## CITIES IN TRANSITION: MONITORING GROWTH TRENDS IN DELHI URBAN AGGLOMERATION 1991 – 2001

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### Abstract

An analysis based on census data for the decade 1991-2001 indicates change in the urban structure of the Delhi Urban Agglomeration, India. The number and rate of growth of census towns and the urban core are examined. The pattern shows emerging traits of urban spread and provides an investigative framework for future research.

Key words: urban agglomerations, urban spread, Delhi

## INTRODUCTION

Managing the ever-burgeoning population of the mega cities continues to be one of the crucial issues in the urban agenda of developing countries. A policy of urban decentralization—limiting or discouraging growth within the core cities while encouraging population concentration in the smaller urban centers in the periphery—is an approach that has been commonly adopted for spatial planning in many such countries over the past decades. The resulting shifts in the urban patterns are finally beginning to emerge across the globe. Despite concerted research endeavors spanning several decades on the many dimensions of urbanization, the differential growth patterns of peripheral urban centers at the *agglomeration level*—by size as well as location relative to the core unit(s)—have remained largely unexplored in the context of India. Utilizing census data for the period of 1991-2001, this exploratory study examines the urbanization trend in the Delhi Urban Agglomeration (DUA), one of the fastest growing urban growth regions of South Asia. How have the patterns changed over time? What are the traits of the urban spread? What are the repercussions of the DUA's growth in the regional environment? Answers to such questions may

indicate a structural change in the urban hierarchical system that has already begun to permeate urban regions across the country. The general expectation is that the areal spread of population in the peripheral areas—as evidenced in the rise in the number and the growth rates of urban places—accompanies a slowing of the growth rate in the core city within the agglomeration.

The following sections offer a brief overview of the evolving concepts of urban agglomeration and urban spread in the context of the urban landscape of India, followed by the empirical analysis of the changes and variations in the urban texture of the Delhi Urban Agglomeration in terms of growth rates, population size, and population density for the core and periphery for the period of 1991-2001.

# THE INDIAN URBAN SCENE: URBAN AGGLOMERATION AND URBAN SPREAD CONCEPTS

The agglomeration concept stems from the term Town Group, introduced by the 1961 Census to re-define urban areas. A *Town Group* consisted of a cluster of towns<sup>1</sup>, identified by infrastructural and functional linkages that resembled areas of "conglomerate growth" (Ramachandran, 1989, p. 111-112). However, the concept was criticized for its limited utility as a cohesive spatial unit for research and study—as originally intended—especially in "matters of planning and development."<sup>2</sup> An amalgam of independent urban units, the Town Group appeared to be more of a "discontinuous set of settlements" (p.112) rather than a spatially bound, functionally integrated community under the influence of a dominant core city. Thus, the Town Group concept was replaced with the concept of the Urban Agglomeration in the 1971 Census to better represent an "integrated urban area" for assessing the urbanization patterns and their emergent trends towards a contiguous area of cities and towns (Census of India, 1991, p.8). Such contiguous areas, identified as "outgrowths," were often located in the rural areas beyond the corporate boundaries of cities and towns. Such an area (e.g., a railway colony, university campus or port area) may not always satisfy the Census criteria for the designation of an urban unit but may functionally relate to an adjoining town to form a "continuous urban spread" within the agglomeration. It should be noted, however, that the Delhi Municipal Corporation's designated urban space was not spatially contiguous in 1991.

The agglomeration concept endured and evolved in subsequent Census reports. Two new criteria—administrative status and population size—were included in the 2001 Census. It was stipulated that a "core town or at least one of the constituent towns" within the agglo-

<sup>&</sup>lt;sup>2</sup> The town group concept was discussed in a symposium of the International Geographical Congress held in New Delhi in 1968. See for details, Ramachandran, 1939, p.112.



<sup>&</sup>lt;sup>1</sup> A town, as defined in the Census, forms the basic unit in the urban fabric of the Indian urban landscape. The urban units are categorized by population size: Class I units with population 100,000 and over are termed cities; and classes II-VI are called towns (II - 50,000-99,000; III - 20,000-49,999; IV - 10,000-19,999; V - 5,000-9,999; VI - Less than 5,000) (Census of India 1991, p.21).

meration "should necessarily be statutory town,<sup>3</sup>" and that "the total population of all [agglomeration] constituents" should be a minimum of 20,000. Following the above criteria, an *Urban Agglomeration* is characterized as:

- a A city or town with one or more *contiguous outgrowths*;
- b Two or more adjoining towns with their outgrowths; [or]
- c A city or one or more adjoining towns with their outgrowths all of which forms
- d a contiguous spread. (Census of India, 2001, p.4. Emphasis added).

That agglomeration boundaries are not fixed but change over time has potential research implications. First, as urban spread occurs, and agglomerations expand over adjacent villages, the data from one Census to another becomes incomparable. Also, because of the inherent fluidity of the agglomeration boundaries, it becomes essential to closely monitor the patterns of change in the urban landscape for the management of urban growth and spatial planning, primarily for two reasons. First, over time, land use is likely to change from rural to urban, with far-reaching socioeconomic and environmental significance. Second, the state of population concentration in the urban spread further points to the success or failure of strategies to disperse population from dense core cities.

## THE DELHI URBAN AGGLOMERATION AND URBAN SPREAD

The 2001 Census listed 384 urban agglomerations in India, 35 of which had a population greater than 1 million. The Delhi Urban Agglomeration (DUA), ranking third among all Indian agglomeration, has added 4.4 million population over the past decade. Its rate of growth has even exceeded two other mega-urban agglomerations—Mumbai and Kolkata— by a substantial margin (Table 1). This high growth can arguably be attributed to Delhi's status as national capital and its economic environment and infrastructural development, both of which attract migrants from adjoining states (National Capital Region Planning Board 2000, p.341-343).

The DUA's core consists of three statutory towns: New Delhi Municipal Council (NDMC), Delhi Municipal Corporation (DMC), and Delhi Cantonment (DC). Delhi's periphery—a contiguous urban spread area—in 2001 shelters 56 Census towns of various size-groups. Over the past decade the number of towns has increased over 167 percent (Figure 1).

The growth patterns of the core city and the urban spread of the DUA in the 1991-2001 period (Tables 2A and 2B) reveal a marked difference between the core and the spread: during the past decade the population in the spread increased over 212% as compared to 35% in the core. Within the urban spread, the Class I cities (population 100,000 and over)

<sup>&</sup>lt;sup>3</sup> "In Census of India, 2001, two types of towns were identified: a) Statutory town: All places with municipality, corporation, Cantonment board or notified town area committee, etc. so declared by state law; b) Census towns: Places which satisfy the following criteria: i) a minimum population of 5,000; ii) at least 75 percent of male working population engaged in non-agricultural pursuits; and iii) a density of population of at least 400 person per sq. km." (Census of India, 2001 p.1).



show a dramatic increase in both the number and the growth rates of population in comparison to the other size classes. In general, with the exception of Class II towns, the growth rates of population appear to be higher in the larger size classes (over 20,000 population size), while the smaller size classes (IV-VI) of less than 20,000 shared a much lower population load and also exhibit a modest rate of growth (Figure 2). A high rank-order correlation coefficient (.87) of the common towns between 1991 and 2001 demonstrates this stability in size and growth in census towns.

Urban Aglomeration	Population 2001	Population 1991	% Share of total UAs in India 2001	% Share of total UAs 10 million plus in 2001	Population change 1991-2001	% Change 1991-2001
Greater Mumbai	16,368,084	12,517,720	9.8	38.6	3,850,364	30.8
Kolkata	13,216,546	10,916,272	7.9	31.2	2,300,274	21.1
Delhi	12,791,458	8,419,084	7.7	30.2	4,372,374	51.9

Table 1: Mega Urban Agglomerations (over 10 million) 1991-2001

Sources: Census of India 1991, series 1 Final Population Total; www.censusindia.net for 2001 information/data.

*Table 2a: Delhi Urban Agglomeration: Population By Core and Spread (Periphery) 1991-2001* 

Urban Agglemeration	Year		% of Total UA Population			
Aggiomeration		Core* Spread		Total	Core*	Spread
Delhi	1991	7,602,394	816,690	8,419,084	90.3	9.7
	2001	10,236,674	2,554,784	12,791,458	80.0	20.0
	Change	2,634,280.0	1,738,094.0	4,372,374.0	-10.3	10.3
	% Change	34.7	212.8	51.9	-11.4	105.9

\*Core = New Delhi Municipal council, Delhi Municipal Corporation and Delhi Cantonment. Source: See Table 1

The emergence of a high number of smaller size towns, especially Class IV, raises certain concerns. Bose (1994, p.17) termed the smaller Census urban units of less than 20,000 population "quasi urban," arguing that they often lacked traditional urban qualities. In 2001 there were 20 towns in census class categories IV, V and VI that exemplify such quasi or semi-urban units. The smaller centers and the urban outgrowths included within the agglomeration are good examples of these quasi or semi-urban units. While characterizing some of the smaller Census towns as "in fact revenue villages for administrative purposes" (Census of India, 2001, p.xv), the Census of India included such towns within the urban agglomeration because of their demographic criteria and contiguousness. Their inclusion within the urban spread thus raises concerns about sprawl. This urban spread phenomenon -reflected

in the "formation of new towns/outgrowths and urbanization of rural components" has also been characterized as urban sprawl in the Census of India (Jain, 1993, p.x). The agglomeration core Delhi "is growing fast" and its overspill of population is sprawling into adjoining areas (National Capitol Region Planning Board, 1996, p.47).



Figure 1: Delhi urban Agglomeration - 2001



*Figure 2: Delhi Urban Agglomeration – 2001 Population By Core and Class Size in Spread (periphery)* 

*Table 2b: Delhi Urban Agglomeration: Population By Core and Spread (Periphery) 1991-2001* 

Vear	Class I**		Class II		Class III		Class IV	
i cai	No.	Population	No.	Population	No.	Population	No.	Population
1991	1	111,567	4	351,469	6	223,360	6	94,480
2001	7	1,019,997	9	635,925	20	698,194	11	140,665
Change	6	908,430	5	284,456	14	474,834	6	46,185
% Change	600	814.2	125	80.9	233.3	212.6	83.3	48.9

Year	Class IV		Class V		Class VI		Total 1 - VI	
	No.	Population	No.	Population	No.	Population	No.	Population
1991	6	94,480	4	28,158	2	7,656	23	816,690
2001	11	140,665	6	49,770	3	10,233	56	2,554,784
Change	6	46,185	4	21,612	1	2,577	33	1,738,094
% Change	83	48.9	50	76.8	50.0	33.7	43.7	212.8

\*\*Does NOT include New Delhi M. Council or Delhi Cantonment. Source: See Table 1

In examining the changing urban landscape, we compared the pattern of change in the urban land as well as in population density in the core city and the urban spread within the DUA for the period of 1991-2001. The Indian urbanization pattern has traditionally demonstrated variation in demographic and economic characteristics across the urban core as well as across the spread within the agglomeration (Mookherjee and Kelly, 200, p.487). Such variations were expected in the DUA as well; however, we felt that *notable* discrepancies between the core and the spread merit close attention. As population density is considered one of the most important measures of urban sprawl (e.g., Lopez and Hynes, 2003, p.331), a significantly lower density in the urban spread is likely to signify a trend toward sprawl formation. On the other hand, a density level either higher or similar to the core city may point to a successful urban dispersal strategy.

In order to explore the overall trends in the occurrence of sprawl in the urban spread area, polygons for the Census towns and the statutory towns were digitized and attributed into a GIS from a 2001 Census of India map (Census of India 2001, 2002, p.xv). Town and agglomeration status attributes were added from 1991 Census of India maps (Census of India 1991, 1991, p.79, 81; Census of India 1991, 1993, p.11). An aggregate land area of all towns thus indicates the total land in the urban spread of the agglomeration in a given year. As Table 3 shows, while in 1991 the urban spread demonstrated a significantly lower level of density than the core, the percent increase in density in the spread over the decade (1991-2001) nearly doubled. There has been a significant change both in population and in land in the urban spread of the agglomeration and in land in the urban spread.

*Table 3: Delhi Urban Agglomeration: Population Density By Core and Spread (Periphery)* 1991-2001

Agglo-	1991				% Change 1991-2001				
meration	Р	А	D	Р	Α	D	Р	А	D
Core	7,602,394	46,831	162.8	10,236,674	52,366	195.5	34.65	11.81	20.4
Spread	816,690	10,586	77.1	2,554,784	23,749	107.6	212.8	124	39.4

P – population; A – area; D – Density

Source: Calculated by authors from census data

## CONCLUSION

Our research shows the dynamics of change in the urban landscape of Delhi, India. The pattern of structural change includes, most significantly, the emergence of new towns and the redistribution of populations and density between the core and spread. However, the census designation of villages as census towns for inclusion in the urban agglomeration is of arguable value, obscuring the true nature of urbanization as evidenced in the changing patterns within the urban spread. Are these kinds of change pervasive across urban systems in the Indian scene? Or do such patterns merely represent a transitory stage of urbanization

within a particular regional context? Our work motivates such questions and tries to offer an investigative framework.

Figure 3: Delhi Urban Agglomeration – 2001; Population Densities for Core and Spread (Periphery)



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