity, Chandaus, Jawan Sikendarpur, Akrabad, Gonda, and Iglas block show medium uniformity and Atrauli, Bijauli, Gangiri, and Dhanipur show high uniformity. Factor which affects the organization of the settlements in the study area is the combined effect of physical, socio-economic and political factors.

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