

## LAND USE AND SOCIO-ECONOMIC RESPONSES TO URBAN ENCROACHMENT ON AGRICULTURAL LAND – A STUDY OF AN INDIAN URBAN-RURAL FRINGE

Kamal Asif, Hifzur Rahman\*

\* Department of Geography, Aligarh Muslim University, Aligarh (U.P.), India – 202002,  
kasif2006bustan@gmail.com, hifzur.rahman31@gmail.com

### **Land use and socio-economic responses to urban encroachment on agricultural land – a study of an Indian urban-rural fringe**

This paper concerns the impacts of the phenomena of urban encroachment on agricultural land for urban purposes in the fringe areas of Aligarh city located in the plains of north India. In reality, it is a consequential phenomenon of urbanization characterized with predominance of non-agricultural pursuits, high density of population; fast pace of life, availability of improved civic amenities and affluences. The rapid land use and socio-economic changes in this transitional and sub-urban system often puzzled researchers in urban geography. The research work involves simulation and analysis of secondary as well as primary imperative data and information. The research aim of the study is to generate possible scenarios of physical and socio-cultural advancement. As a result, the city spreads out continuously over large areas, and the process of inclusion of rural lands continues to far and wide areas, for the use of urban activities and rural transformation. The paper analyses the data pertaining to demographic indicators like population, density, sex ratio, literacy and occupational structure, and agricultural land utilization, and ratio of agricultural and non-agricultural land use in the development blocks forming the urban fringe and sampled villages in the surroundings of Aligarh city. The data is computed and described with the help of percentages and statistical diagrams and maps. Thus, the results obtained prove the agreement that urban encroachment on agricultural lands has direct impact on socio-economic and spatial base of the urban rural fringe.

**Key words:** urban encroachment, sprawl, urban fringe, demography, agricultural land use, migration, rural transformation, socio-economic change, north India

### INTRODUCTION

In India towns are known to have existed since ancient times. They sprang up as citadels of power, military colonies, trading centres and places of religious importance. Some of them rose to pinnacles of glory and then started decaying with the fall of ruling dynasties or changing economies and social values and lay buried in the debris of time, while a few others survived from the vagaries of time and continue to exist even now. In the course of time, some towns retained their premier positions, while some others languished into oblivion or were relegated to minor positions (Census of India 1991). The Ganga plains of India possessed a highly developed civilization comprising highly populated urban centres with a rich socio-economic base in the form of agriculture.

In India out of a total population of 1,210 million, 31.2 per cent live in urban centres while 68.8 per cent live in rural areas (Census of India – Provisional 2011). Since independence, an absolute increase in population has been reported as more population lives in urban rather than rural areas. The level of ur-

banization has increased from 27.81 per cent in 2001 (Census of India 2001) to 31.16 per cent in 2011 (Census of India 2011). During the decade 2001-2011, the proportion of rural population has declined from 72.2 per cent to 68.8 per cent. Urban population has increased by 31.81 per cent, while rural population grew by 12.11 per cent (Tab. 1). It is expected that, the share of urban population will increase to the extent of 40 per cent of total population by the year 2021.

**Tab. 1. Rural and urban population in India (total population in millions and share in %)**

	2001	2011	Actual growth	Growth in per cent
Rural	743 (72.2 %)	833 (68.8 %)	90	12.11
Urban	286 (27.8 %)	377 (31.2 %)	91	31.81
India	1,029 (100.0 %)	1,210 (100.0 %)	181	17.58

Source: Census of India 2001 and 2011 (Provisional).

There has been a sharp contrast in the absolute change in total and urban population in India. At the time of independence (in 1947), 60 million people (15 per cent) lived in urban areas and in next 50 years the total population grew by two and half times, while the urban population rose by nearly five times. Rapid urbanization causes disorganized and unplanned growth of towns and cities so that the pressure of an ever-growing population becomes a burden on the limited civic amenities, which are virtually collapsing. Asymmetrical growth of urban centres has consumed agricultural land in the fringe areas, resulting in low agricultural productivity and changes in the rural environment.

The urban fringe is a zone of transition between the continuously built-up and suburban areas of the central city and the rural hinterland (Pryor 1968). Therefore, it can be assimilated as urban-rural fringe area, which was defined as “*the area of transition between well recognized urban land use and the area devoted to agriculture*”. The urban-rural fringe is a continuous area that starts beyond the urban limits of cities. A more comprehensive definition of urban fringe given by Herington (1984), describes the distinctive characteristics that it is “*an area which is partly assimilated in the growing urban complex, which is still partly rural and where many of the residents live in the countryside, but are not socially and economically part of it*”.

Therefore, the urban fringe has become an important field of urban studies, which started focusing on the processes that were shaping the peri-urban fringe, considered as the place where urban and rural categories met (Adell 1999). Urbanization, in particular, alters both biotic and abiotic ecosystem properties within, surrounding, and even at great distances from urban areas (Grimm et al. 2008). The nature, pattern, pace, and ecological and societal consequences of land change will vary on all spatial scales as a result of spatial variation in human preferences, economic and political pressures, and environmental sensitivities (Carpenter et al. 2007).

Urban growth takes place either in a radial direction around a well established city or linearly along the high ways. When cities expand, prime agricultural land and habitats are transformed into land for housing, roads, and industry (Saini 2008). In other words, the city may be viewed in abstract as a set of elements, which over time can be bundled, unbundled and reassembled in new urban forms. This process is restructuring, but in a specifically urban context (Dick and Rimmer 1998). Visible impacts of this process include encroachment on fertile agricultural land, increased stress on the natural environment, with ominous implications for the economic base, socio-economic and demographic characteristics, and the health and well-being of communities in peri-urban areas (Adeboyejo and Abolade 2009). There is a need for continuous monitoring of the phenomena of growth, and mapping and analysis of its patterns, since it is now essential for the urban administrators whose concern is to provide basic amenities and infrastructure for the complex urban environment (Farooq and Ahmad 2008).

An understanding of the growth dynamics of urban agglomerations is essential for developmental planning. With almost a third of India's population already having become urban it is necessary to acquire information on the growth patterns of cities and how they affect the living environment of the surrounding areas. The current trend of spatial urban growth in almost all Indian cities has a haphazard pattern, particularly the socio-economic setting of the urban-rural fringe areas. Occupational structure, density of population, literacy rate, and sex ratio are the main components of demographic structure, which are directly affected by the urban-rural interface. Among the negativities associated with rapid urbanization, particularly the environmental consequences are among the most documented issues in current urban-environmental research. However, the efforts to start development in most developing countries like India must start with institutional arrangements that foster responsiveness, accountability, and the rule of law (World Bank 1997).

The main aim of the study is to highlight the problem of encroachment on agricultural lands in the urban fringe of Aligarh city. The study was carried out by considering the general agreement of the relationship of urbanization with urban encroachment and explaining a number of issues associated with socio-economic development. The research work enumerates and discusses the various indicators pertaining to demography, land use and other socio-economic impacts of urban encroachment, and examines how they affect the urban fringe area around the city.

## STUDY AREA

Geographically, the city of Aligarh is located in the fertile tract of the rivers Ganga and Yamuna between 27°29' to 28°11' N latitudes and 77°29' to 78°38' E longitudes, and at the intersection of the 27° 51' parallel and the 77° 58' meridian. The elevation at the centre of the city is 187.38 metres above mean sea level. Aligarh is one of the important cities of Uttar Pradesh state, and administrative headquarters of Aligarh District, Aligarh Police Range and Aligarh Division. The city is situated about 140 km southeast of New Delhi, the National Capital of India. Aligarh district lies in the alluvial tract formed by the rivers

Ganga and Yamuna. This tract is commonly known as the *Doab* (land between two rivers), and it is one of the most important agricultural tracts in the Ganga plain of India. The region experiences a tropical monsoon type of climate characterized by distinct seasonal rhythm.

The development of Aligarh city has happened in a very helter-skelter way that, the basic urban services did not increase with the increase in population and area of the city. The urban purposes for which land is bought for basic use are the construction of buildings, housing, parks, roads, railways etc. During the last four decades, the population of Aligarh has increased four times and spread out over a much larger area (Tab. 2 and 3). Encroachment of rural agricultural lands in Aligarh can be gauged by considering the urban expansion or urbanization process of the city (Fig. 1).

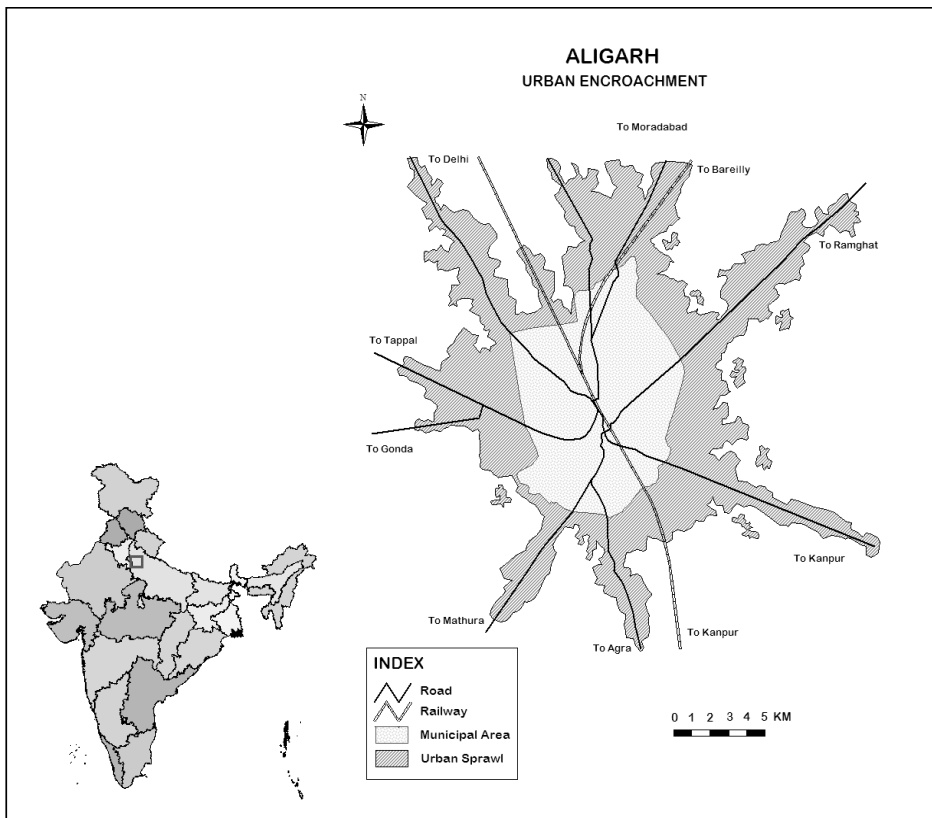


Fig. 1. Location of study area

Source: Based on census of India and Aligarh development authority and municipal corporation maps. Composed and processed by the author.

**Tab. 2. Population growth in Aligarh city**

Census year	Total population	Decennial actual increase/decreas	Growth (in per cent)
1901	72,084	–	–
1911	66,344	– 5,740	– 7.96
1921	66,963	+ 619	+ 0.93
1931	83,878	+16,915	+25.26
1941	112,655	+98,777	+34.31
1951	141,618	+28,963	+25.71
1961	185,020	+43,402	+30.65
1971	252,314	+67,294	+36.37
1981	320,861	+68,547	+27.17
1991	480,520	+159,659	+49.75
2001	669,087	+188,567	+39.24
2006	789,529	+120,442	+18.00
2011	872,575	+203,488	+30.41
2021*	1,249,352	+376,777	+43.18
1901-2011		+800,491	+1,110.50

Source: Census of India 1971, 1981, 1991, 2001 and 2011.

\*Extrapolations in Master Plan Report of Aligarh Development Authority (ADA).

**Tab. 3. Area under urban land use in Aligarh city**

Year	Area (in sq. km)	Actual growth (in sq. km)	Growth (in per cent)
1901-1951	11.06	–	–
1961	31.86	20.80	188.06
1971	34.45	2.59	8.12
1981	34.45	0.00	0.00
1991	40.43	5.98	17.35
2001	44.86	4.43	10.95
2006	50.54	5.68	12.66
2011	56.72	6.18	12.22
2021*	113.79	57.07	100.61

Source: Census of India 1971, 1981, 1991, 2001 and 2011.

\*Extrapolations in Master Plan Report of Aligarh Development Authority (ADA).

## METHODOLOGY

The study incorporates secondary statistical data obtained from records of various government departments, organizations, national and international research agencies. A detailed analysis of policy reviews of various public documents, namely master plan reports, statistical diaries, economic abstracts, district census handbooks, and village and town directories etc. were consulted in order to prepare a complete plan for the present and future scenario of the city's development. The necessary statistical data related to demography and land use in three developmental blocks were obtained from an official record: *Aligarh District Statistical Diary 2010* published by the Department of Economics and Statistics, Aligarh. Each indicator is also described by calculating averages and percentages.

Urban encroachment has been described as an area within the standard metropolitan area, which is outside the urbanized area (Queen and Carpenter 1953). Kurtz and Eicher (1958) in their study have described urban fringe based on five criteria:

- 1) Location,
- 2) Demographic characteristics – population, growth, density, sex ratio and literacy,
- 3) Land use characteristics – agricultural, non-agricultural land uses,
- 4) Occupational structure – agricultural, non-agricultural workers,
- 5) Governmental structure.

For carrying out the present research, indicators or variables belonging to three different categories were taken to describe the developmental process in urban fringe areas.

## A) Demographic Indicators

- a) Population growth in percentage,
- b) Density of population – number of persons per sq. km,

$$\text{Density} = \frac{\text{Total population}}{\text{Total area in sq.km}}$$

- c) Sex ratio-calculated as number of females per thousand males.

$$\text{Sex ratio} = \frac{\text{Total female population}}{\text{Total male population}} \times 1000$$

- d) Literacy-calculated as percentage of literates and non-literates.

## B) Economic Indicators

Ratio of agricultural and non-agricultural workers – considered as percentage of population engaged in farming and non-farming activities.

## C) Spatial Indicators

- a) Net sown area,
- b) Cultivable waste lands,

- c) Fallow lands,
- d) Barren land,
- e) Area under forest,
- f) Pasture lands,
- g) Orchards,
- h) Ratio of agricultural and non-agricultural areas.

In addition to secondary statistical data, a socio-economic survey was conducted for collection of primary information during the year 2009-10. This research work involved a robust and in-depth study for which case study approach was applied to investigate the responses of the urban encroachment. This was done through questionnaire-based interviews with farmers in 40 villages located around Aligarh city. The main subjects of the questionnaire are: how many people are involved in farming and non-farming activities; number of literates and illiterates; number of peripheral villages and number of far-lying villages; industrial and institutional areas; commercial and residential areas etc. Taking the points of foremost consideration, interviews of farmers were conducted in each village with the help of a questionnaire and relevant information was picked out.

The relevant questions were also discussed with village *pradhans* (elected representatives of villages) and other available relevant authorities in the respective villages to prepare socio-economic and land use profiles of villages. Visits to the actual sites of the problems were also included in the survey. Relevant information was also acquired through personal observations on the actual sites of the problems. Thus, the information obtained through primary sampling provides the opportunity for in-depth discussion with people living on margins and those on the frontline of the problems.

The urban fringe of Aligarh city lies at the meeting place of three development blocks, namely: Jawan, Lodha and Dhanipur consisting of a total of 347 villages covering an area of 682.4 sq. km, which truly form the urban fringe of the city (Fig. 2). These blocks form the *tehsil* (a sub-division of district) of Koil and share their boundaries with the municipal limit of Aligarh city, where marginal wards of the city intermix or disappear in the zone of transition or the zone of rural-urban mix. This transitional zone actually forms the inner fringe of the study area (Fig. 3). The focus was on the position of the inner fringe, which consists of 20 villages located just outside the municipal limit (between 6 and 8 km from the centre) of Aligarh city. Another 12 villages have been selected from the middle fringe (between 8 and 10 km), and 8 villages from the outer fringe (between 10 and 12 km) of the city. The villages have been selected on the basis of distance decay consideration. They are located along the transportation routes as well as in the interior parts, and where dilation of urban activities seems to be noticed. In this way the urban fringe area, around Aligarh city, has been divided into three zonal rings.

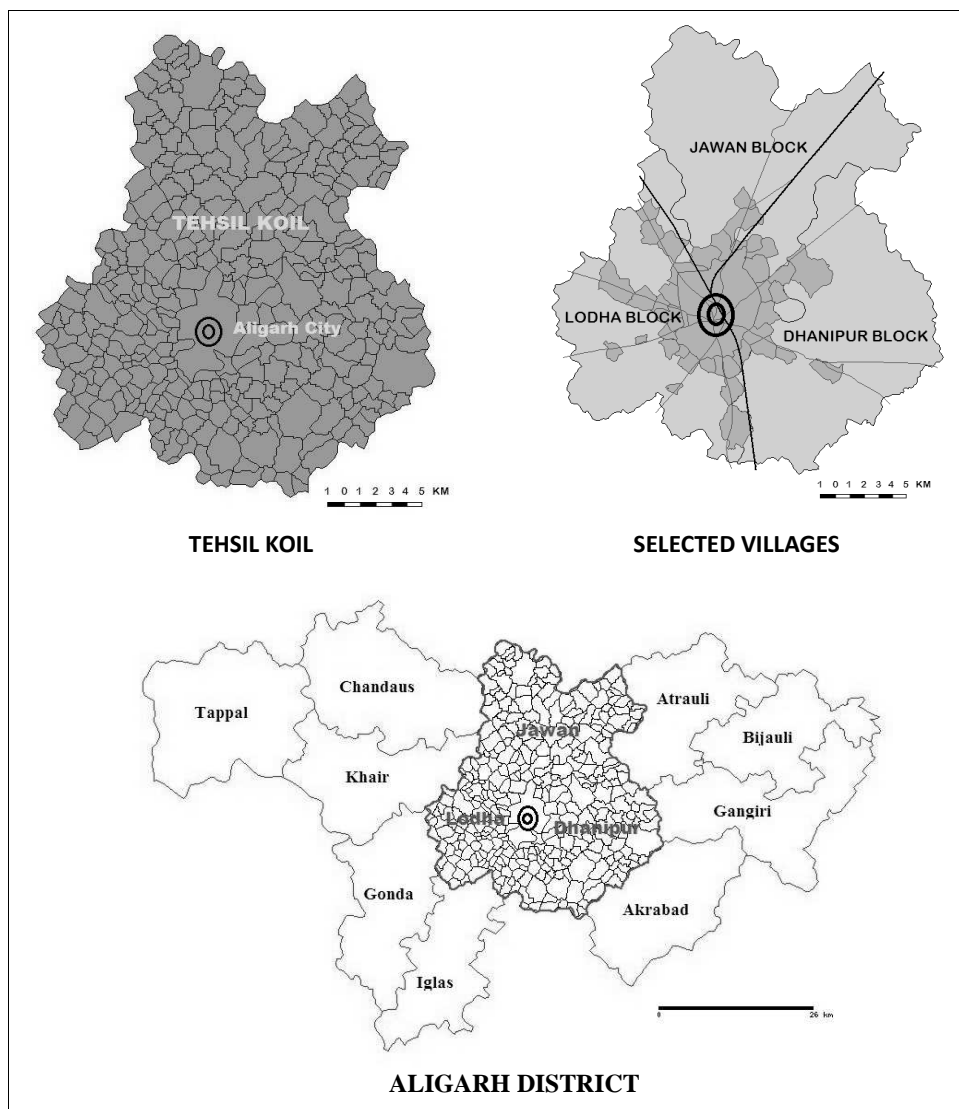


Fig. 2. Selection of villages in *Tehsil* Koil of Aligarh district

Source: Based on Census of India, Uttar Pradesh Administrative Atlas 2001.  
Composed and processed by the author.



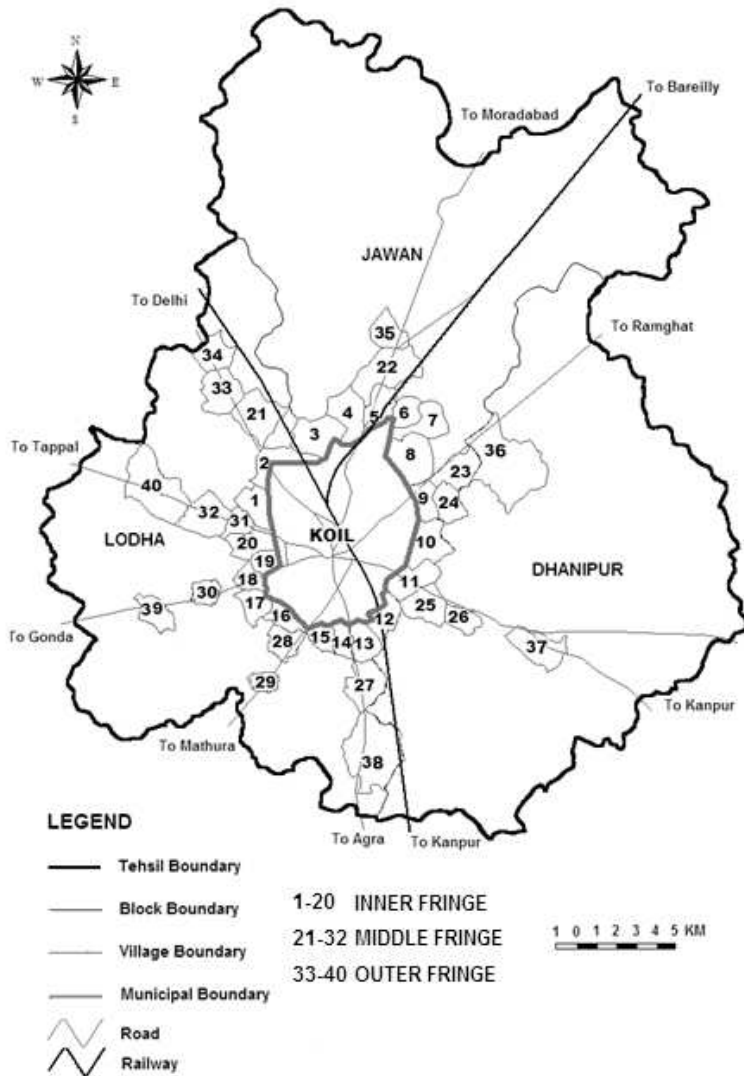


Fig. 3. Map showing selected villages and location coding in the urban fringe

Source: Based on Census of India, Uttar Pradesh Administrative Atlas 2001.  
Composed and processed by the author.

INNER FRINGE – 20 villages (50 per cent) between 6-8 km

MIDDLE FRINGE- 12 villages (30 per cent) between 8-10 km

OUTER FRINGE- 8 villages (20 per cent) between 10-12 km

## SOCIO-ECONOMIC RESPONSES OF DEVELOPMENT BLOCKS AND SELECTED VILLAGES

The study of demographic characteristics has an important role in understanding the sustainability and governance issues in the fringe areas. In the three development blocks, namely, Jawan, Lodha and Dhanipur forming the urban fringe of Aligarh city, demographic characteristics are the chief indicators for consideration of the urban impact in the rural landscape.

Population density is most important among the demographic indicators. It is calculated as number of persons per square kilometre. Table 4 shows the average density of the entire area as 862 persons per sq. km. The highest density is seen in the Lodha block, which has 923 persons per sq. km, the Jawan block recorded a density of 912 persons per sq. km, and the Dhanipur shows the lowest with 750 persons per sq. km.

Sex ratio is another strong indicator that proficiently describes the demographic character of an area, which is explained as the number of females per thousand of male population. The average sex ratio in three blocks is 861, for Jawan it is 872, which is the highest, and the lowest sex ratios are 872 in Jawan block and 863 in Dhanipur blocks, respectively. As far as the educational status is concerned the literacy rate in the three blocks is not satisfactory and needs proper attention. The overall literacy rate in the blocks is 58.8 per cent. The highest literacy rate is seen in Lodha with 60.4 per cent, while Jawan has 59.6 per cent and Dhanipur 56.4 per cent.

**Tab. 4. Demographic characteristics of the development blocks forming the urban-rural fringe of Aligarh city**

Name of block	No. of villages	Total households	Population 2001	Density (persons / sq.km)	Sex ratio	Literacy rate (per cent)	Agri-workers (per cent)	Non-agri workers (per cent)
Jawan	109	32,877	211,390	912	872	59.6	56.6	43.4
Lodha	140	31,496	200,642	923	849	60.4	44.4	55.6
Dhanipur	98	27,728	175,008	750	863	56.4	59.1	40.9
Total/average	347	92,101	587,040	862	861	58.8	53.4	46.6

Source: Aligarh District Statistical Diary (2010).

Occupational structure is another indicator related to the economic background of the urban-rural fringe. It attributes the impact of the city on peripheral areas, contributes to the functionality of an area, and paves the way for urban encroachment. It has been calculated in terms of ratio of agricultural and non-agricultural workers namely 53.4 per cent, and 46.6 per cent, respectively (Tab. 4). Dhanipur block experiences the least urban impact on its rural landscape. Its agricultural workers make up more than 59.1 per cent, while the Lodha block shows the least share of 44.4 per cent, and non-agricultural workers are 55.6 per cent. The areas in the northern fringe of Aligarh experience more urban influ-

ence on rural landscapes. However, the overall percentage values of this share in the three blocks are 53.4 per cent and 46.6 per cent, respectively.

The demographic characteristics like density, sex ratio, literacy and main workers in 40 villages covered for the survey around Aligarh city – Inner fringe, Middle fringe and Outer fringe are shown in Tab. 5. The village level data have been processed and presented in the form of statistical diagrams in order to ease the analytical representation. In order to evaluate the growth of the city into the surrounding region, density of population is the most significant demographic indicator (Pal and Singh 2009).

The Inner fringe of Aligarh city possesses the highest population density, namely 1,461 persons per sq. km. Obviously, as one moves away from the city, the density of population tends to decrease (Tab. 5). Therefore, the population density in the Middle fringe is relatively low, with 735 persons per sq. km, while in the Outer fringe, it is the lowest recorded at 531 persons per sq. km (Fig. 4). Hence, the data clearly reveals that, increasing distance from the Inner fringe of the city towards the Outer fringe indicates a decline in the density of population, which is due to the decreasing urban impact in fringe areas.

Another impact of urbanization is fluctuation in the sex composition in the surrounding fringe areas of Aligarh city. Selective migration of male population from rural areas to Aligarh city or other cities in search of employment, while leaving their families in villages has been the main reason for this fluctuation in the composition by sex. As a result, the number of females per thousand males shows an increasing pattern from the Inner fringe towards the Outer fringe (Tab. 5 and Fig. 5). There is a high sex ratio, namely 885 females per thousand males in the Outer fringe, whereas in the Middle and Inner fringe it is 856 and 851, respectively.

Education and literacy rates are other factors showing the impact of cities on their fringe areas. During the primary survey of the villages in the urban fringe areas of Aligarh city, it was found that, there is a declining trend in literacy rate from the Inner fringe towards the Outer fringe (Fig. 6). The statistical diagram shows that, the percentage of literacy in the Inner fringe is highest (66.15 per cent) because of good educational facilities offered by the city. It is one of the functional characteristics of the city. The Middle fringe has a lower literacy rate of 62.23 per cent, while it lowest in Outer fringe at 60.73 per cent. The data presented in Tab. 5, shows that populace living in the inner margin of the city is more benefited by educational facilities than the populace living in the outer margin.

The impact of urban encroachment on rural landscape is also clear if we examine the data of the ratio of agricultural and non-agricultural workers in the selected villages from the urban fringe of Aligarh city. It is clear from Tab. 5 that there is a trend of increase in the percentage of agricultural workers to non-agricultural workers, from the Inner fringe towards the Outer fringe. The percentage shares of agricultural and non-agricultural workers in the Inner fringe are to the tune of 28 per cent and 72 per cent. Subsequently, in the Middle fringe these shares are 47 per cent and 53 per cent, while in the Outer fringe they are 56 per cent and 44 per cent (Fig. 7). The data reveals that, agricultural activities in the outer margin of the urban fringe areas of Aligarh city dominate over non-agricultural activities and vice-versa.

**Tab. 5. Demographic characteristics of selected villages in the fringe of Aligarh city**

Name of village	Area (in ha)	Total house- holds	Total population	Density persons / sq.km	Sex ratio	Literacy rate (per cent)	Agri. workers (per cent)	Non-agri. workers (per cent)
<b>INNER FRINGE</b>								
Alapur Garhia	108.1	126	682	631	809	64.6	37.3	62.7
Sarsaul	248.0	746	4,789	1,931	840	69.1	20.7	79.3
Baraula Jafrabad	310.7	591	3,797	1,225	861	76.0	19.0	81.0
Ramgarh Panjupur	358.2	1,388	9,312	2,601	868	71.3	39.0	61.0
Manzurgarhi	284.1	735	4,735	1,667	880	74.9	31.6	68.4
Maheshpur	126.0	105	856	679	755	58.8	32.9	67.1
Barhati	299.8	408	2,669	892	861	64.1	38.0	62.0
Chilkora	157.0	205	1,477	941	858	68.4	29.9	70.1
Kwarasi	315.2	1,401	8,219	2,609	768	77.2	17.1	82.9
Asadpur Kayam	459.2	476	3,088	673	910	65.4	25.0	75.0
Dhanipur	283.2	1,859	11,000	3,887	851	75.2	17.0	83.0
Bhadesi Mafi	226.1	355	2,344	1,037	795	57.3	32.3	67.7
Hajipur Chauhata	149.2	122	884	593	889	58.1	36.6	63.4
Parhiawali	261.0	338	2,226	853	904	60.9	30.9	69.1
Kasba Kol	1,895.0	1,013	6,631	349	855	69.5	17.7	82.3
Chamraul	81.3	64	458	563	847	61.7	39.0	61.0
Shahpur Qutub	289.6	176	1,167	404	888	59.9	39.0	61.0
Alahadadpur	149.5	344	2,201	1,477	896	64.0	21.8	78.2
Rorawar	109.8	393	2,730	2,486	862	62.9	16.1	83.9
Ashrafpur Jalal	120.1	678	4,478	3,731	826	63.7	20.0	80.0
<b>MIDDLE FRINGE</b>								
Mahrawal	694.3	614	3,957	570	895	71.0	40.6	59.4
Cherrat	691.2	851	5,456	789	898	70.4	47.8	52.2
Talaspur Kalan	270.2	443	2,445	905	898	62.3	43.7	56.3
Sukhrawali	189.5	177	1,243	658	825	61.0	46.1	53.9
Sidhauli	316.4	290	2,003	634	872	59.4	42.0	58.0
Boner	171.2	243	1,403	820	868	62.1	48.9	53.1
Mukundpur	357.5	325	2,262	633	811	62.5	45.0	55.0
Kheria	197.9	164	1,048	532	868	55.2	48.9	51.1
Ahmedpur Amar	90.0	153	983	1,092	898	62.8	51.6	48.4
Ibrahimpur	120.0	221	1,293	1,077	798	62.1	51.0	49.0
Hardaspur	185.7	248	1,274	688	830	61.0	54.8	45.2
Lausara Bisawan	355.6	214	1,484	418	816	56.9	49.0	51.0
<b>OUTER FRINGE</b>								
Bhankri Khas	369.7	291	1,735	470	940	61.1	54.0	46.0
Bhartari	230.4	263	1,404	610	805	60.0	60.5	39.5
Chandaukha	258.4	106	798	309	942	62.4	54.0	46.0
Harduaganj (R&T)	1,932.0	929	6,015	311	865	71.9	48.8	51.2
Panaithi	326.0	217	1,383	424	882	59.8	62.3	37.7
Madrak	731.0	1,137	7,046	964	862	61.0	53.8	46.2
Govindpur Fagoi	302.7	284	1,879	622	941	54.7	57.0	43.0
Lodha	628.1	543	3,386	539	846	55.0	62.0	38.0

Source: (a) District Census Handbook: Town and Village Directory, Census 2001.

(b) Primary Survey of Selected Villages in the Urban Fringe.

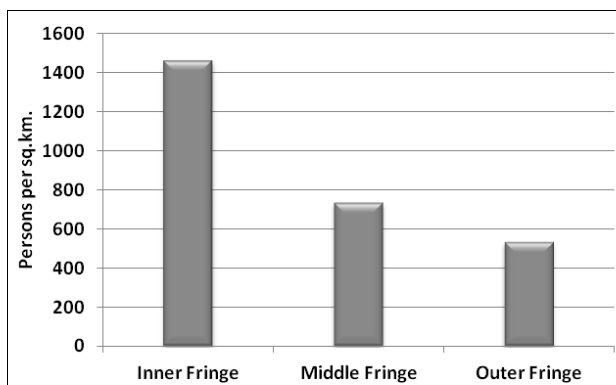


Fig. 4. Population density (persons per sq. km) in selected villages of the urban fringe of Aligarh city (2001)

Source: Based on Tab. 5.

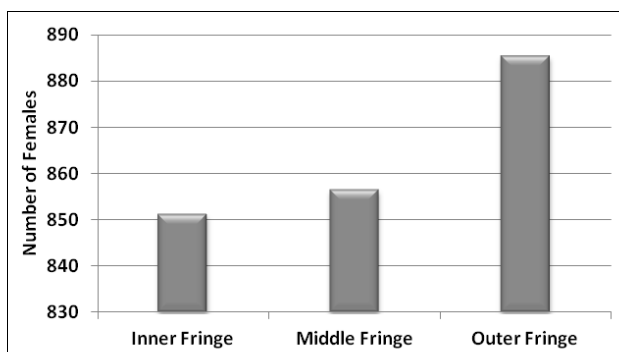


Fig. 5. Sex ratio – number of females per thousand males in selected villages of the urban fringe of Aligarh city (2001)

Source: Based on Tab. 5.

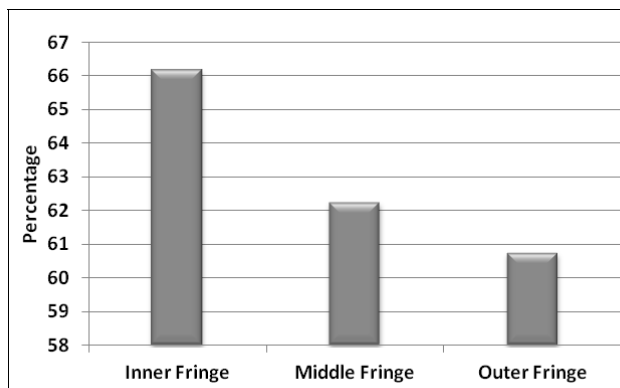


Fig. 6. Literacy rate (in per cent) in the selected villages of the urban fringe of Aligarh

Source: Based on Tab. 5.

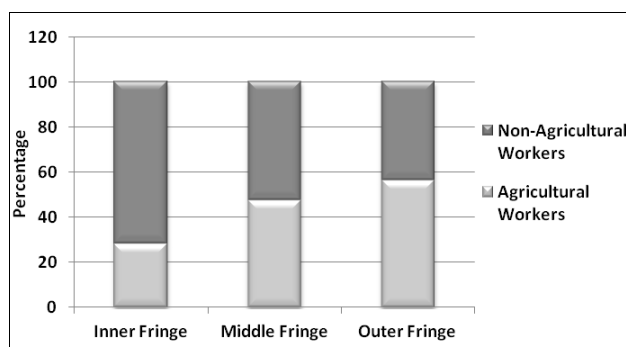


Fig. 7. Ratio of agricultural and non-agricultural workers in selected villages of the urban fringe of Aligarh city

Source: Based on Tab. 5.

Agricultural workers in a village are people who earn their livelihood from agricultural and allied activities, while non-agricultural workers are those who earn from work other than agriculture, but they are still the part of the rural community.

Table 6 shows the average percentages of causes of in-migration in the villages attached to the city in the Inner fringe. The findings of the survey clearly reveal that the nature of migration differs in rural areas from that of urban areas. The general pattern of in-migrants for economic causes was found to be highest in all spatial categories. The social and economic causes of migration from rural to urban areas are 38.7 and 61.3 per cent respectively. The causes of migration from urban to rural are 29.1 per cent social and 70.9 per cent economic. The percentages of causes of migration from other districts and within the district are shown as 27.0 and 73.0 per cent, and 20.1 and 79.9 per cent, respectively. In the case of migrants from other states it has been found that 34.3 per cent of migrants came for social causes and 65.7 per cent for economic causes.

**Tab. 6. Average percentages of causes of in-migration in villages of the inner fringe**

Place of origin of migrants	Social causes (in per cent)	Economic causes (in per cent)
Rural-urban	38.7	61.3
Urban-rural	29.1	70.9
Intra-district	27.0	73.0
Inter-district	20.1	79.9
From other state	34.3	65.7

Source: Based on primary survey of villages 2009-10.

## AGRICULTURAL LAND UTILIZATION IN DEVELOPMENT BLOCKS AND SELECTED VILLAGES

An urban area is functionally defined as the built-up land occupied by constructional development that is either clustered in settlements of various sizes or found in isolation in the countryside. Rapid expansion of metropolitan Aligarh has been referred to as “urban sprawl”, indicating a complex pattern of land use, transportation and, socio-economic development. As the city area extends into the surrounding rural area, large tracts of land have developed in “leapfrog”, with low-density patterns. Different uses of land for housing, markets, offices, industries, recreation and open spaces, and agricultural land uses are sequestered from each other in traditional and modern styles.

Different land use categories belonging to agricultural and non-agricultural sectors were analysed on the basis of some spatial indicators of development. These categories incorporated for example, net sown area, cultivable waste lands, fallow lands, barren lands, area under forests, pasture and orchards. Further, each land use category was described by calculating the averages and percentages to the total reporting area of the blocks.

For the purpose of examining land utilization in three development blocks Tables 7 and 8 show a detailed profile of land uses during 2010. The total area of the three blocks was 89,239 ha, out of which the net sown area was 78.3 per cent and non-agricultural land amounted to 10 per cent. The other important categories are: fallow lands covering 4.8 per cent, barren and uncultivable lands 3.8 per cent, cultivable waste lands 1.5 percent and forest lands 1.0 percent. The land under pastures and orchards shared only 0.6 per cent and 0.03 per cent, respectively, of the total land area (Fig. 8).

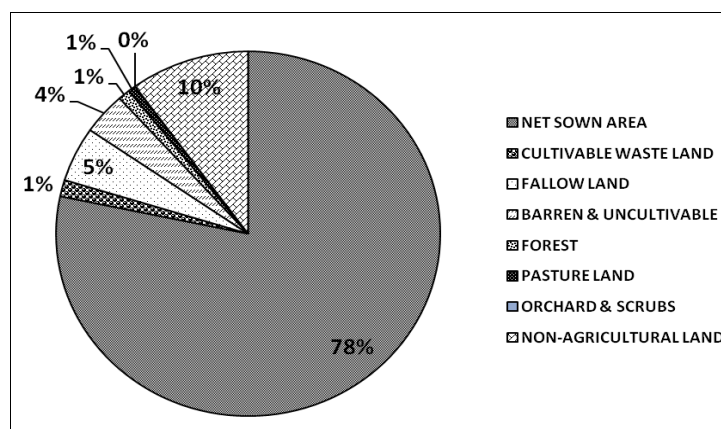


Fig. 8. Average land utilization in three development blocks forming the urban fringe of Aligarh city (2010)

Source: Prepared by the author. Based on Aligarh District Statistical Diary (2010).

The largest portion of the urban fringe of Aligarh city is shared by the Lodha, Dhanipur and Jawan blocks consisting of 133, 93 and 108 villages, respectively. Out of these, a set of 40 villages representing these blocks were

taken for the study. As the urban growth of Aligarh shows maximum encroachment towards the north, the share of non-agricultural land is highest in the Jawan block at 10.9 per cent, with 10.4 in Dhanipur and 8.7 per cent in Lodha (Figs. 9, 10 and 11). The Jawan block has the largest area under forest to the extent of 833 ha. (2.6 per cent), the Lodha block has 49 ha. and Dhanipur 50 ha. (0.2 per cent each) – Tab. 7.

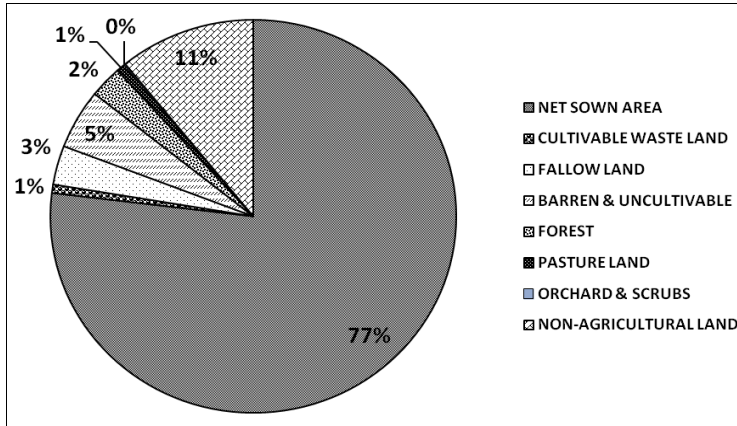


Fig. 9. Average land utilization in the Jawan block of the urban fringe of Aligarh city (2010)

Source: Prepared by the author. Based on Aligarh District Statistical Diary (2010).

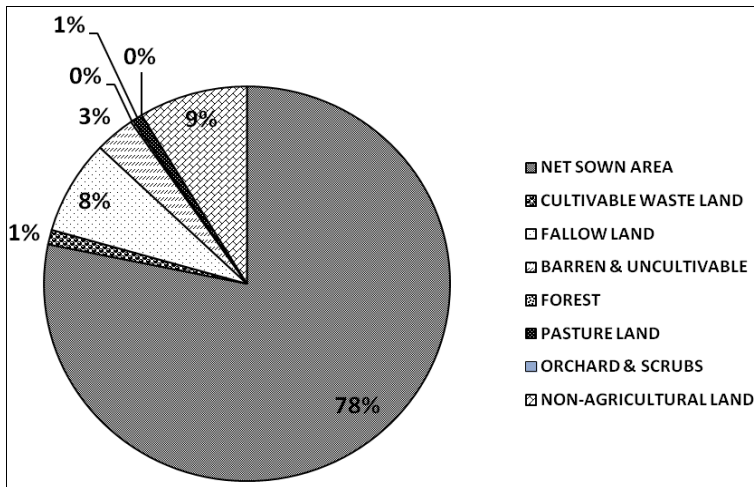


Fig. 10. Average land utilization in the Lodha block of the urban fringe of Aligarh city (2010)

Source: Prepared by the author. Based on Aligarh District Statistical Diary (2010).



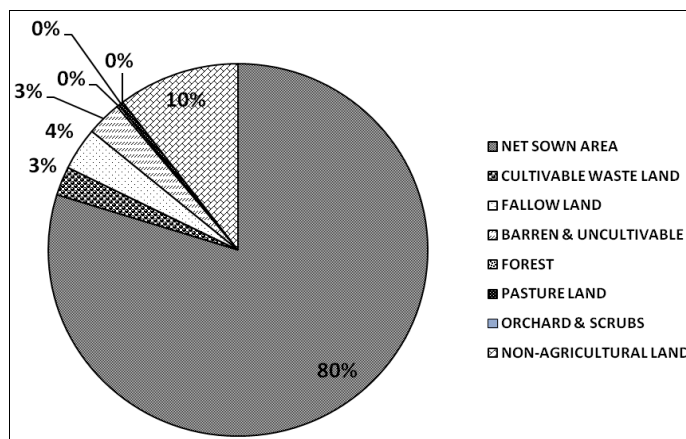


Fig. 11. Average land utilization in the Dhanipur block of the urban fringe of Aligarh city (2010)

Source: Prepared by the author. Based on Aligarh District Statistical Diary (2010).

**Tab. 7. Land utilization in the development blocks forming the urban fringe of Aligarh city (in hectares, 2010)**

Name of block	Land utilization category (area in hectares and per cent to total)							
	Total area	Forest	Cultivable wasteland	Fallow land	Barren and uncult.	Pasture land	Orchard scrubs	Non-agri. land
Jawan	31,691	834 (2.6%)	215 (0.7%)	1018 (3.2%)	1560 (4.9%)	192 (0.7%)	28 (0.1%)	3,461 (10.9%)
Lodha	27,543	49 (0.2%)	330 (1.2%)	2121 (7.7%)	891 (3.2%)	231 (0.8%)	1 (0.003%)	2,371 (8.7%)
Dhanipur	30,005	50 (0.2%)	744 (2.5%)	1109 (3.7%)	920 (3.0%)	120 (0.4%)	2 (0.006%)	3,105 (10.4%)
Total	89,239	933 (1.0%)	1,289 (1.47%)	4,248 (4.87%)	3,371 (3.7%)	543 (0.63%)	31 (0.03%)	8,937 (10.0%)

Source: Aligarh District Statistical Diary (2010).

Table 8 shows that, during 2010 the gross sown area of the three blocks accounted for 121,463 ha which is 57.5 per cent more than the total net sown area (69,887 ha). The gross irrigated area accounted for 108,824 ha (63.4 per cent out of 66,620 ha net irrigated area). Thus the figures for land utilization clearly reveal that the land of the three blocks is characterized by an intensive agricultural system and that farming is the mainstay of livelihoods in the urban fringe of Aligarh city.

The complexes of interaction seen in urban land use and the environment surrounding the city, and in the urban-rural fringe areas have generated a change in the rural landscape. According to Blizzard and Anderson (1952) urban fringe is the area of mixed urban and rural land use between the points where full city services cease to be available, and where agricultural land use

predominates. Similarly Hussain (2007) has pointed out that the urban-rural fringe is an area of mixed urban and rural population, and land use, which begins at the point where agricultural land use appears near the city and extends to the point where villages have distinct urban land uses or where some persons, at least from the village community, commute to city daily for work or other purposes.

**Tab. 8. Agricultural land utilization in the development blocks forming the urban fringe of Aligarh city (in hectares, 2010)**

Name of block	Land utilization category (area in hectares and per cent to total)				
	Net sown area	Area sown more than once	Gross sown area	Net irrigated area	Gross irrigated area
Jawan	24,383 (76.9%)	18,793	43,176	23,305	41,221
Lodha	21,549 (78.2%)	15,759	37,308	20,450	30,385
Dhanipur	23,955 (79.8%)	17,024	40,979	22,865	37,218
Total	69,887 (78.3%)	51,576	121,463	66,620	108,824

Source: Aligarh District Statistical Diary (2010).

Thus, the villages in the urban fringe of Aligarh city show a similar pattern where urban encroachment has led to the conversion of agricultural lands to non-agricultural or urban uses. This situation can clearly be seen taking examples from the villages in the Jawan block such as Ramgarh Panjupur, Manzurgarhi and Maheshpur. A similar condition can clearly be seen in the villages of the Lodha block namely, Alapur Garhia, Rorawar, Alahadadpur, Shahpur Qutub and Mukundpur. In the Dhanipur block; these transformations are seen in the villages of Kwarasi, Asadpur Kayam, Bhadesi Mafi and Sukhrawali where most farmlands have been converted for residential and institutional purposes (Tab. 9).

The ratio of agricultural and non-agricultural area (in per cent) is shown in the selected villages of the urban fringe of Aligarh city. Table 10 shows that the share of land under non-agricultural use is highest in the Inner fringe at 24.7 per cent, while in the Middle fringe, it is 15.7 per cent, and in Outer fringe 14.3 per cent. Inversely, the share of agricultural land use shows a pattern of increasing order from the Inner fringe towards the Outer fringe in order of 75.3 per cent, 84.3 per cent and 85.7 per cent, respectively. Hence, it is clear that, agricultural activities increase from the inner margin towards the outer margin of the fringe and a reverse order is seen for non-agricultural activities.

**Tab. 9. Land utilization in selected villages of the urban fringe of Aligarh**

Name of village	Total area (in ha)	Area under different land use (in hectares)				Total area under agriculture ha (per cent)	Total area non-agricultural ha (per cent)
		Forest in ha (per cent)	Irrigated	Non-irrigated	Cultivable waste land		
INNER FRINGE							
Alapur Garhia	108.1	-	77.1	1.3	-	78.4 (72.5)	29.7 (27.5)
Sarsaul	248.0	1.0 (0.4)	157.9	-	-	157.9 (63.6)	89.1 (36.0)
Baraula Jafrabad	310.7	-	172.9	12.1	11.2	196.2 (63.1)	114.5 (36.9)
Ramgarh Panjupur	358.2	-	193.2	19.0	7.0	219.2 (61.2)	139.0 (38.8)
Manzurgarhi	284.1	-	220.1	10.0	-	230.1 (81.0)	54.0 (19.0)
Maheshpur	126.0	-	70.0	7.4	-	77.4 (61.4)	48.6 (38.6)
Barhati	299.8	-	205.8	2.4	47.5	255.7 (85.3)	44.1 (14.7)
Chilkora	157.0	-	100.0	-	11.5	111.5 (71.0)	45.5 (29.0)
Kwarasi	315.2	-	253.0	50.1	-	303.2 (96.2)	12.0 (3.8)
Asadpur Kayam	459.2	-	225.0	14.4	76.2	315.6 (68.7)	143.6 (31.3)
Dhanipur	283.2	-	132.8	7.6	16.4	156.8 (55.4)	126.4 (44.6)
Bhadesi Mafi	226.1	-	164.8	4.6	28.1	197.5 (87.4)	28.6 (12.6)
Hajipur Chauhata	149.2	-	123.0	16.2	-	139.2 (93.3)	10.0 (6.7)
Parhiawali	261.0	9.0 (3.4)	218.5	6.7	2.6	227.8 (87.3)	24.2 (9.3)
Kasba Kol	189.5	-	58.4	-	21.0	79.4 (41.9)	110.1 (58.1)
Chamraul	81.3	-	71.1	4.0	2.0	77.1 (94.8)	4.2 (5.2)
Shahpur Qutub	289.6	-	253.5	7.0	14.1	274.6 (94.8)	15.0 (5.2)
Alahadadpur	149.5	-	97.5	-	-	97.5 (65.2)	52.0 (34.8)
Rorawar	109.8	-	95.3	-	-	95.3 (86.8)	14.5 (13.2)
Ashrafpur Jalal	120.1	-	89.1	-	1.3	90.4 (75.3)	29.7 (24.7)
MIDDLE FRINGE							
Mahrawal	694.3	1.0 (0.2)	559.0	10.1	2.6	571.7 (82.3)	121.6 (17.5)
Cherrat	691.2	-	410.0	20.0	0.7	430.7 (62.3)	260.5 (37.7)
Talaspur Kalan	270.2	-	133.2	-	69.5	202.7 (75.0)	67.5 (25.0)
Sukhrawali	189.5	-	139.3	8.7	-	148.0 (78.1)	41.5 (21.9)
Sidhauli	316.4	-	254.4	18.4	12.4	285.2 (90.1)	31.2 (9.9)
Boner	171.2	62.0 (36.2)	59.0	11.0	16.0	86.0 (50.2)	23.2 (13.6)
Mukundpur	357.5	-	320.4	30.2	-	350.6 (98.0)	6.9 (2.0)
Kheria	197.9	-	182.9	9.0	-	191.9 (97.0)	6.0 (3.0)
AhmedpurAmarkhan	90.0	-	86.0	-	2.0	88.0 (97.7)	2.0 (2.3)
Ibrahimpur	120.0	-	95.5	8.1	-	103.6 (86.3)	16.3 (13.7)
Hardaspur	185.7	-	179.0	3.0	1.7	183.7 (98.9)	2.0 (1.1)
Lausara Bisawan	355.6	-	308.0	20.9	11.4	340.3 (95.7)	15.3 (4.3)
OUTER FRINGE							
Bhankri Khas	369.7	-	314.7	26.1	1.8	342.6 (92.7)	27.1 (7.3)
Bhartari	230.4	-	205.0	15.4	-	220.4 (95.6)	10.0 (4.4)
Chandaukha	258.4	-	133.9	20.5	-	154.4 (59.7)	104.0 (40.3)
Harduaganj (R & T)	1,932.0	-	1,640.0	-	-	1,640.0 (84.9)	292.0 (15.1)
Panaithi	326.0	-	228.7	0.9	42.2	271.8 (83.4)	54.2 (16.6)
Madrak	731.0	-	639.0	-	2.2	641.2 (87.7)	89.9 (12.3)
Govindpur Fagoi	302.7	-	250.0	12.7	20.0	282.7 (93.4)	20.0 (6.6)
Lodha	628.1	-	457.3	80.5	16.0	553.8 (88.2)	74.3 (11.8)

Source: District Census Handbook: Town and Village Directory, Census of India 2001.

**Tab. 10. Share of agricultural and non-agricultural area in selected villages of the urban fringe**

Fringe area	Agricultural land use (in per cent)	Non-agricultural land use (in per cent)
Inner fringe	75.3	24.7
Middle fringe	84.3	15.7
Outer fringe	85.7	14.3

Source: Generated from Tab. 9.

### IMPACT OF NEW AGRICULTURAL TECHNOLOGY ON FARMING IN THE URBAN FRINGE

The primary recipients of the response to the phenomenal process of urban expansion are farmers and farmland located in the fringe areas, where socio-economic activities are the gainful pursuits in the form of community development. Agriculture accounts for almost half of the gross domestic product. Its contribution to the growth and distribution of income affects a vast majority of the population. The development of agriculture for food, raw material for industries, to solve the problems of unemployment and under-employment, and increase the income of the rural poor are important issues related to urban development (Shafi 1990 and 1993). It can only be achieved through the adoption of New Agricultural Technology, such as improved seeds, fertilizers, machinery, insecticides, pesticides and modern irrigation methods. But these have created a number of environmental problems such as land degradation, soil erosion, alkalinity and salinity, water logging, depletion of water resources and health hazards.

The distribution of agricultural facilities in the three development blocks Jawan, Lodha and Dhanipur forming the urban-rural fringe of Aligarh city (Tab. 11) clearly shows that modern agricultural technologies in fringe areas of the city are inadequate because in many villages located in remote areas the natives do not have access to all facilities through the proper distribution channel. There are 174 fertilizer retailing and 129 seed retailing centres in the blocks. From these 41.4 per cent of the fertilizer retailing centres are located in the Lodha block and 45.7 per cent of the seed retailing centres in Dhanipur block. A total of 75 retailing centres provide insecticide and pesticide to the farmers through insecticide retailing centres, out of which Jawan and Lodha have 36 per cent each, while Dhanipur possesses 28 per cent of the centres. Farmers in all the three blocks lack the facilities of the main agricultural service centres. However, there are some small agricultural service centres, out of which Dhanipur has 45.4 per cent of the centres, while Lodha and Jawan equally possess 27.3 per cent of the centres. The number of biogas plants is enumerated as 1,856 units, out of which Dhanipur has 38.2 per cent of the units, while the Jawan and Lodha have 33.6 and 28.2 per cent of the units, respectively (Tab. 11). It is well known that, biogas plant units are the best source of clean fuel for rural households and of bio-fertilizer for organic farming.

**Tab. 11. Distribution of agricultural facilities in the development blocks forming the urban fringe of Aligarh city (in per cent)**

Name of block	Fertilizer retailing centres	Seed retailing centres	Insecticide retailing centres	Agricultural service centres	Biogas plants
Jawan	25.8 %	18.6 %	36.0 %	27.3 %	33.6 %
Lodha	41.4 %	35.7 %	36.0 %	27.3 %	28.2 %
Dhanipur	32.8 %	45.7 %	28.0 %	45.4 %	38.2 %

Source: Aligarh District Statistical Diary (2010).

The use of agricultural machinery and implements are important components of new agricultural technology. The urban fringe areas of Aligarh city are agriculturally rich but the status of the use of agricultural machinery is not satisfactory. The use of new agricultural technology has encouraged the farmers, but with small land holdings and low purchasing power they are unable to bring them into use efficiently. The primary information obtained and interaction with farmers has shown that almost all the farmland in the selected villages is tractor operated (27 per cent of farmers are tractor owners and 77 per cent use them on rent). Figures for the actual number of tractors in the three development blocks are not available. However, there are a total of 1,792 improved cultivators, 1,705 improved threshers and 110 sowing machines under agricultural operation in the blocks. Among these, Lodha has the most improved cultivators with 35.26 per cent, Jawan has 59.64 per cent of the improved threshers, while the Lodha block has 45.45 per cent of the sowing machines (Tab. 12). Statistical information pertaining to distribution of spraying machines and harvesters is not available, as the foremost choice of the farmers is to get the work done manually mainly by family members.

**Tab. 12. Distribution of agricultural machinery in the development blocks forming the urban-rural fringe of Aligarh city (in per cent)**

Name of block	No. of tractors	Improved cultivators	Improved threshers	Sowing machines	Sprayers
Jawan	-	32.15 %	59.64 %	20.90 %	-
Lodha	-	35.26 %	22.81 %	45.45 %	-
Dhanipur	-	32.58 %	17.53 %	33.63 %	-

Source: Aligarh District Statistical Diary (2010).

Table 13 shows the distribution of chemical fertilizers in 2010. The total distribution of chemical fertilizers in the three development blocks amounted to 24,738 metric tonnes. Out of this, nitrogenous fertilizer (urea) had a share of 16,211 mt. (65.5 per cent), phosphorus based fertilizers had 6,435 mt. (26.0 per cent) and potassium based fertilizers 2092 mt. (8.5 per cent). The three blocks namely, Jawan, Lodha and Dhanipur received almost equal amounts of the three

types of fertilizers. The use of chemical fertilizers on farmlands in fringe areas is highest. This is appropriate for meeting the demand of food production. At the time of interaction with farmers, it was found that the amount of fertilizers distributed in the villages is about half of the actual requirement of the farmers.

**Tab. 13. Distribution of chemical fertilizers in the development blocks forming the urban-rural fringe of Aligarh city (in metric tonnes)**

Name of block	Nitrogenous fertilizer	Phosphoric fertilizer	Potassium fertilizer	Total
Jawan	5,398 (65.5%)	2,146 (26.0%)	698 (8.5%)	8,242 (100.0)
Lodha	5,407 (65.4%)	2,148 (26.0%)	713 (8.6%)	8,268 (100.0)
Dhanipur	5,406 (65.7%)	2,141 (26.0%)	681 (8.3%)	8,228 (100.0)
Total	16,211 (65.5%)	6,435 (26.0%)	2,092(8.5%)	24,738 (100.0)

Source: Aligarh District Statistical Diary (2010).

### ECONOMIC RESPONSES TO URBAN ENCROACHMENT IN THE URBAN FRINGE

The change in the economic position of the villages around Aligarh city is another indicator that acknowledges the urban impact in fringe areas. As a result of rural transformation the communities themselves undergo economic change, from crop production to a trading economy. Gradual expansion of the city as an industrial centre and a changing economic base is having a clear impact on the rural landscapes of the urban fringe of Aligarh. Evidence can be drawn from the blocks of Jawan, Lodha and Dhanipur, which form the city fringe that large areas of good agricultural land have been encroached upon and bought for non-agricultural purposes like industrial, public and community services.

For example, the northern fringe area mainly along the Anupshahar Road, which is a part of the Jawan block, was formerly a well known area for vegetable cultivation and dairy farming. The area is now fully residential and industrial. Three villages, namely Ramgarh Panjupur, Manzargarhi and Maheshpur, clearly illustrate these phenomena. A similar sense is clearly visible in the Lodha block, namely Alapur Garhia, Rorawar, Alahadadpur, Shahpur Qutub and Mukundpur. In the Dhanipur block, the transformations were seen in Kwarasi, Asadpur Kayam, Bhadesi Mafi and Sukhrawali villages where most farmland has been converted to residential and institutional uses.

However, the agricultural economy in the area has been much transformed and is of prime concern as a major part of the agricultural land has been bought for non-urban uses. Several agricultural facilities have been provided by the government to benefit the farmers. Table 14 shows storage and marketing facilities for agricultural produce in the three development blocks.

During 2010 there were a total of 25 warehouses with a capacity 2,500 mt. and 15 cold stores with a capacity of 89,082 mt. in the area. The Dhanipur block possesses the largest number of warehouses numbering 12 with a total capacity

of 1,200 mt. and 6 cold stores with a capacity of 45,855 mt. These areas are lacking in agricultural markets. There are only two markets for trading agricultural produce, one at Dhanipur village and other at Harduaganj, which forms part of the Dhanipur block. Agricultural markets do not exist in the Jawan and Lodha blocks.

**Tab. 14. Distribution of storage and market facilities in the development blocks of the urban-rural fringe of Aligarh city**

Name of block	Number of rural warehouses (capacity in mt)	Number of cold stores (capacity in mt)	Number of agricultural markets
Jawan	5 (500)	1 (1,152)	0
Lodha	8 (800)	8 (42,075)	0
Dhanipur	12 (1,200)	6 (45,855)	2
Total	25 (2,500)	15 (89,082)	2

Source: Aligarh District Statistical Diary (2010).

**Tab. 15. Distribution of rural industries in the development blocks forming the urban-rural fringe of Aligarh city**

Name of block	Registered units and working labour	Cottage industries and working labour	Village industries and working labour	Total units and working labour
Jawan	6 (362)	12 (54)	2 (2)	20 (378)
Lodha	3 (65)	17 (84)	3 (3)	23 (152)
Dhanipur	10 (171)	10 (46)	13 (13)	33 (230)
Total	19 (598)	39 (194)	18 (18)	76 (760)

Source: Aligarh District Statistical Diary (2010).

Rural industries are another strong indicator of the characteristics of the rural economy in the area. The distribution of rural industries, cottage industries, Khadi village industries and small-scale industries located in rural areas of the urban fringe of Aligarh city are shown in Table 15. It has been found that there were a total of 76 industries in 2010 in the area, which engage a total of 760 persons as working labourers. Out of these 19 were registered units, 39 belonged to the category of cottage industries and 18 were from the Khadi Village Industry scheme. The Dhanipur block leads with a total of 33 agro-based industries and engaged 230 persons directly. These industries include dairy units, a sugar mill, organic manure, pesticides, vegetable oil, flourmill, pulses, fruit and vegetable processing. Cottage and Khadi village industries can be treated as micro scale units based on micro finance schemes of different agencies. They are completely located in villages especially for women and weaker sections of society, and helpful in habitat resource utilization and providing sustainable rural livelihoods.

## CONCLUSION

This research paper shows that the phenomena of urban encroachment on agricultural land strongly affects the socio-economic and land use characteristics of surrounding fringe areas of a city. This transitional zone of sub-urban systems is undergoing a process of restructuring of the demographic, land use and socio-economic setup of rural areas. The demographic indicators of change show that, as the city expands into its fringe area the density of population decreases with increasing distance from the city. Because of male selective migration from rural areas, the sex ratio increases, and also the literacy rate decreases towards the outer fringe. In the case of land utilization research, it was found that, in marginal villages of the fringe more land is devoted to agricultural purposes, while in the villages near the city more land is utilized for non-agricultural purposes. Analysis of the impact of urban encroachment on the socio-economic structure of the urban fringe presents gainful pursuits in the form of community development and rural transformation. Development of agriculture through modern agricultural technologies, food supply, industrial development, and market and storage facilities provides a prospective channel for economic gains in the urban fringe areas.

In the urban fringe of Aligarh city, socio-economic growth is a continuous phenomenon, therefore, there is need to maintain equilibrium in planning to achieve sustainable development. To overcome the risks of associated rapid urbanization, there is also a need for rational policies from the government, which should be adaptive, participatory, and effective. Planning should be done for sustainable management of natural resources, which can contribute to the socio-economic viability of urban and rural areas, ensuring livelihoods, generating employment and providing food security.

## REFERENCES

- ADEBOYEJO, T., ABOLADE, O. (2009). Household responses to urban encroachment on the rural hinterland in the Ogbomoso urban fringe, Nigeria. In de Sherbiniin, A., Rahman, A., Barbieri, A., Fotso, J. C., Zhu, Y., eds. *Urban population-environment dynamics in the developing world: case studies and lessons learned*. Paris (CICRED), pp. 41-75.
- ADELL, G. (1999). *Theories and models of the peri-urban interface: a changing conceptual landscape*. London (The Development Planning Unit).
- ALIGARH DISTRICT STATISTICAL DIARY (2010). Lucknow (Economics and Statistical Division).
- BLIZZARD, S. W., ANDERSON, W. F. (1952). *Problems in rural-urban fringe research: conceptualization and delineation. Progress Report*, 89. Philadelphia (Pennsylvania State College Agricultural Experiment Station).
- CARPENTER, S. R., BENSON, B. J., BIGGS, R., CHIPMAN, J. W., FOLEY, J. A., GOLDING, S. A., HAMMER, R. B., HANSON, P. C., JOHNSON, P. T. J., KAMARAINEN, A. M., KRATZ, T. K., LATHROP, R. C., MCMAHON, K. D., PROVENCHER, B., RUSAK, J. A., SOLOMON, C. T., STANLEY, E. H., TURNER, M. G., VANDER ZANDEN, M. J., WU, C. -H., YUAN, H. (2007). Understanding regional change: comparison of two lake districts. *BioScience*, 57, 323-335.
- CENSUS OF INDIA (1971, 1981, 1991, 2011). *Aligarh district census handbooks: village and town directory*. Lucknow (Directorate of Census Operations).



- CENSUS OF INDIA (2001). *District census handbook (Part A & B): town and village directory. Village and town-wise census abstract*. Lucknow (Directorate of Census Operations).
- CENSUS OF INDIA (2001). *Uttar Pradesh administrative atlas, Vol. I*. Uttar Pradesh (Directorate of Census Operations).
- CENSUS OF INDIA (2011) (PROVISIONAL). *Office of the registrar general and census commissioner, India*. New Delhi (Ministry of Home Affairs, Government of India).
- DICK, H. W., RIMMER, P. J. (1998). Beyond the third world city: the new urban geography of south-east Asia. *Urban Studies*, 35, 2303-2321.
- FAROOQ, S., AHMAD, S. (2008). Urban sprawl development around Aligarh city: a study aided by satellite remote sensing and GIS. *Journal of Indian Society of Remote Sensing*, 36, 77-88.
- GRIMM, N. B., FAETH, S. H., GOLUBIEWSKI, N. E., REDMAN, C. L., WU, J., BAL, X. (2008). Global change and the ecology of cities. *Science*, 319, 756-760.
- HERINGTON, J. (1984). *The outer city*. London (Harper and Row).
- HUSSAIN, M. (2007). *Models in geography*. New Delhi (Rawat Publication).
- KURTZ, H. A., EICHER, J. B. (1958). Fringe and suburbs: a confusion of concepts. *Social Forces*, 37, 32-37.
- MASTER PLAN REPORTS OF ALIGARH (1991-01 and 2001-21). Aligarh (Aligarh Development Authority).
- PAL, N., SINGH, R. P. B. (2009). Changing environs and its impact on peri-urban zone of Varanasi. In Jafri, S. S. A., Bajpai, B. K., eds. *Rural-urban fringe: problems and management*, New Delhi (Concept Publishing Co.), pp. 131-153.
- PRYOR, R. J., (1968). Defining the rural-urban fringe. *Social Forces*, 47, 202-215.
- QUEEN, S. A., CARPENTER, D. B. (1953). The sociological significance of the rural-urban fringe: from the urban point of view. *Rural Sociology*, 18, 101-107.
- SAINI, V. (2008). Study of urban sprawl of Bikaner city. *Annals of the Rajasthan Geographical Association*, 25, 59-64.
- SHAFI, M. (1993). Ecosystem and management of agriculture. *The Geographer*, 40(2), 1-8.
- WORLD BANK (1997). *Annual world development report 1997: the state in a changing world*. New York (Oxford University Press).

Kamal A s i f, Hifzur R a h m a n

## VYUŽITIE ZEME A SOCIÁLNO-EKONOMICKÉ DÔSLEDKY PRENIKANIA MESTA DO POĽNOHOSPODÁRSKEJ KRAJINY. ŠTÚDIA Z OBLASTI URBÁNNO-RURÁLNEHO PRIESTORU V INDIÍ

Hlavným cieľom tohto článku je pokus o analytickú diskusiu o vplyvoch rozširovania mesta na sociálno-ekonomické pomery v okrajovej časti mesta Aligarh v Indii. Výskum hodnotí tri priestorové sektory, z ktorých pozostáva skúmaná oblasť, a štyridsať vybraných dedín v rámci týchto sektorov, pričom sa analyzujú demografické vlastnosti a formy využitia zeme. Okrajová časť mesta je rozdelená do strednej, vnútornej a vonkajšej zóny na základe narastajúcej vzdialenosti. Potrebné dáta o hustote zaľudnenia, pomere pohlaví, gramotnosti, zamestnaneckej štruktúre a o poľnohospodárskom využívaní územia sú vypočítané a opísané v percentách s použitím diagramov a máp.

Diskusia sa v prvom rade zaoberá sociálno-ekonomickým profilom vybraných dedín v troch rozvojových sektoroch. Hustota zaľudnenia má tendenciu klesať, a to smerom od vnútornej zóny k vonkajšej ako výsledok klesajúceho vplyvu mesta na okrajovú

oblasť. Podiel žien stúpa smerom od vnútornej k vonkajšej zóne z dôvodu selektívnej migrácie mužskej populácie za pracovnými príležitosťami v meste.

V ďalšej časti sa opisujú spôsoby a charakteristiky využitia zeme v troch rozvojových sektoroch a vo vybraných dedinách na okraji mesta. Sú charakteristické intenzívnymi formami poľnohospodárstva, ktoré tu sú pilierom živobytia obyvateľstva. Podiel poľnohospodársky využívannej pôdy sa zvyšuje smerom od vnútornej k vonkajšej zóne. Poľnohospodárska činnosť podobne narastá smerom od vnútornej zóny po vonkajšiu a opak sa pozoruje v prípade iných činností. Postupná expanzia mesta ako priemyselného centra s meniacou sa ekonomickou základňou má zreteľný dosah na vidiecku krajinu v okrajových oblastiach mesta.

V tretej časti sa diskutuje o nových poľnohospodárskych technológiách vrátane kvalitnejšieho osiva, chemických hnojív, mechanizácie, nových metód pri využívaní insekticídov a zavlažovania. Spomínané prvky nových technológií používajú farmári vo vzdialenejších častiach okrajovej oblasti v nedostatočnej miere, pretože k nim majú obmedzený prístup. V závere článku sa uvádzajú výsledky, ktoré potvrdzujú, že prenikanie mesta do poľnohospodárskej krajiny má priamy dosah na sociálno-ekonomickú základňu v zóne medzi urbánnym a vidieckym priestorom.