

# Consequences of Urban Sprawl in Gautam Buddha Nagar District, Uttar Pradesh

Sudhir Kumar Sinha

Associate Professor, Department of Geography,  
Shaheed BhagatSingh (Eve.) College, University of Delhi, New Delhi

Received: June 18 , 2018

Accepted: August 02, 2018

## ABSTRACT

*Economic growth is needed in developing countries to overcome their socio-economic problems. High economic growth can be achieved through rapid urbanization as cities have emerged as engines of growth. In India, large cities have emerged as island of development whereas vast majority of areas remain backward even lacking basic amenities. Consequently, large scale migration is taking place from backward areas to cities causing urban sprawl. This paper analyses the consequences of urban sprawl in Gautam Buddha Nagar district, Uttar Pradesh. The study reveals that consequences of urban sprawl is both positive as well as negative. On the one hand it results into higher economic growth, providing employment opportunities, social and economic amenities as well as hope of better future, and on the other hand it is causing higher social, economic and environmental cost. There is a need to minimize negative impacts of urban sprawl for sustainable urban development.*

**Keywords:** Urban Sprawl, Economic Growth, Urbanization and Sustainable Urban Development

## Introduction

The term 'sprawl' denotes uncontrolled, unplanned or poorly planned, uncoordinated rapid expansion of low density urban land-uses into surrounding rural areas. The term sprawl has most often been used as a negative term—something unwanted, undesirable, ugly, with lots of socio-economic and environmental cost. There is large number of studies which describes the negative impacts of sprawl. However, there is some disagreement as some of the scholars have pointed out the positive aspects of sprawl as well. Torrens (2006) has listed the negative and positive impacts of sprawl in brief from the works on sprawl. He has pointed out that sprawl is problematic for several reasons, such as direct cost of providing infrastructure and services over low density areas, poor water and air quality, increased travel and accessibility costs and unwelcome social justice costs. On the other hand, sprawl satisfies residential demand and provides affordable housing. Ewing et al. (2002) have opined that ultimately urban sprawl should be judged by its consequences. Citizens and policy makers need to decide on the preferable developmental pattern based on the conditions created by the given pattern for the people as well as environment

## Review of Literature

There are large numbers of studies pointing out the negative consequences of sprawl. Some of the important work in this area are by Barnes et al. (2000), Benifield (1999), Stoel (1999), Daily (1997), USEPA (1997, 2001), Doyle et al. (2001), Arnold and Gibbons (1996), Schueler (1994), Johnson (2001), and Carruthers (2003). These studies have evaluated the consequences and significance of environmental and socio-economic impact. Pope (1999) lists lost open space, loss of natural habitat, fragmented landscape, increased air pollution and depleted water quality as the environmental cost, requirement of huge subsidy as economic cost, and more commuting time, remote and isolated suburban neighborhoods and abandoned urban communities as social costs.

Caruthers and Ulfransons (2003) in their study evaluated the relative costs of alternative forms of development. He considered twelve separate measures of public expenditure and concluded that urban sprawl raises the cost of providing public services.

Ewing et al. (2002) in their study of 83 metropolitan regions in USA, evaluated the impact of seven indicators. They found that barring average commute time (no difference), all other six indicators had negative impact.

Wheeler (2003) in their study on contra Costa County (USA) highlighted the negative impact of urban sprawl in terms of infrastructure costs, equity costs, environmental costs and quality of life. The study advocated for smart growth in the area.

Some studies have also pointed out the positive impact of urban sprawl. Besides negative consequences, Wassmer (2005) suggests that sprawl has resulted into increased satisfaction of housing preferences, infilling, ease of car travel, better public schools and lower crime rates. Holcombe (1999) has argued that urban sprawl is good. Advocating for decentralized urban development, he opines that it will keep commuting distances short and allow the enjoyment of amenities of suburban development not available in central city. Similarly, Bast (1999) has opined that sprawl provides a choice to people which must not be denied. Not much work has been done on consequences

of urban sprawl in Indian cities. Sudhira et al. (2004) have stated that urban sprawl driven by population growth and large-scale migration is taking its toll on the natural resources at an alarming pace. According to Padmanaban et al. (2017) “Urban Sprawl (US), propelled by rapid population growth leads to the shrinkage of productive agricultural lands and pristine forests in the suburban areas and, in turn, adversely affects the provision of ecosystem services”. Kumar et al. (2007) have advocated for preventing sprawl in future. Sinha and Shekhar (2016) and Sinha (2017) have studied the consequences of urban sprawl in Noida city and Gautam Buddha Nagar district in Uttar Pradesh.

Thus, although sprawl has both positive and negative consequences, most studies point out that negative consequences are more serious and therefore, this form of urban development is unsustainable. The review of literature suggests that there is need to study the consequences of urban sprawl comprehensively in Indian cities.

### Objectives

- i. To understand the consequences of urban sprawl; and
- ii. To evaluate the consequences of urban sprawl in Gautam Buddha Nagar district, Uttar Pradesh.

### Methodology

The study is based upon both primary and secondary data. Primary data was obtained through a questionnaire survey carried out in the city of Noida in 2016. 240 households from 8 localities (30 from each locality) were selected with the help of stratified random sampling.

Secondary source of information includes satellite imagery and other published sources. The land-use/cover classification of the study area was carried out by downloading the Landsat imagery, path 146, row 40 from the open source to find out the conversion of agricultural land into built-up area and other related attributes. Primary and secondary sources of information, together gives a good understanding of consequences of urban sprawl in the study area.

### Study Area

The study area is a part of National Capital Region and one of its town- Noida is part of Central National Capital Region (CNCR earlier called Delhi Metropolitan Area- DMA).

Gautam Buddha Nagar district in Uttar Pradesh state of India is a newly created district formed in 1997. It is located between  $28^{\circ} 6' N$  and  $28^{\circ} 40' N$  latitude and  $77^{\circ} 17' E$  and  $77^{\circ} 42' E$  longitude (Fig1). The district covers a total area of 1442 sq. kms as per 2011 census with a population of 16, 48, 115 persons in 2011. The district is bounded by district Ghaziabad in the north, Aligarh district in the South, Bulandsahar district in East and river Yamuna make up natural boundary in the west with NCT Delhi and Faridabad district of Haryana lying on the other side of the river. The whole district lies in the National Capital Region (NCR) with the Census town Noida being part of the central National Capital Region (CNCR) of NCR.

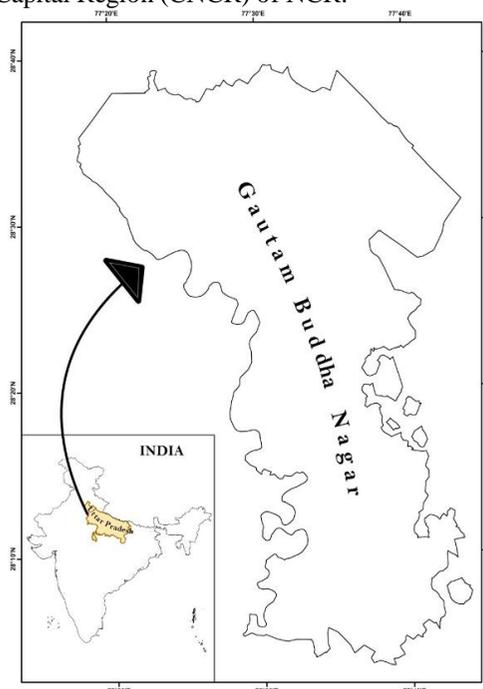


Fig 1: Location of Gautam Buddha Nagar in Uttar Pradesh

Urban population in the district was 59.5 % of the total population in 2011. This urban population was residing in 13 towns. Out of 13 towns, only population of Noida city (6,37,272 persons) and Greater Noida (1,02,054 persons) was more than 1 lakh in 2011. Population of all other towns was less than 35,000 except Dadri (91,189 persons).

Thus, it is clear that Noida is the main urban settlement of the district. It became a census town in 1991 and since then its population is doubling every decade. Because of importance of Noida in the urban hierarchy of Gautam Buddha Nagar district, this study particularly focuses on the consequences of urban sprawl in Noida.

**Consequences of Urban Sprawl in Gautam Buddha Nagar District**

The major consequences of sprawl in Gautam Buddha Nagar district is following:

- i. The first and foremost negative consequence of sprawl have been excessive loss of fertile agricultural land in the district. The land use/cover has been analyzed between 1977 and 2011 for four time periods. It has been found that between 1977 and 2011 the area under agriculture has decreased by 27,311 hectares i.e. from 1,24,935 hectares in 1977 to 97,624 hectares in 2011. In terms of percentage area under agriculture decreased from 86.64 % in 1997 to 67.70 % in 2011. The average rate of decrease in area under agriculture between 1977 and 2011 has been 803 hectares per annum (Table 1).

**Table 1: Land Use/Cover Change-Gautam Buddha Nagar**

Year	1977-1991		1991-2001		2001-2011		1977-2011	
	Hectare	Percent	Hectare	Percent	Hectare	Percent	Hectare	Percent
Agriculture	-663.36	-0.53	-951.70	-0.82	-850.70	-0.80	-803.26	-0.64
Built Up	764.21	6.71	909.90	4.12	983.50	3.15	871.56	7.65
Barren Land	-42.21	-0.93	118.20	3.00	-184.60	-3.61	-36.91	-0.82
Water	-58.64	-1.75	-76.40	-3.03	51.80	2.94	-31.38	-0.94

Similarly, in largest city of the district (Noida) the agricultural land decreased from 14,811 ha in 1977 to 7029 ha in 2011. The land under agriculture decreased by 7782 ha between 1977 to 2011 with an average annual decrease of 229 ha. Loss of agricultural land has environmental cost as it adversely affects the ecology of the area. Keeping in view that India has very large population which is still increasing, conservation of agricultural land is important.

- ii. Urban sprawl has resulted into population living in larger space than required. Sinha (2017) in his study has discussed that Noida has witnessed relatively low-density development causing excessive loss of precious agricultural land. A large urban space has economic cost as higher the density of urban area lower is the cost for providing public services and development and maintenance of urban infrastructures. A sprawling city requires more roads, pipes, wires etc. and has higher cost such as on cleaning roads, solid waste collection. Not only the cost on extending water and electricity supply to larger area is more but also transmission losses in the delivery system are also more.
- iii. The absence of efficient public transport system has led to automobile dependent urban growth in the study area. This has caused higher energy consumption, more roads and parking spaces and air pollution. Dominance of private transport and long commuting hours also has negative effects in terms of health hazards such as breathing problems, skin diseases. It causes more accidents, injuries and death. It also causes road rage and longer commuting hours reduces time availability for family and leisure. A survey was carried out in Noida to assess the transport system in the city. The result of survey indicated that only 28.33 % were using public transport (Table 2) with popular mode of public transport being shared auto for travel within Noida.

**Table 2: Mode of transport (in %)**

Localities	Public	Private	
		Motorised	Non-Motorised
Mamura	36.67	23.33	40
Sector 10	23.33	20	56.67
Sector 12	63.33	36.67	0
Sector 26	53.33	46.67	0
Sector 44	10	90	0
Sector 52	0	100	0
Chalera	40	13.33	46.67
Sector 105	0	100	0
Total	28.33	53.75	17.92

All 240 respondents reported that they were not satisfied with public transport system in Noida indicating the poor state of public transport. The degree of dissatisfaction was found to be low among most of the respondents using non-motorized means of transport as neither they were using public transport nor

needed it for their daily commuting. Respondents reporting degree of dissatisfaction to be very high was not much. However, high degree of dissatisfaction was reported by maximum respondents (45 %). The main reason for this wide spread dissatisfaction was lack of credible intra-city public transport system.

Increase in travel time in commuting to place of work was used as a proxy to assess the problem of traffic congestion. Survey result indicated that on an average travel time between 2005 and 2015 has increased by more than 50 %. The increase in travel time was less for only respondents who were using non-motorized mode of transport and for those whose work place was located within 5 kms of their residence.

- iv. Sprawl has negatively impacted water quantity and quality in the study area. With the decrease in agricultural land (and increase of built-up area) water recharge to ground water aquifers has decreased. Consequently, the water table in Noida is going down since last five years by 1 to 1.5 m every year (Bhowmick, 2018). The quality of water also gets affected due to polluted water of the city.
- v. The positive consequence is that it has already provided cheap housing, employment, educational and health facilities to a population of about 7 to 8 lakhs and is likely to benefit more than 5 million people in the coming decades. Thus, the city is providing poor with job opportunities, greater access to resources and services, and hope of a better future.

Therefore, on one hand sprawl has benefits in terms of providing employment, cheap housing, economic development etc. on the other, it has severe social, economic and environmental costs. As urbanization is desirable for economic growth and giving a choice to people to migrate, there is a need to minimize the negative effect of urbanization/urban sprawl. So that with the desired positive consequences of urbanization it is sustainable as well.

### Conclusion

Urban population in India is increasing rapidly which is causing urban sprawl. Urbanization has many positive impacts on society and economy. It causes economic development, provides job opportunities specially to poor and people from backward areas, choice to people to escape from poor living conditions of backward areas as well as gives them hope of a better future on the other hand. Sprawl a product of urbanization in India has many social, economic and environmental cost. The planning needs to minimize the negative consequences so that we reap the benefit of urbanization and urban development is sustainable as well. An analysis of consequences of urban sprawl indicates that on the one hand more than 5 million people will be benefited by employment, housing and other amenities, on the other hand, sprawl has caused loss of precious fertile agricultural land, higher infrastructure development cost, higher energy consumption, air pollution, traffic congestion, health problems, and impacting water quality and quantity negatively. The study also suggests that there is need for more studies on consequences of urban sprawl in Indian cities.

### References:

1. Arnold, C. L. Jr. and C.J. Gibbons (1996). Impervious surface coverage: The emergence of a key environmental indicator. *Journal of the American Planning Association* 62(2):243-258.
2. Barnes, K. B. et al. (2000). Impervious surfaces and the quality of natural and built environments. A white paper prepared for the project Chesapeake Bay from Space. Available online. <http://www.chesapeakebayfromspace.net>.
3. Bast, J. L. (1999). Town, City, or Suburb? P-9. In: PERC Reports, Vol 17, No. 1.
4. Benfield, F. K. et al. (1999). Once There Were Greenfields: How Urban Sprawl Is Undermining America's Environment, Economy and Social Fabric. The Natural Resources Defense Council, Washington, DC.
5. Bhowmick, S. (2018). Noida's Groundwater Level falling by 1.5 meter every year, *The Times of India*, Aug 24. (retrieved on 25 Aug, 2018) <https://timesofindia.indiatimes.com/city/gurgaon/noidas-groundwater-level-falling-by-1-5-metres-every-year/articleshow/65522432.cms>
6. Carruthers, J. I. (2003). Growth at the fringe: The influence of political fragmentation in United States metropolitan areas. *Papers in Regional Science* 82:472-99.
7. Carruthers, J. I. and F. Ulfarsson (2003). Urban sprawl and the cost of public services,
8. Daily, G. C. ed. (1997). *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington D.C.: Island Press.
9. Doyle, K. et al. (2001). Paving Paradise: Sprawl's impact on wildlife and wild places in California. A smart Growth and Wildlife Campaign California white paper. San Diego, California: National Wildlife Campaign California white paper. San Diego, California: National Wildlife Federation. Available online. <http://nwf.org/smartgrowth>.
10. Ewing, R. et al. (2002). *Measuring Sprawl and Its Impact*. Smart Growth America, Washington, DC.
11. Holcombe R.G. (1999). In defense of urban sprawl- pp. 3-5. In: PERC Reports, Vol 17, No.1.
12. Johnson, M. (2001). Environment impacts of urban sprawl: a survey of the literature and proposed research agenda. *Environment and Planning A* 33:717-35.
13. Kumar, J. A. V., Pathan, S. K. and Bhandari, R. J. (2007). Spatio-Temporal Analysis for Monitoring Urban Growth- A Case Study of Indore City, *Journal of the Indian Society of Remote Sensing*, Vol. 35, No. 1, pp 11-20

14. Padmanaban, R. Bhowmik, A. K., Cabral, P. Zamayatin, A., Almegdadi, O. and Shuangao, W. (2017). Modelling Urban Sprawl Using Remotely Sensed Data: A Case Study of Chennai City, Tamil Nadu, *Entropy*, 19,163.
15. Pope, C. (1999). Americans are saying no to sprawl- pp. 5-7. In: PERC Reports, Vol 17, No.1.
16. Schueler, T.R. (1994). The importance of imperviousness. *Watershed Protection Techniques* 3 (1):100-111.
17. Sinha, S. K. and Shekhar, R. (2016). Urban Sprawl in Noida City, Gautam Budh Nagar (U. P.) *Annals, NAGI*, Vol. XXXVI (No. 1), pp. 89-102.
18. Sinha, S. K. (2017). Urban Sprawl in Gautam Budh Nagar, Ph.D Thesis, Department of Geography, University of Delhi, [Unpublished Thesis].
19. Stoel Jr., T. B. (1999). Reining in urban sprawl. *Environment*, 41(4), 6–33.
20. Sudhira, H.S., Ramachandran, T. V., and Jagadisha, K.S. (2004). Urban Sprawl: Metrics, Dynamics and Modelling Using GIS, *International Journal of Applied Earth Observation and Geoinformatics*, (5):29-39.
21. Torrens, P.M. (2006). Geosimulation and its application to urban growth modeling. In: J. Portugali (ed.), *Complex Artificial Environments*, Springer-Verlag, London, pp.119–134.
22. USEPA (1997). Ozone: Good up high, bad nearby. EPA/451/K-97-002. The Environmental Protection Agency. Available online. [www.epa.gov](http://www.epa.gov).
23. USEPA (United States Environmental Protection Agency) (2001). Our Built and Natural Environments. A Technical Review of the Interactions between Land Use, Transportation, and Environmental Quality. US Environmental Protection Agency. URL:<http://www.smartgrowth.org/pdf/built.pdf>.
24. Wassmer, R.W. (2005). Causes of Urban Sprawl (Decentralization) in the United States: Natural Evolution, Flight from Blight, and the Fiscalization of Land-Use, Working Paper, 1-34.
25. Wheeler, S. M. ed. (2003). *Contra costa county: small growth or sprawl?*, Greenbelt Alliance, San Francisco.