ABSTRACT

Settlement has occupied an important place among the visual imprints made by man upon physical landscape, through the process of cultural occupancy since the dawn of civilization. The evolution and growth of settlement in an area is a result of interplay of the prevailing ecological conditions, cultural and social values of the residents, technology, management system and the settling process through time span. Settlement refers to an organised colony of human beings ranging from a simple farmstead to a highly complex city and from a temporary camp of hunters or miners to more sedentary houses of farmers and city dwellers. Settlement includes not only the various kinds of buildings put to a variety of uses but also lanes, streets, roads, parks, places of worship and playgrounds etc. In the initial stages settlement features bear simple forms and have close relationship with the environment. However, the growth of knowledge and spread of civilization increases the degree of variability in their form and size.

The spatial patterns, types, shapes, sizes and structures of dwellings of rural settlements provide a clear evidence of the influence of the physico-cultural and socio-economic factors of a region.

The selection of the Aligarh District for the present study is due to its uniqueness in many respects. The District
lies in the fertile Ganga Yamuna doab, which is known as the cultural heart of the country. It is one of the most ancient settled regions having a long history of peopling and occupancy. In spite of the intermixing of various ethnic groups and cultural traits from within and outside the country in time span, the region has preserved its own culture, known as the Braj culture. It may be added that no serious study on the evolution of rural settlements and their spatial variation has been made so far in Aligarh District.

It is rather difficult to trace the multifaceted evolution of rural settlements in the study area and their spatial pattern from prehistoric, ancient and medieval eras to the modern period. This is due to the complexity of successions, absorptions and interruptions by later settlers and lack of adequate archaeological excavations in the study area. Extensive excavations in the region are practically impossible because of high density of population.

The objectives of the present study are to trace the evolution of rural settlements in sequent occupancy, to examine the influence of various factors on the spatial distribution of the settlements, to analyse the shape of villages and to suggest suitable models for rural development plans, to identify rural house types on the basis of their building materials and sizes, of the houses, to analyse the social morphology of selected villages (built-up area) and to
examine the influence of castes as well as dominant land ownership on the spatial patterning of rural houses.

The present pattern of settlement distribution is the result of a series of ups and downs of earlier settlements. In order to understand the present, it is therefore, necessary to look into the past. Keeping this aim in view, an attempt has been made in the present work to analyse the evolution of rural settlements and their spatial variations in the Aligarh District.

The following sources have been extremely helpful in providing significant clues to the understanding of the evolution of settlements and their spatial variations in the study area.
(a) Archaeological evidences
(b) Historical sources
(c) Place names, culture, cults and folk lores
(d) Written records
(e) Maps
(f) Field surveys and interviews

Quantitative techniques have been used to examine the spatial distribution and types of rural settlements and shape analysis of villages in the study region.

The Aligarh District lies 27° 29' to 28° 11' north latitude and 77° 29' to 78° 38' east longitude in the state of Uttar Pradesh. It covers an area of 5024 square kilome-
trees, out of which 4978 square kilometres is rural and the rest is urban. It is situated in the fertile middle part of Ganga Yamuna doab which has been under agricultural occupation for centuries. It has witnessed the emergence of 1749 rural settlements, out of which 1704 are inhabited. According to 1981 census the District has a population of 2565450 persons spread over an area of 5024 square kilometres. The density of population is about 511 persons per square kilometre. About 65 per cent of the population of the District is engaged in agricultural activities and about 77 per cent of its people live in rural areas.

Physiographically, the Aligarh District consist of a vast alluvial plain having a gentle slope from north to south and south east. The general topographical layout of the study area is, therefore, very similar to that of the rest of the doab. The region is bounded by two great rivers, i.e. the Yamuna in the west and the Ganga in the east, intersected by numerous tributaries, forming many small lakes & depressions. The whole topography of the District has a saucepan appearance. On the basis of the nature of alluvial deposits, the study area may be divided into two parts, i.e. the Khadar (new alluvium) and the Bhanger (old alluvium). The former occupies a lower level and forms the inundable lowland fringes along the rivers while the latter forms the upland tract above the normal flood limit. The central part of the
District has many lakes and depressions, creating a serious problem of waterlogging during the rainy season.

The area under study falls under the monsoon climate, characterised by a cool and dry winter (November to February) a hot and oppressive summer (March to mid June) and the rainy season (mid June to October). The maximum mean temperature in December varies between 29°C and 23°C, while mean minimum temperature during the month ranges from 12°C to 8°C. The maximum temperature rises to 41.7°C in May and to 39.8°C in June. The average annual rainfall of the District is about 65 cm. The soils of the District vary from loamy to clayey and sandy, depending upon the topographical conditions. Of the total cropped area of the District, 56.49 per cent is irrigated, canals and tubewells, being the main sources of irrigation.

Physical homogeneity provides suitable conditions for the growth of agrarian economy in the study area. However, at micro level, there are variations in the agrarian landscape. This is due to the differential interaction of physical environment and socio-economic attributes, which affect the nature of a human habitat. About 77.66% of the total area is net-sown. Mursan Block has the highest percentage of net sown area in the District. There are no mineral deposits except those of kankar and reh.
Due to the absence of any important minerals, the study area lacks large scale industrial establishments. Yet medium and small scale industries have been developed in the District. It is well-known for its locks, electrical equipment and light engineering goods and other metal products. In the year 1988, the District had 213 industrial units registered with the Industrial Directorate. Glassware, agricultural implements, locks, soap, silicates and candles are the principal small scale industries in the rural areas of the District.

The study area has the benefit of efficient means of transport and communication facilities. The total length of the state highways in the District is about 207 kilometres, while that of metalled roads is 1373 kilometres.

The District has a large number of rural market centres. These markets are periodic in nature, where different types of commodities such as food grains, vegetables, fruits and spices as well as animals are bought and sold by the inhabitants of the surrounding areas.

Population is one of the important factors determining the nature of human settlements in terms of size and economy. A perusal of the population figures relating to the Aligarh District indicates that since the 1901 census there has been a steady population growth in the District, the only
exception being the period between 1901-1921, when it
registered a negative growth. Since 1921 the population has
been increasing continuously. The present distribution of
population in the Aligarh District is the result of many
interrelated physical and cultural factors. According to the
1981 census the average rural population density of the
District is 513 persons per sq. km. At the block level there
are considerable variations in the density of population due
to differences in soil fertility and prevailing environmental
conditions. The Tappal block of the District records lowest
density, i.e., below 350 people per sq. km.; where as the
highest rural density in the District is found in Mursan
Block i.e., Tappal Block lies in the infertile terrain of the
yamuna khadar while Mursan Block lies in the fertile and
irrigated tract of the Aligarh District.

Caste structure is the most important social factor in
determining the size of a rural habitation. Dwellings of the
people of high castes tend to be concentrated at one place,
while the houses of the low castes people are set apart in
different localities. There are a number of gradations in the
hierarchy of Hindu castes. Muslim society is also divided
into high and low castes.

The beginnings of the rural settlements in the study
area go back to the pre-historic period. This is borne out by
the legends and folk lores of the area, the presence of a
large number of mounds, and more convincingly, the archaeo-
logical excavations in different parts of the District. The abundance of mounds suggest that the area had a number of settlements in the ancient period. Archaeological excavations show that the settlements of this region date back to at least 1500 B.C. and that the area has been under the sway of many dynasties. In order to understand the present formal pattern of the rural settlements of the Aligarh District, a study of its histogenesis, i.e., the evolution of its settlements, assumes considerable significance. Hence an attempt has been made in the present work to trace the evolution of the rural settlements in the District, taking into account the place-names, culture, cults, archaeological evidences historical as well as written records, since no single evidence is strong enough to trace the evolution of rural settlement in the study area.

The study of place-names help to trace the evolution of rural settlements because their suffixes and prefixes are closely related to the physico-cultural background of an area, since there is a complex relationship between names of places and their geographical surroundings. Indian villages have a varied nomenclature, even in the same region there are diversities because of variations in physico-cultural and socio-economic conditions at micro-level. There place-names are often influenced by the geographical environment which provides clues to the evolution, growth and decay of earlier human settlements. It has been found that different names
have been assigned to the same place in different historical periods. Such changes of place names are due to the changes of people inhabiting the settlements and also result from changes in their socio-economic conditions. During the field studies of the district it has been found that a large percentage of the names of the villages have suffixes or prefixes like, Paur, Pura, Nagla, Garh, Garhi, Sarai, Khora, Khurd, Kalan, Maufi, Chak etc. and these affixes usually refer to a ruling chief or a god, or a goddess or the topographical features or the vegetation of the area.

Occupation of land has been a universal process in the formation of territories among corporate political groups throughout human history. Territory formation was the first step in the process of settling at lower level. During the course of land occupancy and actual settling process, emotional and historical ties developed among the inhabitants, which tended to bind them to live together in a territory. Such a territorial occupation required autonomy for the occupants to function as a viable unit. Many cultural institutions such as shrines, markets, fairs, and places associated with gods and godlings came up in the course of the settling process and these made the inhabitants to feel that some places were vital for the well-being of the group and must be defended. The occupied land, the shrine, the family burial ground and sites of local festivals also generated a sense of belonging to the territory settlers.
which was shared by the non-corporate group with those of the corporate political group. As such, the territory became a complex symbol of possessiveness, means of sustenance, well being, security and culture evolved over a period of time.

Initially, human settlements had no fixed territorial system. However, later these territories developed as clan based republics headed by their chiefs.

During the ancient period a fixed territorial system came into existence, and this has continued up to the modern period, with minor intrusion into their boundaries. In the medieval period there was a three-tier political structure in almost all parts of India; At the top was the central government, in the middle was the provincial government and at the base was the hegemony of the locally dominant corporate group. An occupied territory was the primary clan area and known as Paragna. A Paragna was segmented into sub-clan or secondary clan areas known as tappas, which were subdivided into smaller territorial units known as gaon (grams). As a result of this three-tier division, there evolved a hierarchy of settlements. During the British period, a five-tier territorial system was introduced, i.e., the pargana, the tappa or turf, the taluka, the patti and the gaon in descending order. The parganas were maintained as sub division of a tehsil and were used as revenue units, and they
continue to function as such. Taluqdari and zamindari and other territorial rights of land corresponding to them gave not only weight, but also formed the basis of surveys and records of holding rights. Four years after India achieved independence, the Zamindari Abolition Act was passed by the Uttar Pradesh legislature and by January, 1956, all the Zamindari estates had been abolished. The Aligarh District has been divided into seventeen blocks, and these have been subdivided into Adalat Panchayats, each one of which has 8 to 12 villages under its jurisdiction. These units are often independent of the clan boundaries and other social ties.

Information regarding the territorial evolution of the District in the ancient period is not available. So the present study is primarily based on medieval sources, particularly on the information contained in the Ain-i-Akbari of Abul Fazl and on the Misl-i Bandobast of 1866. During Akbar's reign (1556-1605), a new unit of administration was introduced, i.e., the sarkar. Koil, (the old name of the Aligarh District) was a sarkar of the suba of Agra. It contained 21 mahals or paragnas and four daastur (revenue) circles. The sarkar of Koil covered an area much larger than that of the present Aligarh District. There were many zamindar clans which held lands in the region. Some of the more important of these clans were the Chauhans, the Badgujars, the Porouchas, the Gahlots, the Bangars, the Pundirs, the Jats and the Brahmins. A study of these zamindar
clans between the sixteenth and the nineteenth century reveals incursions into the territories of these mahals, their patterns of settlement, areas of jurisdiction and changes in the position of these clans in the region during the period.

The evolution of rural settlements in sequent occupancy in the Aligarh District has been studied under three periods, i.e., ancient, medieval and modern. Excavations at various sites of the study area have revealed that settlements of this region began around 1500 B.C. The earliest remains, i.e., pieces of Ochre Coloured Pottery (OCP, 1800-1300 BC) have been found at Jalali. Then successive remains of different periods, Black and Red Wares (BRW - 1300-1200 BC), Painted Grey Ware (PGW 1300-700 BC) have been recovered from different places in the District, such as Sankra, Morthal, Hathras Qila, Sasni etc. A large ruined brick stupa and a small building have been found in Balai Qila, which indicate that this site once had a Buddhist settlement. A piece of sculpture belonging to the Kushan period has been recovered from Lakhnau near Hathras tehsil which dates back between 145 and 176 A.D. Very few remains of the Gupta period have been found in the District. Among these are a female head with a striking style of coiffure and the image of Maha Vishnu. The region is also rich in the relics of the tenth and eleventh centuries A.D. The images of post-Gupta period are still being worshipped in village temples at many places in the
study area. A large number of pieces of pottery and sculptures of the medieval period have also been recovered from different mounds in the Aligarh District.

It is clear from the foregoing discussion that the region was continuously settled from the prehistoric to medieval period, though it is very difficult to trace the patterns of settlements during the different periods until extensive excavations have been conducted.

Though Aryans had completed their colonization by the end of the seventh century B.C., the region was affected by the migration waves of Rajput clans at the beginning of twelfth century A.D. Migrations of various other corporate groups or clans followed the Muslim invasion in 1194 A.D., when the fortress of Koil was taken by Qutubuddin Aibek. From that time migration of Muslims continued upto the eighteenth century. In this way a distinct pattern of socio-economic and cultural territorialization emerged in the study area. It is true that many of the rural settlements of today in the District do not appear to have been established on a planned basis. They appear to have just grown. During the Muslim period the villages of the study area remained practically unchanged as Muslims preferred to live in towns rather than in the countryside. Even with the establishment of the British rule the village type remained almost the same, although the need for living within the village wall was no
longer felt by the people due to the establishment of peace and security in the country.

Since the beginning of the twentieth century, the diversification of industries, development of transport and communication facilities have together contributed to the growth of many settlements in different parts of the District.

After independence (1947), rural settlements in the study area witnessed a general tendency of dispersal because of changed economic conditions, loss of the hold of traditional as well as socio-religious beliefs and customs and the abolition of the zamindari system. The consolidation of land holdings, the extension of the means of transport and communication, electricity, irrigation, banking and marketing facilities to the rural areas, improvement in the methods of farming, have all contributed to this trend in recent years. The phenomenal increase of population and consequent demand for more land for farming and housing has not only led to the widespread shrinkage of forest cover but also to the reclamation of barren lands. The new administrative institutions like development blocks, and village panchayats and public buildings belonging to primary schools, rural health centres, panchayat bhawans (village council house), community centres etc. have led to a change in the rural landscape of the study area. A large number of new settlements have grown up
around these centres under programme of providing house-sites and credit facilities to harijans and landless labourers.

Owing to its homogeneous relief and fertile alluvial soils, the Aligarh District has an almost uniform distribution of rural settlements. However slight variations may be seen at micro-level due to difference in local relief, sources of water supply, drainage lines, soil types, patterns of land use, transport facilities, social attributes and population density, etc. Factors like deeply cut ravines usar lands, ill-drained soils, proneness to floods and non-availability of drinking water etc. On the one hand, and bhanger lands, well drained fertile soils and availability of fresh water, on the other hand, have also militated against strictly uniform distribution of settlements in the District. The size (area and population) and density of rural settlements is closely related to spacing. With increase in distance between settlements the density of villages tends to decrease. In the study area the average areal size of village is 2.95 Km$^2$. The highest per village areal coverage (4.237 Km$^2$) is in the Tappal Block of Khair tehsil while the lowest areal size (1.582 Km$^2$) is found in Mursan Block of Hathras tehsil. The average population of a village in the study area is 1193 persons. There are 72 villages, 4.23 per cent of the villages in the District, inhabited by less than 200 people. Two thirds of the total number of villages in the District are inhabited by 500 to 999 people. Exceptionally large villages, inhabited by more than 5000 people represent only
0.94 per cent of the total number of villages in the study area. The average density of villages in the Aligarh District comes to 36 village / 100 km² of area, while the average inter village spacing is 1.83 kilometre. The range of spacing varies between 1.35 kilometre (Mursan block) and 2.21 kilometre (Tappal block). The correlative index between the number of villages in a unit and spacing is taken as one of the indices for classifying rural settlement into different types. With the assumption that the settlements are distributed randomly, an attempt has been made to test the degree of deviation from the random situation, with the help of nearest neighbour analysis. The result shows that Rn values of all blocks in the study area are above 1.0 and that the expected mean distance (rE) is higher than the variance (V). Thus the settlements are more regular than random, because the value of expected mean distance (rE) is always higher than variance and Rn value is more than 1.0. So Dacey's Regular Poission Probability law is quite applicable in this case, because the empirical variance mean ratio here is always less than 1, and the mean, in every case, is more than the variance.

Rural settlements of the District has been classified into three different types - compact settlements, mostly covering the areas along the Yamuna and Ganga rivers; semi-compact type which are generally associated with bhanger tract, and hamleted settlements which are found through out
the region. The hamleted settlements is a result of socio-economic and physico-cultural factors. The term 'pattern' is often equated with the term 'shape'. However, there are geometrical dissimilarities between these two terms. A closed curve has a shape whereas a non-closed collection of points has a pattern. Settlement pattern denotes the shape or arrangement of settlements in relation to natural or man-made features such as streams, ridges, canals and roads etc. Patterns of rural settlements of the study are influenced by physico-cultural factors, state of insecurity in the past, and the present social ethos of the rural society. On the basis qualitative or classical approach, a number of settlement patterns have been identified. Rectangular and square settlement pattern are the characteristic features of the entire study area. The geometrical or quantitative approach of shape analysis is based on the elementary packing theory; The circle is considered to be an ideal geometrical figure owing to its maximum packing capacity, compactness and better accessibility. Hence, the circular geometry has been used for the computation of shape in the present analysis. A study of the village shapes of 174 sample villages of the Districts show the predominance of rectangular & square pattern. This is mainly due to the rectangular system of land division, i.e., the bigha system, prevalent during ancient times. There are only two villages which represent
very elongated shape, while three villages may be categorized under circular shape.

The second basis of shape analysis is the number of contacts between a village and its neighbouring villages. The mean contact number of sample villages is 5.648, which is very near to 6, a feature of a strictly hexagonal system. This is further corroborated by the fact that 63.8 per cent of the sample villages record contact numbers between 5 and 7.

There appears to be no correlation between contact index, population density, and shape index, because of the homogeneous nature of the study area. Transformation of village shapes takes place in order to minimise the transport cost, to bring territorial limits of a village within easy reach of the village site and to accelerate the pace of economic progress and modernization. For the transformation of village shape, three areas from discrete ecological setting have been selected and suggestions have been advanced, using Thiessen's Polygons and Hexagons of varying 'K' values for the rural development plans.

Rural dwellings constitute the basic element of cultural landscape and occupy an important place in the geographical analysis of human settlements. They provide a clear evidence of the complex relationship between man and his environment. The distributional pattern of rural
dwellings generally follows the pattern of rural population distribution and is determined by the ecological condition of a region.

According to 1981 census, there are 332513 rural houses in the District, with an average density of 68.87 houses per square kilometre. The maximum and minimum densities 84.20 houses and 58.60 houses per square kilometre are found in Sasni and Tappal blocks respectively. House types of the region have been classified on the basis of their building materials and sizes and shapes. The study reveals that mud and unburnt brick wall with thatched and mud roof houses constitute 50 per cent of the total rural dwellings. Burnt brick wall with burnt brick, stone and lime roof dwellings (pucca dwellings) cover about 25 per cent of the total number of rural houses, while rest of the dwellings consist of mixed materials used in walls and roofs.

The size of a dwelling reflects the economic condition of the dweller and the size of household. The sizes of the houses in the Aligarh District vary from palatial buildings to single room huts, which mark the difference between the rich and the poor. One and two room dwellings together constitute more than two third of the total number of rural houses of the District and offer shelter to 71.81 per cent of its total rural population. The three and four room dwellings, which are nearly 20 per cent of the total rural houses in the District, provide accommodation to over one-
fifth of the total rural population. Mostly the rural houses in the study area are multipurpose one, used for sleeping, fodder keeping cattle, storing, etc. Generally the housing conditions and village environment are far from satisfactory. The houses are constructed in close proximity to one another, allowing little ventilation. There are many big and small pits full of contaminated water near the inhabited sites emitting foul smell, which cause diseases and infections. A few suggestions have also been given to improve the housing conditions and village environment of the rural areas of the Aligarh District.

The morphological structure of the sample villages (built up area) in the study area is mainly determined by their socio-economic as well as physical attributes. Landownership and caste system have played an important role in determining their spatial and morphological structure. Sample village studies reveal that Brahmins, though occupying the highest rank in the social hierarchy, do not hold the central or the best available sites of these villages, whereas people of the second and third order of the social hierarchy, such as Khastriya and Vaishyas, occupy that sites, as they have the largest land holdings in these villages. The lowest strata of the rural society, namely people belonging to the scheduled castes generally live in congested residences on the preiphery of these villages, away from higher caste dwellings. The stigma of pollution creates a
sense of ritual distance between different castes as well as determines the spatial arrangement of their respective dwellings in the villages. Distance among various castes based on religio-ritual notions is decreasing due to interdependence of functional ties between the people of higher and lower castes, which tends to reduce caste barriers in spite of the stigma of untouchability attached to the latter. This makes the rural settlements compact and unified.

The analysis of the spatial patterning of houses of different castes reveals that caste inhibitions contemplate the people of different castes to live in separate settlement units. However the latest houses of the low caste people are built near the residences of the high caste people, in these sample villages, owing to the growth of population and changes in the socio-economic conditions.