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## EFFECT OF CITY EXPANTION ON THE COUNTRYSIDE: A CASE STUDY

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### Abstract

*The study investigates the expansion of Aligarh city during the last fifty years (1951 to 2001) and its effect on the countryside. Four particular kind of effects on the countryside deserves special attention i.e. loss of cultivated land, loss of biomass, land degradation, and changes in landuse and occupational pattern. This paper focuses on the loss of cultivated land and agricultural land put to non agricultural uses. The results show that during the last 50 year the city population has increased 5 times and area has increased 6 times, absorbing 72 villages and consuming 71.3 per cent of good fertile cultivated lands. Further it was also abserved that most of the cultivated lands are utilized for residential purposes with lack of infrastructural facilities like water, sanitation, electricity, roads etc.*

### Introduction

Inspite of rapid urbanization, India is still a land of villages and nearly 70 per cent of its population even today lives in villages and is engaged in agricultural pursuits. Although India is often portrayed as land of villages and hamlets, nevertheless, in reality it is equally a land of towns and cities. The scale of urban development is quite alarming and the size of urban population (285 millions, 2001) is one of the largests in the world. The number of cities having more than 1 million population has increased from 12 in 1981 to 35 in 2001 (Census of India, 2001). So despite its essentially rural orientation, India is changing and the effect of urban expansion is being felt on the countryside. Some of the causes of urban expansion such as population growth, economic development, migration, infrastructural innovations resulting in transformation of villages into towns, towns

into cities and cities into metros. However, in such a phenomenon for ecologically feasible development, planning requires an understanding of the growth dynamics (Hardoy, et.al,1992). Due to urban expansion, four particular kinds of effects on the countryside deserves special attention, loss of cultivated land, land degradation, loss of biomass and changes in landuse and occupational pattern (Siddqui, 2000).

In this paper an attempt has been made to assess the effect of city expansions on the countryside; especially on loss of agricultural land and conversion of agricultural land to non-agricultural uses. Aligarh city has been selected as the study area because little attention is given to smaller cities which are fast expanding and creating big problems especially in the peripheral zones. The countryside in the immediate hinterland is most affected and is suffering from many problems.



### Data and Methodology

This study is mainly based on primary sources of data collected through field survey of peripheral zone, survey of the fringe villages, and interview with villagers, gram pradhans and government officials. The data were drawn from a comprehensive survey of about 130 villages lying in the fringe areas with the help of a questionnaire and interviews during 2004-05.

The expansion of Aligarh city from 1951 to 2001 has been mapped with the help of Census of India data of 1951, 1971, 1981, 1991 and 2001, topographic sheet No. 541/1 and 54E/13 and IRS ID geo-coded panchromatic satellite analogue imagery on 1:12500 scale acquired in 2001 (Singh, et. al., 2001).

Under mentioned simple procedure has been adopted to demarcate the fringe area of Aligarh city:

- A circle with the radius of 12 km was drawn from the city headquarter.
- This circle was further sub-divided into 6 zones taking a radius of 2 km to assess the zones-wise effects.

Only 12 km radius has been taken to demarcate the fringe area because the effect of city growth occurs just outside the built up area and often outside the city boundaries.

### Discussion and Results

Today, with an unprecedented population growth the physical expansion of the cities is inadvertent. The physical expansion of built up areas beyond their municipal boundaries is conspicuous. Much of the development has occurred in a spontaneous, haphazard and unplanned manner. What were initially rural villages have now been transformed into urban residential, commercial and industrial complexes. This phenomenal growth of cities has been the topic of concern to planners the world over (Bhat, et al, 1974).

#### (i) Expansion of Aligarh City

Like other cities of India, Aligarh had a humble beginning as a trading centre. It is a city of great antiquity, wrapping in its fold many dynasties and their rise and fall. Its origin dates back to about 1500 B.C. when a Buddhist settlement existed here. During the ancient period development of the city took place around a Hindu temple at the bank of a small lake called '*Achal Tal*'. After a gap of couple of centuries when nothing was known about the history of the area, from the end of 12th century Muslims made there appearance at the scene and exercised their control over the area. An area called '*Upper Kot*' was developed next to the ancient area. All through the medieval period, expansion and renovation of the city has taken place. It had remained a walled city all through the medieval period with four gates, namely, *Delhi gate*, *Turkman gate*, *Madar gate* and *Sasni gate*. Thus, throughout the medieval period, Aligarh developed tremendously and remained an important administrative, industrial and agricultural town. After the final collapse of Muslim rule in mid 19th Century, the city passed into the British hands and during this period too the city witnessed a large scale development, which includes opening of post office in 1842 and the laying of first railway line between Aligarh and Tundla in 1863. The main highlight of entire British regime over the city is that they developed the city in a planned manner. They developed a separate area of residence and administration to the north and north-east of the old nucleus of the city, known as civil lines. Thus, in each period different area developed and now we have three fairly and neatly delineated areas in the city. Chronologically speaking, during the ancient period dominated by Hindu population developed *Achal Tal* area, the Medieval period, dominated by Muslims developed the *Upper*

*Kot* area and modern era of British inhabited by a mixed Hindu and Muslim population developed the civil-lines area. These areas instead of loosing their identity with time have retained it (NeviII, 1909).

Earlier the city expanded slowly but now industrialization and urbanization have accelerated the rate of its expansion. Industries, research and training centres, educational institutions, state and central government offices have come up in the past four decades. All these have led to a continuous development and physical expansion of the city. There is a specific patron in the expansion of the city. The city is criss-crossed by nine inter-city metalled roads. First the development took place along the sides of the roads and when it has expanded to a sufficient distance from the centre of the city, the houses started being built along the areas connecting the two adjacent roads.

A perusal of Table 1 reveals that the city population has increased 5 times while the area has increased 6 times during the last fifty years

(1951 to 2001). Apart from city's natural growth there has been migration from outside the city from surrounding villages, towns and other states. This helped in rapid increase of its population. The population growth during all the decades has been stable ranging between 30 to 50 per cent, while its growth rate during the decade 1971-81 was slightly lower (27.17 per cent) and during the decade 1981-91 it was the highest (49.76 per cent)

The city's built up area which was 11.05 sq. km in 1951, increased to 68.97 sq km in 2001. The decadal growth rate of area shows that during the decade 1951-61 the growth rate was the highest (99.09 per cent) but during the decade 1981-91 it was the lowest (8.92 per cent). The Aligarh Municipal Board was established in 1865 and the Aligarh Development Authority was formed in the year 1991. This helped in bringing other developed areas and the municipal limits under administrative control. The physical growth of Aligarh city during 1951, 1971, 1991 and 2001

**Table1**  
**Aligarh City: Population, area, density and growth rates (1951 to 2001).**

Year	Population	Area in sq. km	Population density per/sq km	Growth rates (in percentage)		
				Year	Population	Area
1	2	3	4	5	6	7
1951	141,610	11.05	12,815	-	-	-
1961	185,020	22.00	8,410	1951-61	30.65	99.09
1971	252,314	33.45	7,543	1961-71	36.37	52.00
1981	320,861	39.75	8,072	1971-81	27.17	18.83
1991	480,520	43.10	11,149	1981-91	49.75	8.42
2001	667,732	68.97	9,681	1991-01	38.96	60.02
<b>Total</b>				<b>1951-2001</b>	<b>371.52</b>	<b>524.16</b>

- Source:** (i) Census of India 1951 to 2001, Directorate of Census, U.P.  
(ii) Spatial extent of Built up area of 1951, 1961, 1971, 1981 was obtained from Census of India and Survey of India topographic sheets.  
(iii) Built-up area extent of 1991 and 2001 was interpreted from IRS ID panchromatic satellite imagery.

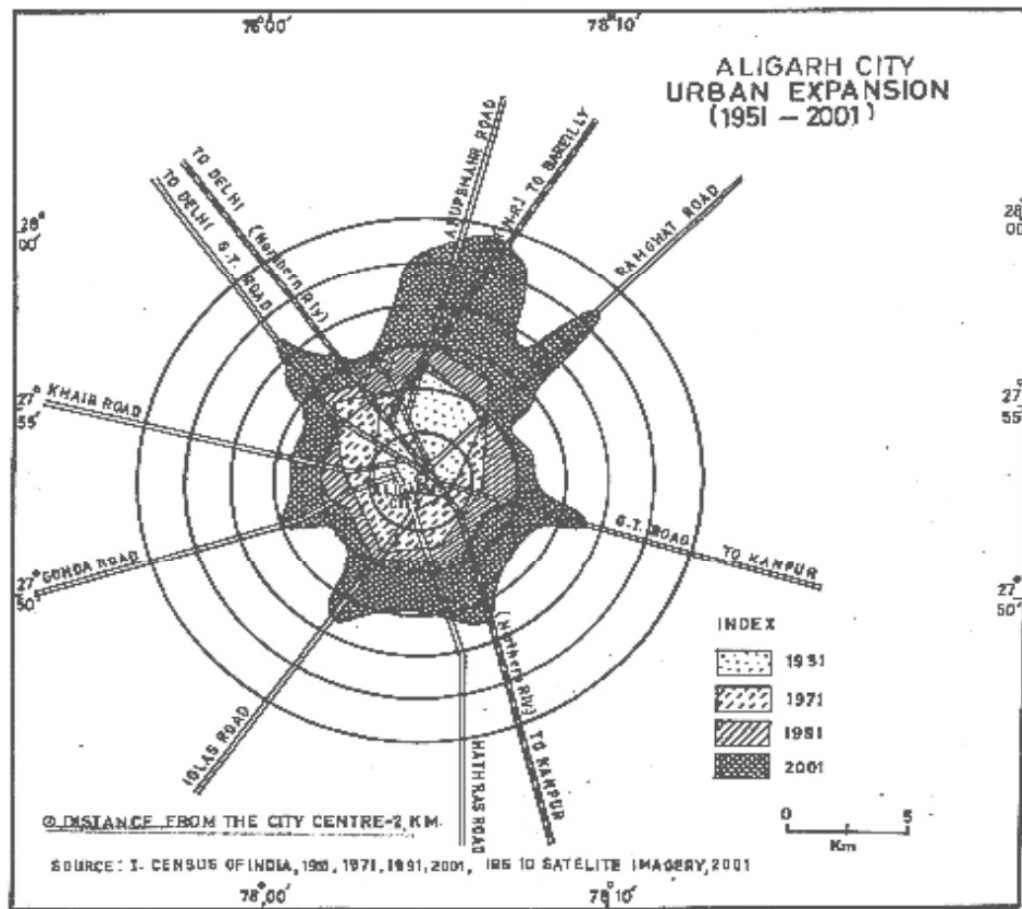


Fig. 1

has been marked (Fig.1). Taking 12 km radius from the city centre a circle has been drawn for demarcating the hinterland of the city. This has been further divided into 6 zones (2 km) for easy interpretation of the urban expansion. The entry roads to the city like G.T. road (to Delhi), Anupshahar road, Ramghat road, G.T. road (to Kanpur), Hathras road, Iglas road, Gonda road and Khair road have also been drawn to examine the pattern of urban sprawl. A perusal of Fig.1 shows that usually urban sprawl takes place along the highways, edge of the urban area and later by slow encroachment on land lying outside the city limits. Bulges along these roads are conspicuous.

In 1951, the city expansion was mostly confined within the 2 km radius. In the east and west a small bulge along the Iglas road could be

observed. While in the north a bulge has been formed along the Anupshahar road which extends up to 5 km radius. Another bulge along the Ramghat Road extends up to 4 km radius. After two decades i.e. in 1971 (Fig. 1), the city had spread in all directions covering almost the whole of 4 km radius. While in the north, the bulge was still there which extended beyond 5 km radius. By 1991, the urban expansion was found to be almost equal in the eastern and western side covering the 3 km radius. Bulges extending upto 4 km could be observed along the Anupshahar road, G.T. road, Ramghat road and Iglas road. Little development was observed along the Gonda road, Khair road and G.T. road (to Kanpur). By 1991, the city had expanded equally in the east, west and southern directions fully covering the 4 km

radius. However, the bulge in the north along the Anupshahar road increased upto 7 km radius while along the Ramghat and G.T. roads (to Delhi) it spread upto 6 km. The city developed in a dispersed and low density pattern leaving pockets of vacant land or under developed land within itself. The city had sprawled rapidly by 2001. It has expanded on all sides covering the 6 km radius. Higher density and compact sprawl has been observed. Linear growth was noticed along the eight major roads entering the city spreading as eight arms stretched out wards (Fig. 1). The space between the arms acts as the sinks for city development. The analysis of city's expansion shows that previously it was low-density sprawl and then it was ribbon sprawl i.e. development along the major transportation corridors outwards from city centre. Leapfrog development could be seen in the northern part of the city. Along the Anupshahar road the city has sprawled beyond 10 km radius. Urban growth has been intensified along the main transportation corridors i.e. along the G.T. road (to Kanpur). Hathras road, Northern Railway line from Kanpur to New Delhi, G.T. road (to Delhi), Anupshahar road, Northern Railway line (to Bareilly) and Ramghat road. But urban growth was most apparent along the Anupshahar and Ramghat roads in the north. Least urban expansion has taken place in the south-east along the Hathras road. Thus, the development along the main transportation lines has created wedges within the built-up area, with vacant lands, where the process of intermittent infilling occurs leading to contiguous urban sprawl over a period of time. Maximum development and expansion has been observed in residential areas. City's residential area can be broadly separated into two parts the eastern and western, with the railway line making the divide. The eastern area consists of the old city, characterized by old

houses, narrow lanes which are lined up with petty shops and rooms used as workshops. East of the railway line comprises of the new part, the civil lines area, characterized by having educational institution like Aligarh Muslim University, colleges and schools, administrative offices and residences. Elegant compact colonies with high quality spacious houses came up. Gradually, the outskirts of the city is expanding into the rural areas. Till recent past many of these villages were well outside the city limits but then the sprawling city swallowed their lands. Villages like Kishanpur, Dodhpur, Begpur, Jamalpur, Dhurramuafi etc. witnessed in mute silence their transformation. Many new industrial areas and residential colonies like *Firdous Nagar*, *Hamdard Nagar*, *Shatabdinagar*, *ADA Colony*, *Kundan Nagar*, *World Bank Colony* and *Suraksha Vihar* have come up in the northern part of the city. Similarly, *Mahfooz Nagar*, *Lodhipuram*, *Kumher Nagar*, *Indira Nagar*, *Prem Nagar* and *Prabhat Colony* developed on the southern part. Thus, we find that since 1951 a sea changes has taken place in urban landuse and city of Aligarh is heading for a rapid expansion.

A perusal of Table 2 shows the difference in land area under various urban uses in Aligarh city in 1951 and 2001. It is observed that the total area of the city has increased 6 times, the area under residential uses increased nearly 15 times, area under commercial used increased 11 times, area under industries 9 times, area under parks and open spaces 4 times, and area under administrative purposes doubled. However, areas under transport and public utility services registered a decrease.

#### **(ii) Effect of city expansion on the countryside**

Uncontrolled physical growth impacts most on what might be termed as an immediate hinterland around the city. This cannot be described as urban or sub-urban and yet much

**Table 2**  
**Aligarh City: Distribution of land area under various urban uses (1951- 2001)**

Type of Land	1951		2001	
	Area (ha)	Percentage	Area (ha)	Percentage
(i) Developed land	562.35	50.76	4,654	67.48
1. Residential	246.45	43.85	3,625	77.89
2. Commercial	35.00	6.20	398	8.55
3. Industrial	20.00	3.55	186	4.00
4. Recreational	4.00	0.70	169	3.60
5. Transport	173.00	30.78	148	3.18
6. Parks and open spaces	16.00	2.65	66	1.42
7. Public utility	43.10	7.66	35	0.08
8. Administrative	24.80	4.41	27	0.06
(ii) undeveloped land	542.65	49.24	2,243	32.52
<b>Total Land</b>	<b>1105</b>	<b>100</b>	<b>6,897</b>	<b>100</b>

Source: Census of India, 1951 and 2001

of it is no longer rural. Within this area, agriculture may disappear or decline as land is bought up by people or companies in anticipation of its change from agricultural to urban uses as the city's built up area expands. There is lack of effective public control on such changes in land uses or on the profits which can be made from them.

Various urban activities and urban influences led to the transformation of rural agricultural land to non-agricultural purposes, as required by the city. New industries and some old industries, bus stand, fruit-vegetable-grain mandis, schools, colleges, hospitals etc. have been shifted to the outskirts or adjacent villages. Land in villages is also withdrawn from agriculture for non-agricultural purposes bringing quite large amount of money to farmers.

Table 3 shows year-wises villages encroached upon and loss of agricultural land by the expanding Aligarh city. The urban area

of Aligarh has grown more than 6 folds since 1951 eating into the surrounding agricultural areas and absorbing nearly 72 villages during 1951 to 2001. The Table 3 reveals that in 1951, about 13 villages were absorbed by the expanding city, thereby consuming 68.3 per cent of fertile cultivated land; by 1971, the city absorbed 9 villages and consumed another 74.3 per cent of good cultivated land; by 1991 the city absorbed another 9 villages and consumed 81.5 of agricultural land and by 2001 about 41 villages were absorbed and 69.8 per cent of fertile cultivated land was consumed. Thus, during the last fifty years the expanding Aligarh city absorbed nearly 72 villages and on an average consumed 71.3 per cent of good fertile cultivated land belonging to these villages. The loss of fertile cultivated land is an important consequence of uncontrolled growth of cities which often expands over most fertile land as in this case. Aligarh district is an agriculturally prosperous district of Uttar Pradesh and eating

**Table 3**  
**Aligarh City: Villages encroached and loss of cultivated land (1951 to 2001)**

			Loss of Agricultural land (ha.)				
Year	Name of Villages		Total Area of the villages	Total Cultivated land of the villages (ha.)	Percentage of cultivated area to total area		
	1		2	3	4		
1951	1	Jamalpur Ka Nagla					
	2	Dodhpur					
	3	Jeewangarh					
	4	Begpur Kanjaul					
	5	Kishanpur					
	6	Chandanya					
	7	Naurangabad					
	8	Gambhirpura					
	9	Nagla Masani					
	10	Nagla Bhamola					
	11	Mian Ka Nagla					
	12	Nagla Mallah					
	13	Nagla Tikon					
	Total 13 villages		2,760.63	1,886.42	68.3		
1971	1	B. Jafarabad					
	2	Nagla Kalar					
	3	Chauharpur					
	4	Nagla Maulvi					
	5	Nagla Mohabob					
	6	Rorwar					
	7	Bhojpur					
	8	Pala Sahibabad					
	9	Nagla Pala Sahibabad					
	Total 9 villages		2,293.19	1705.83	74.3		
1991	1	Dhurra Muafi					
	2	Sarsol					
	3	Jalalpur					
	4	Nagla Asakali					
	5	Hamarayan ki Sarai					
	6	Bhuj Ki Sarai					
	7	Kuwarsi					
	8	Alhadpur Nivri					
	9	Dalchand Ka Nagla					
	Total 9 villages		20,72.16	1,689.45	81.5		
2001		Chandauka					
		Rathgawan					
	1	Imlauth					
	2	Dhirdharpur				22	Rasulpur Dev sani
	3	Mirzapur Siya				23	Shahpur
	4	Manzurgarhi				24	Talaspur Khurd
	5	Sikandarpur				25	Khariya Khwaja
	6	Cheerat				26	Budha
	7	Cherrat				27	Daulora Nirpal
	8	Supehara				28	Mandirwala Nagla
	9	Bhanpur				29	Ajitpur Asana
	10	Bhataula				30	Ahmadpur
	11	Alampur Subkra				31	Bar Ali Fate Khan
	12	Barenti				32	Hajipur Chohata
	13	Mahe shpur				33	Pariyawali
	14	Bhagwanpur				34	Bhadesi
	15	Ramgarh				35	Rahmatpur
	16	Panjipur				36	Sindhauri
	17	Nagla Bhai Beg				37	Dhanipur
	18	Sikandarpur				38	Asadpur
	19	Bhierwali				39	Kwarsi
	20	Mahrawal				40	Chilkaura
	21	Ilyaspur				41	Dev Sani
		Bhika mpur					Shahpur Madrak
		Jatanpur					
		Chikawati					
	Total 41 Villages		8,811	6,153			
Total No. of villages encroached 72			17,653.52	12,602.35	71.38		

Source: (i) Village Landuse Records from 1951 to 2001  
(ii) Based on field Survey (2004-05)



**Table 4**  
**Aligarh City: Zone-wise decreases in cultivated area and the use of these lands for non agricultural purpose in the fringe areas.**

	Zone III 4-6 Km	Zone IV 6-8 Km	Zone V 8-10 Km	Zone VI 10-12 Km
1. Total No. of villages	11	30	41	48
2. Total area of villages (ha.)	3,236	5,615	6,942	9,196
3. Percentage of cultivated area to the total area	53	78	75	75
4. Percentage of decrease in cultivated area to the total area of the zone	7.8	2.5	1.8	0.9
5. This land is now being used for	In Percentages			
(i) Residential/Industrial purpose	86	64	51	25
(ii) Borrow pits	14	25	30	40
(iii) Brick kilns	-	11	19	35

Source: (i) Village landuse Records, 2001  
(ii) Based on field survey (2004-05)

away of fertile land by the expanding city is a great loss especially for a country like ours.

Table 4 is showing zone-wise decrease in the cultivated area and the uses of agricultural land for non-agricultural purposes. This table is based on survey of 130 villages lying in the fringe areas of Aligarh city. The highest decrease in the cultivated area (7.8 per cent) was observed in zone III. As one moves outward from the city centre the decrease becomes less. As the zone of urban land expands, agriculture is pushed outwards. Most of the previously cultivated area is now under non-agricultural purpose like residential or industrial purposes, or under borrow pits and brick kilns. Such types of changes were seen in every zone. In zone III about 86 per cent of land was used for residential/industrial purposes, 14 per cent was under borrow pits; in zone IV 64 per cent was used for residential/industrial purposes, 25 per cent for borrow pits and 11 per cent for brick kilns; in zone V 51 per cent was used residential/Industrial purposes, 30 per

cent for borrow pits and 19 per cent for brick kilns; and in zone VI 25 per cent was used for residential/industrial purposes, 40 per cent for borrow pits and 35 per cent for brick-kilns. Thus it was observed that as distance from the city increases area under residential and industries decreases and area under brick kilns and borrow pits increases. Brick kilns are pushed away from the city. Unplanned and uncontrolled city expansion produces a patchwork of different developments including many high density residential areas interspersed with vacant lands. The haphazard expansion usually has serious social and environmental consequences, including the segregation of the poor in the worst located and environmentally most dangerous areas and in areas which require high costs for providing basic infrastructure such as roads, water, sewage pipes, electricity, transport, schools, hospitals etc. These newly developed residential areas have no services and infrastructure and those which do exist are

grossly inadequate. One sees the paradox of extreme over crowding, chronic housing shortage, acute shortage of infrastructure and services and yet vast amounts of land left vacant or only partially developed. This implies in terms of increasing cost of providing infrastructural services in these areas.

### Conclusion

The loss of agricultural land can usually be avoided if the government controls the physical expansion of cities and ensures that vacant or under utilized land is fully used. In Aligarh city, the problem is not of the lack of vacant land but of government action to guide new developments on lands other than the best fertile cultivated areas. The natural landscape close to the city is also destroyed. The need to preserve such areas might seem less urgent than the need for land for housing. But once an area is built-up it is almost impossible to bring back open spaces. The wisdom lies in how effectively we plan the urban expansion without hampering and distributing the rural landscape. Preservation of land is essential because our food and raw material originates from it and it is a habitat for a verity of flora and fauna. Land is a scarce commodity. Any disturbance to this resource by way of change in land use like conversion of agricultural land into built-up is irreversible. The use of land unsuitable for development may be unsustainable for the natural environment as well as to the humans. Today we talk of 'sustainable development' which is defined as, 'development that meets the needs of generations to meet heir own needs' (World Commission on Environment and Development 1987). This principle should be followed.

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