

Urban Sprawl: A Case Study of Lucknow City

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ABSTRACT: *Cities often experience growth either physically, by population, or by a combination of both. Urban sprawl in recent times is a subject of popular debate between policy makers and environmentalists in context of the status of urban people and the state of the human ecology. With the high pace of social and economic development resulting growth of urban population, lack of infrastructure, congested traffic, environmental degradation and shortage of housing became the major issues faced by the urban areas. The present paper is an attempt to identify and analyze the rate of urban growth, with a focus to explore the morphological structure and characteristic of urban sprawl in Lucknow City (capital city of the most populous state of Uttar Pradesh, situated in the middle of Gangetic Plain and spreads on the banks of the river Gomati, a left bank tributary of river Ganga) arising out of dynamic interaction between different urban functions along with historical, social, economic and administrative factors based on primary and secondary data.*

KEY WORDS: *Low-density sprawl, Leap frog development, Ribbon sprawl, Urban Growth, Urban Sprawl*

I. INTRODUCTION

Cities often experience growth either physically, by population, or by a combination of both. Urban sprawl is much more complicated because it may or may not qualify as urban growth. How a city grows can create the appearance of sprawl. Such urban growth may appear as a low density leapfrog pattern, a linear or strip development pattern a long highways, or a tightly condensed pattern of a new development around pre-existing built-up landscapes (Nechyba et al. 2004) without urban growth there would be no appearance of urban sprawl. Today, Urban Sprawl is one of the contemporary issues of cities all over the world. Urban Sprawl is the outgrowth of the urban area caused by the uncontrolled and uncoordinated urban growth. Sprawl is also considered to be an unplanned outgrowth of urban areas along the periphery of the cities, along highways, and along the road connecting a city. Urban sprawl has been at the centre of current debate on urban structure. In the literature of urban planning or urban economics, there is a big debate on even the definition of urban sprawl itself. Let alone its causes and impacts (Gordan and Richardson, 1997; Ewing, 1997; Fischel, 1999; Brueckner, 2001).

Sprawl is the spreading out of a city and its suburbs over more and more rural land at the periphery of an urban area. This involves the conversion of open space (rural land) into built-up, developed land over time. 'Sprawl' in simple terms is just spreading out of a city and its suburbs over more and more rural land at the periphery of an urban area while in reality it is a complex phenomenon that mean different things in different areas and conditions. Sprawl is also considered to be an unplanned outgrowth of urban areas along the periphery of the cities, along highways, and along the road connecting city. Urban sprawl refers to the outgrowth of urban areas caused by uncontrolled, uncoordinated and unplanned urban growth. Travis and Camagni (2005) defined it as '*the uncontrolled spreading out of a given city and its suburbs over more and more semi-rural land at the periphery of an urban area*'. They further state that the sprawling process of expansion is disordered, unplanned, leading often to inefficient and unsustainable urban expansion patterns.

Urban sprawl can be categorized into three types these are as following:

Low-density Sprawl: Low-density continuous sprawl is a phenomenon caused by outward spreading of low-density suburban land use as currently being experienced by many of cities like America as their population becoming bigger and bigger and there is no lack of land supply. This highly consumptive use of land for urban purposes is supported by piecemeal extensions of basic urban infrastructure such as water, sewer, power and roads.

Ribbon Sprawl: Ribbon sprawl is a type of sprawl characterized by concentration of development along major transportation arteries, primarily roads. While development occurs on land adjacent to the major roads, areas without accessibility to the roads tend to remain as green areas, waiting for conversion into urban land uses when land values increase and infrastructure is extended from the major roads.

Leapfrog Development Sprawl: Leapfrog development sprawl is a scattered form of urbanization with disjointed patches of urban land uses, interspersed with green areas. Leapfrog development may be caused by obvious physical limitations such as prohibitive topography, water bodies and wetlands or by more subtle reasons such as differences in development policies between political jurisdictions. Leapfrog development

occurs when developers build new residences some distance from an existing urban area, bypassing vacant parcels located closer to the city. Medium density areas with low connectivity indicated leapfrog patterns.

II. OBJECTIVES

The objective of this study is to identify and analyze the rate of urban growth, with a focus to explore the morphological structure and characteristic of urban sprawl and to focus on how urban sprawl leads to land use change in Lucknow city.

III. METHODOLOGY

Methodology revolves around the visual interpretation and cartographic techniques, as described below:

- a. Preparation of base map from Survey of India Topographical Map 63B/13 of the study area on scale 1:50,000 published in 1976.
- b. Preparation of base map from Survey of India, Modified Open Series Map 63B/13, 63B/14, 63F/1 and 63F/2 of the study area on scale 1:50,000 published in 2011.
- c. Overlaying of Modified Open Series map on Topographical Map published in 1976.
- d. Mapping it by visual interpretation
- e. Comparison and change detection by mapping
- f. Comparison with predicted reports by various development authorities.
- g. Statistical Analysis of the compared data

IV. ABOUT THE STUDY AREA

Lucknow Metropolis lies between the coordinates of 26° 30' N to 27° 10' N latitudes and 80°30' E to 81°13' E longitudes. It is the capital city of the most populous state of Uttar Pradesh in India. Lucknow is situated in the middle of Gangetic Plain and spreads on the banks of the river Gomati, a left bank tributary of river Ganga. It enjoys a central position in the state of Uttar Pradesh. It is bounded on the north by Sitapur, on the south east by the Rae Bareilly, on the north east by Barabanki, on the north west by Hardoi and on the south west by Unnao district as represented in fig. 1.

The height of Lucknow city above mean sea level is 123 metres. The total land area of Lucknow city is 310 Sq. km. Lucknow has got an extensive network of roads and railways and it has grown all around in a radius of 25 Km. The road network is primarily of radial pattern. Nine regional roads converge into the city from all directions linking Lucknow to Kanpur, Sultanpur, Kursi, Faizabad, Hardoi, Rae Bareilly, and Mohaan. The city is very favorably located at a junction of three National Highways other five Provincial Highways. The NH-24 links it to Delhi in the north; NH-25 links it to the west and south via Kanpur, Jhansi and Bhopal; and NH-28 links to Patna and Calcutta in the east via Gorakhpur. Kanpur and Lucknow are separated only by 80 kms. Lucknow - Kanpur area has become an area of intense interaction reflected by changes in land use, mushroomed development in all sectors of the economy. It is also well connected with the railway network falling in the Northern and North Eastern railway zones. Almost all the major train routes touch this city. It has good rail network touching all the important rail junctions in the country. Railway ministry has given some special train to Lucknow. The famous Satabdi and Rajdhani express passes from Lucknow to various part of the country. The city has two major railway stations one is Lucknow railway junction and other is Charbagh station. The major railway lines are Lucknow-Kanpur-Jhansi, Lucknow-Delhi, Lucknow-Gorakhpur, Lucknow-Rae Bareilly. Lucknow is well connected with the other important towns and cities of the country by air routes. Lucknow has direct flight to Delhi, Mumbai, Bangalore, Patna and Sarjah. The Lucknow airport located in Amausi is only 20 km far from the city and has 7453 feet long runway. The Air India, Indian Airlines and Sahara airlines has regular scheduled flights from Lucknow to other parts of country.

LOCATION MAP OF STUDY AREA :

LUCKNOW CITY

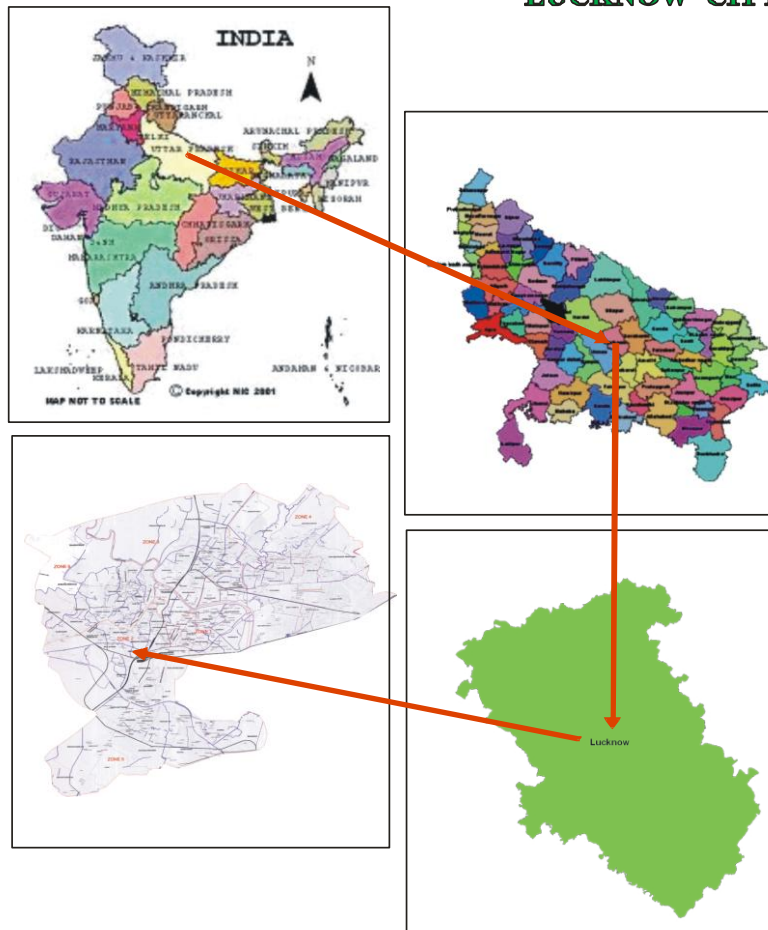


Fig. 1 : Showing the Location Map of Study Area: Lucknow City

V. GROWTH OF CITY IN DIFFERENT EVOLUTIONARY PHASES

The Gomti River, a tributary of Ganga river system is the chief geographical feature, meanders through the city, dividing it into the Trans-Gomti and Cis-Gomti regions., almost presently bifurcates the city of Lucknow into two parts: the first part forming the core of Nawabian and British evolution of the city structure and form, while the second half is the urban sprawl of the post-independent evolution of the city structure and form. The urban land use and architecture may be seen in the perspective of these two periods in the understanding of the evolution and growth related to histo-genesis and morphogenesis of the Lucknow Metropolis. The present city of Lucknow has been divided into 40 wards and a cantonment with a population of 22.67 lakh persons (2001 census) and covering an area of 337.50 km². Currently the population of Lucknow is more than 3 million. The majority of Lucknow's population includes people from Eastern Uttar Pradesh. Demographic features of Lucknow (UA) is presented in Table 1.

Table 1. Demographic Features of Lucknow(UA) –1991-2001

No	Details	1991	2001
1	Population		
	a. Male	892308	1199273
	b. Female	776896	1067660
	c. Total	1669204	2266933
2	Sex Ratio	871	890
3	Area (Sq. km)	337.50	337.50
4	Density of population	4946	6717

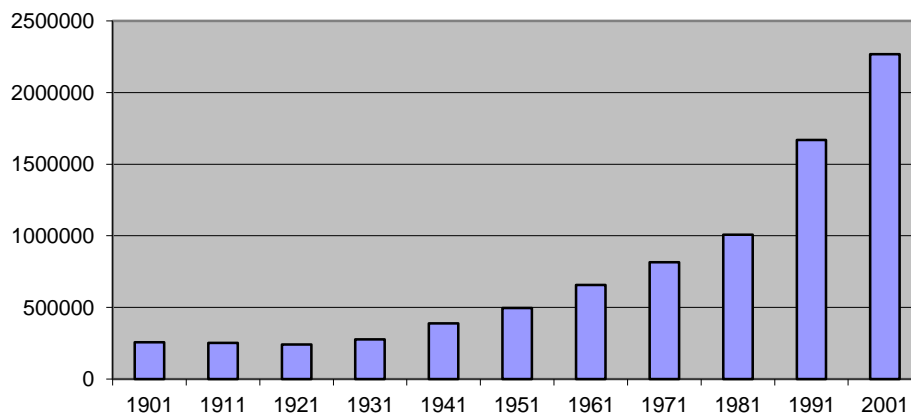
Source: Census of India, 1991 & 2001.

Some positive trends in the sex ratio that is an increased level from 871 to 890 during the same period covered under the study. The information regarding the population of Lucknow UA during the last century is presented in Table 2 is depicted in Figure 2.

Table 2. Population of Lucknow (UA) –1901-2001

No	Years	Population
1	1901	256239
2	1911	252114
3	1921	240566
4	1931	274659
5	1941	387177
6	1951	496177
7	1961	655673
8	1971	813982
9	1981	1007604
10	1991	1669204
11	2001	2266933

Source: Towns & Urban Agglomerations, Census of India

Figure 2. Population of Lucknow (UA) 1901-2001.

Lucknow, by virtue of its central location in the state, was rightly selected as the seat of administration for Uttar Pradesh. It was the capital of Oudh kingdom during the Nawabian period due to its strategic location. Then city of Lucknow originated around the Lakshman Tilla and Machchi Bhawan as it is asserted to be the site of old fort built for the defence at that time, is considered as nucleus of the city. In the early period of growth city expanded by the left bank of the river Gomti. Earlier Rajputs, Shekhs of Bijnaur and Pathans of Ram Nagar lived in an area between Lakshman Tilla to present Residency. Although the buildings of Lucknow was initiated by Shekhs but it got momentum in Nawabi period. Network of roads generally become the cause of development of any town. In case of Lucknow earlier roads were developed by the side of river Gomti in a semi-circular way. Therefore, the city was expanded according to road network. Roads were irregular, narrow and zigzag in shape and also unmetalled. The morphology of Lucknow is the resultant of different phases of its evolution and growth following the internal structure, i.e., layout and form and the spatio-functional development of urban landscape in the city.

The city grew because of their land use pattern and functions and these different kind of functions laid the formation of its morphological development. In Nawabian period residential colonies developed around Chowk with peripheral areas in the surroundings (Classical Chowk Model), Baradari, Rumi Darwaja, Gol Darwaja, Akbari Darwaja, Bazar Ghaulal, China Bazar, Aminabad, Terahi Bazar, Aminaganj, Fatehganj, etc. were other markets along the river Gomti. The Bazars were developed with enormous economic activities related to unique embroidery, chicken works and jewelry. The handwork on clothes were popular at that time. Architecture was as its peak in Nawabian period. Imambara, Forts, Mohallas etc. were built by them in Lucknow as a symbol of Nawabian architecture. At the time of Asaf-ud-Daula Lucknow started spreading along the river Gomti. In 1816, Gasi-Uddin Haider built iron bridge (New Daliganj Bridge) down the river to facilitate transportation between north and south of the Gomti. This bridge was mainly constructed for the purpose of the northward development of the city. At that time, the land was generally used in residential, commercial and recreational. In the reign of British rulers, Lucknow became administrative centre. Rapid progress started in the planned development of Lucknow with advice of Patrick Geddes, an urban planner. The road pattern was

modified (Mixed Colonial Street Model) and roads were constructed and broad. Machchi Bhawan was selected as the residence of British military. At that time, Lucknow occupied an area of about 16 km². After 1857, Brigadier General Sir Robert Napier drew a plan for the city which was designed for the defence of the city. A new era began in Lucknow after the birth of Municipal Board in 1862. The Municipal Board took planned management of metalled and straight roads, new avenues, many gardens, parks and open spaces. In 1866, Nishatganj bridge was constructed on river Gomti near Hazratganj bridge for development of eastern area (Mixed Colonial Street Model). In 1867, many markets were settled at Sadatganj, Daliganj, Shahganj, Aminabad, Rakabganj etc. Railway lines and Charbagh Railway station were constructed in 1867. In 1870, the city had spread over a total of 31.77 km², of which 9.21 km² of land was fully built up with 57256 houses. The cantonment was developed in the south-eastern part of Lucknow and the military was shifted from Machchi Bhawan and other areas to this area. Cantonment occupied an area of 27.40 km². This era had well planned roads, buildings, playgrounds and rifle range. It lies in the outer area near Dilkusha railway station. In new century (1900), Municipal Board invited Patrick Geddes, a town planner of Britain to advise them. It was the real phase of a planned layout of the city's development for urban design and flag in the evolution of urban landscape. Planned markets were developed as Nazirabad, Ghasiari, Madi, Chikmandi, Nazar Bagh, Raniganj, Ganeshganj, etc. In 1928, the capital functions were shifted from Allahabad to Lucknow and the city became administrative centre of Uttar Pradesh. The Hazratganj became the total point of all important activities, administrative as well as commercial. All important offices related to administration and big hotels were constructed around the Hazratganj market. The introduction of administrative and business activities allowed the function structural development in urban process. In 1930, Lucknow was proclaimed as the state capital. It was with the efforts of Sir Hercourt Buttlar, the Governor of the state and several state offices were transferred from Allahabad to Lucknow and were established towards the north and east of the main city. The new Civil Lines, Mall Avenue, Council House, Residency, Clock Tower (Ghantaghar) etc. were added to the city. Aishbagh area developed an industrial part of the city. Some small industries such as paper mill and oil mills were established on the north western bank of river Gomti. Thus, administrative, commercial as well as industrial function became prevalent in the urban growth of Lucknow. In the second decade of the century the University was established across the river in Niralanagar. The decaying "Machchi Bhawan" was used for establishment of medical college, which was the most suitable site on the Gomti bank. The form and structure of the city alone to the urban shape with increasing number of function in quantity as well as in quality.

After independence, the Development Trust, Municipal Corporation and other statutory bodies also ventured construction of new colonies in a planned manner. Labour colonies have also emerged as a distinct landmark in new pattern of the city. Housing schemes for lower and middle income groups were further emerged in the development of housing colonies. After 1971, Lucknow was extended towards Niralanagar, Aliganj, Mahanagar, Nishatganj, New Haiderabad, Sitapur road and Faizabad road. Tal Katora road and Aishbagh were declared site for heavy industries. Some planned and organized colonies Kanausi, Chandranagar, Singarnagar, Ramnagar, Indralok, Krishnanagar and Vijai Nagar, were developed along the Kanpur road. Polytechnic college and Amausi Airport were also settled in the south-eastern part along the Kanpur road. The direction of the growth of the city was primarily envisaged only along two accesses, viz. along Kanpur and Sitapur roads. After 1991, it has swelled along every outgoing road added to which are the Raebareli, Sitapur, Hardoi and Faizabad roads. It really provided an access to city sprawl along the transport network. This accessibility confirmed the movement of commodities and people not only in the intra-urban space but also in the inter-urban space in the regional economy. An overall functional morphology of Lucknow may be analyzed through this axial growth in all the directions by these major roads passing from the city. A number of new colonies developed such as HAL, Ram Sagar Mishra Colony, Sarojini Nagar, Gomti Nagar, Aliganj Extension and PAC Colony. In the south of Lucknow, there settled Telibagh and Kharika residential areas with Sanjay Gandhi Post Graduate Institute of Medical Sciences. The intermittent filling of residential areas between major roads allowed the development of spatial structure by evolving layout, form and shape of the city. The planned city develop to the north of river Gomti. This area has developed colonies like Mahanagar, Aliganj, Niralanagar, Vikas nagar, Vishnupuri, Indiranagar, Gomtinagar, Triveninagar, and so on. It happened in the process of urban development models occupying in an Indian metropolis like Lucknow.

VI. EXISTING LAND USE PATTERN

It may be inferred from Table 3 and fig.3 that about one half of the existing land used is for residential purpose. This has increased to near about two third in the proposed land use pattern of Lucknow. The area proposed in the master plan of Lucknow had increased from the existing 9170.96 hectares to 20988.5 hectares, showing the growth at 128.9 per cent of the area. In absolute terms it increased to 11817.54 hectares. The land proposed for commercial purpose had increased from 2.43 per cent of the total area of the existing land use to 4.3 per cent of the total proposed area. This is a positive sign as far as the economy of Lucknow is concerned.

On the contrary, industrial allocation of the land from the existing to a proposed one has dramatically reduced from 6.5 per cent to 3.5 per cent in the proposed land use pattern. Likewise the proportion of land used for community facilities and services has reduced from 9.83 per cent to 5.4 per cent in the proposed land use pattern. While transportation purpose the existing as well as proposed land use system in Lucknow was more or less same. The proposed land use pattern tries to reduce the water bodies in Lucknow. Moreover in the open space category, the proposed land use pattern has not mentioned any figure and treated as nil, clearly narrates the fact that all the areas are fully utilized.

Residential Land Uses

The area under existing residential use is 8945.00 Hectare (54.98 per cent) which is concentrated in Aliganj, Indiranagar, Gomatinagar, Hussainganj, Maqboolganj, Nirala Nagar and C.B. Guptanagar wards. The residential houses in the old parts of the city are mixed and unplanned. These are closely constructed houses along the narrow streets and lanes being over-congested. The houses are old, dilapidated and unventilated unhygienic conditions. The residential areas, therefore, have a varied character from congested areas of Kashmiri Mohalla, Asharfabad, Chowk, Aminabad, Kaisarbagh, Hussainganj, Bashiratganj etc to the spacious and newly planned colonies of Mahanagar, Indiranagar, Gomatinagar, and so on developed in the third and fourth stage of urban growth.

Commerical Land Use

The area under trade and commerce is covered about 360.00 Hectare which is 2.21 per cent of the total developed land. The significant commercial areas are Chowk, Aminabad and Hazratganj. The most planned commercial hub was created along the Hazratganj road during the British period as a fashionable and spacious shopping complex. However, Chowk-Hazratganj, Aminabad area is considered as Central Commercial Area (CCA) of Lucknow metropolis. Other commercial areas are Nazirabad, Quiserbagh, Maulviganj, dar, Nishatganj, Alambagh, Daliganj, Shriram road, Faizabad road etc. The newly developed shopping complexes are now emerged in the various planned colonies, such as Kapurthala market, Nishatganj market, Janpath market, Lekhraj market as well as markets along Gautam Buddha Marg, Ganga Prasad Verma road, Nandan Mahal road etc.

Industrial Land Use

Industries occupy very small area of land as it is only 6.08 per cent of the total developed urban area. The area is mainly lying in Aishbagh, Nishatganj, Daliganj, Hindnagar and Yahiaganj. The light industrial area of Aishbagh has the precision instrument factory, cycle parts factories, agricultural implements, general engineering factories, electrical, hardware, chemicals, pharmaceutical, etc. Besides these Lucknow is generally known for its small scale and handicrafts/cottage industries specially for luxury and beauty articles like-gold and silver brocades, chicken and embroidery works and Indian perfumery as specialities. These small cottage industries are concentrated in the muslim dominated ward such as Chowk, Aminabad, Bashiratganj, etc.

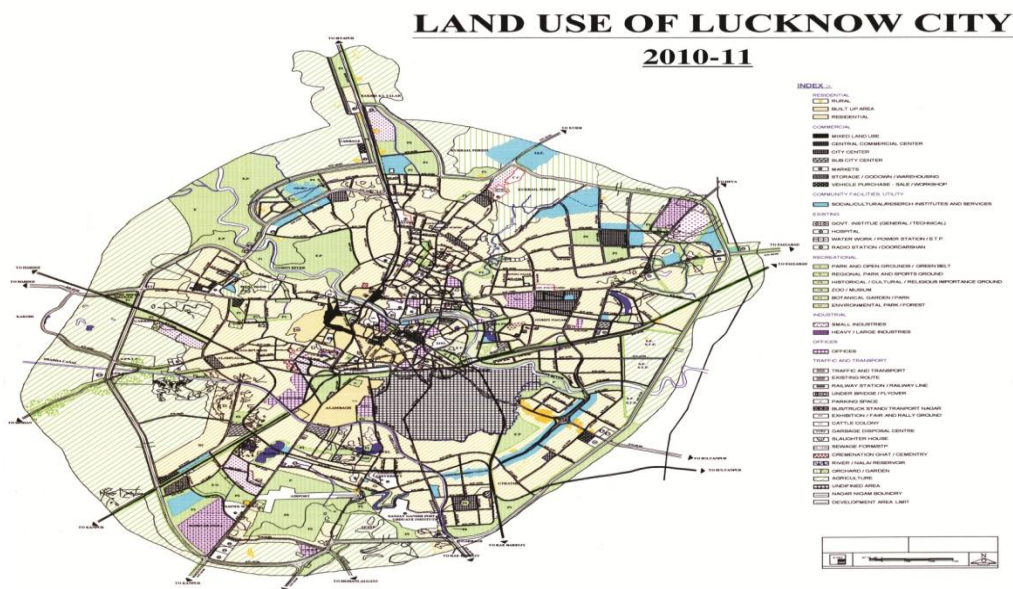


Fig. 3 :Land use Pattern of Lucknow City

Land Under Public Uses

The public and semi-public uses are comprised of education, administration, recreation, health, transport, communication, water supply, and other public uses. Land under these is 1410.00 Hectare which is 8.67 per cent of the total area of the city. The most prominent institutions of higher education are Lucknow University, Chhatrapati Sahuji Maharaj Medical Colleges, Engineering Colleges, Isabels Thornburn College, Colvin College, and Sanjay Gandhi Post Graduate Institute of Medical Sciences. Besides these, there are numerous research institutes of central as well as state Government related to the fields of science and technology, medicines, agriculture sugarcane, seeds and horticulture. The pre-secondary and secondary schools are also widely scattered all over the metropolis. Health facilities are also well developed being capital city of the state. The city has important hospitals like Civil Hospital (Hazratganj), Balrampur Hospital and Duffern Hospital on the Hospital road, Gandhi Memorial Hospital on Shah Mina road, Vivekanand Hospital, Chhatrapati Sahuji Maharaj Medical Colleges and Sanjay Gandhi Post Graduate Institute of Medical Sciences. Sanjay Gandhi Post Graduate Institute of Medical Sciences. Besides these there are more than hundred small clinics and dispensaries owned by either government or private medical practitioners. There are Rajendranagar T.B. Clinic and Thakurganj T.B. Hospital which provide special treatment to the T.B. patients.

The area under the administrative use is 3.44 per cent of the total developed area in the city. Lucknow, the capital of State Government has the head offices of various departments like P.W.D., Hydel, Irrigation, Directorate of Medical and Health, Town and Country Planning, Post and Telegraph Office, Bharat Sanchar Nigam Ltd., Municipal Corporation, Electric Supply Office, Airways, Road Transport Offices, Railways etc. and overall is Vidhan Sabha Bhawan. Most of them are generally located along the Rani Laxmibai Marg, Vidhan Sabha Marg, Kalidas Marg and Ashok Marg. Many of these offices are in Hazratganj ward. Other offices are located in various residential colonies, Aliganj extension and in newly developed commercial complexes in the peripheral area of the Metropolis. The area under recreational use is 2.67 per cent of the total developed area. The monument building with parks as well as parks and playgrounds are scattered in the metropolis, Rama Bai Park, Ambedkar Park, Kanshiram Park, Begham Hazrat Mahal Park, Kunwar Jia Lal Park, Sarojini Naidu Park, Globe Park, Buddha Park, etc. are the important parks in the Lucknow. The other most popular parks are Jhandewala Park, Aminabad Park, Ladies Park, Gange nawab Park, Victoria Park, etc. Along the bank of river Gomati there are number of parks namely Shahid Park Surajkund Park, Hathi Park and Neebu Park have been developed by the Lucknow Development Authority. Important stadiums and playgrounds include K.D. Singh Babu Stadium, Railway Playgrounds etc.

Defence Land Use

The existing urban land under defence use occupies as Cantonment area in the city. This land is demarcated since the British time. This area is strictly prohibited for public and, hence the land is not available to all.

Other Urban Land Uses

The other urban land uses occupy about 14.33 per cent, i.e., 2330 Hectare which includes as open land (12.42 per cent) and water bodies (3.91 per cent). These vacant lands are lying in the middle and outer zones of the city (which may be used in future). A significant land is also used in agricultural practices.

Table 3. Existing Land Use Pattern (in Hectare)

Sl. No.	Land use	1987		2004-2005		
		Area	%	Area	%	Growth
1	Residential	4485.98	48.91	8945.00	54.98	99.40
2	Commercial	223.77	2.43	360.00	2.21	60.88
3	Industrial	596.22	6.50	990.00	6.08	66.05
4	Offices	474.69	5.20	560.00	3.44	17.97
5	Public Services	902.02	9.83	1410.00	8.67	56.32
6	Parks & Playground	346.48	3.78	435.00	2.67	25.55
7	Traffic	952.00	10.38	1240.00	7.62	30.25
8	River/Water Bodies	193.66	2.11	310.00	1.91	60.07
9	Open land	996.14	10.86	2020.00	12.42	102.78
Total		9170.96	100.00	20988.50	100.00	77.43

Source: Lucknow Master Plan, 2021

VII. CONCLUSION

As shown in Table 4, the rate of population change is high although smaller than the increase in urban land. The study reveals that the increase in urban area was recorded twice in year 1991 and about thrice in 2001 since 1971. The rate of land consumption for urban purposes was substantially moderate till 1980's but in year

1990's it witnessed a sharp increase that is 81.83 per cent in land consumption as compared to population growth. As it is often the case, the lack of urban planning forced immigrant to settle in the periphery of the city where land and accommodation prices were much lower than in the city centre. The economic factor or the differential land rents thus appears as a major driver of urban sprawl in Lucknow city.

Table 4: Increase in Population and Growth of Areas

Year	Population Lucknow Agglomeration	Population Increase in (%)	Municipal Corporation	Population Increase in (%)	Area	Increase in Area
1971	813982	-	774644	-	80.00	-
1981	1007604	80.78	947990	81.71	130.11	61.4864
1991	1669204	60.36	1619115	58.55	159.00	81.8301
2001	2245509	74.34	2185927	74.07	212.24	74.9152
2011	2880108	77.97	2817105	77.59	304.00	69.8158

Table 5: Land Development Density

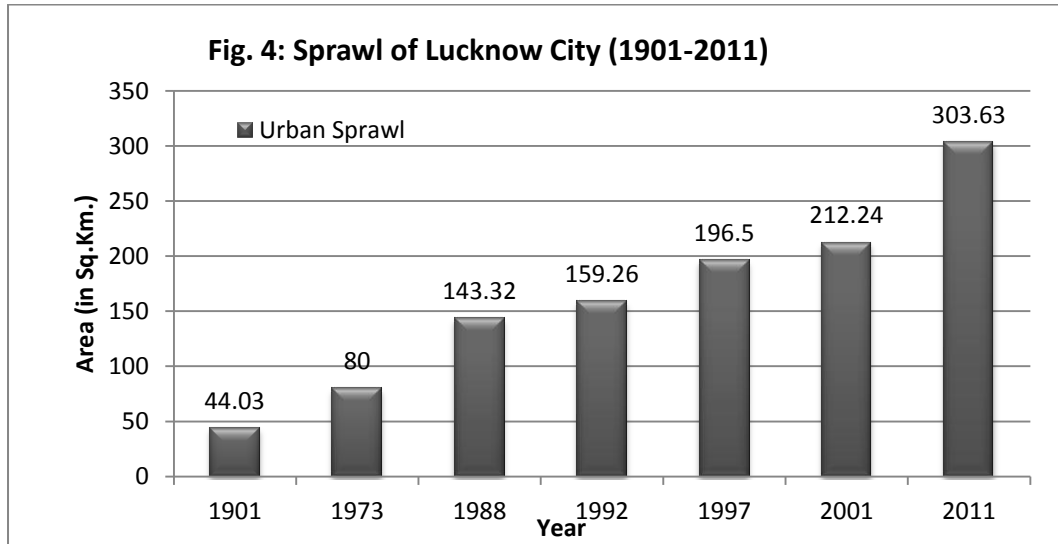
Year	Urban Population	Area (Sq. Km)	Density
1971	813982	80.00	10175
1981	1007604	130.11	7744
1991	1669204	159.00	10498
2001	2245509	212.24	10580
2011	2880108	304.00	9474

Lucknow is growing at unprecedented rates, creating extensive urban landscapes. Lucknow has changed from small, isolated population center in early 1990's to a large interconnected urban complex today having diverse economic, physical and environmental features.

Table 6: Sprawl of Lucknow City (1901-2021)

Year	Area in Sq.km.	Annual Growth Rate in %
1901	44.03	-
1961	79.16	1.32
1974	80.00	0.08
1986	132.75	5.49
1988	143.32	3.98
1992	159.26	2.78
1997	196.50	4.67
2001	212.24	2.00
2005	243.80	3.72
2011	304.00	4.12
*2021	414.34	3.62

Source: Compiled from various historical maps, SOI Toposheets and Census



By comparing Survey of India Topographical maps published in 1976 with the new Survey of India Modified Open Series Map published in 2011, it has been found that the spatial extent of urban sprawl is not linear or nodal in character, it seems to spread radial in all direction and is equally on both side of River Gomati and influence of transport infrastructure is minimal. The colony and residential settlement area is divided into two zones, that is Cis-Gomati and Trans-Gomati.

The expansion in the north and the north-eastern portions of the city took place after the construction of Dams on both side of the eliminating the possibilities of flood. The commercial and residential areas on Cis-Gomati side are Hazratganj, Alambagh, RDSO colony, Charbagh, Aishbagh, Kaiserbagh, Aminabad, Hussianganj, Model Houses, Lal Bagh, Golaganj, Wazirganj, Rajendra Nagar, Malviya Nagar, Sarojini Nagar, Rajajipuram, Haiderganj, Thakurganj, Chowk and Sadatganj. The residential settlements in the trans-Gomati areas are Nirala Nagar, Aliganj, Daliganj, Old and New Hyderabad, Nishatganj, Indira Nagar, Manas Enclave near Kukrail, Gomati Nagar, Gomati Nagar Extension, Nilmatha Cantt, Viksa Nagar, Khurram Nagar and Jankipuram.

Today built-up area has reached to Kathuta Jhil after crossing Chinhat area, newly constructed Sports College along the Kursi road and several other educational institutions are also developing towards North in direction that is Aliganj, Vikas Nagar, Jankipuram and Janakipuram Extension driving urban sprawl towards North. The expansion of Lucknow is also growing towards south-west that is Rajajipuram, Krishna Nagar, Indralok and the area of Shivanagar etc. The built-up area of Lucknow is now approaching towards Amausi Airport along the Lucknow-Kanpur Highways, towards south-east of Lucknow-Raebareilly road, and Lucknow Hardoi road.

Due to uncontrolled sprawl of city loss of agricultural land has changed the aspect of Lucknow city. The bad alum land, cultivated without benefits, has turned into developed residential areas, has satisfied housing demand for population explosion. However, this made to face with problem of ecological unbalance and traditional agricultural trade villages. Such as floricultural villages crop disappeared and a new decorative plants trade exist as reminder of this addition. In Low laying land cultivation of wet rice varieties has replaced to balance it with drainage. But construction and concretization process made flow looking to narrow sewerages, or the altitude raise of new urban areas caused flow into lower old urban areas and instant inundation in the city centre. Besides these, nearly all farmers who are the owner of the land are now facing miserable livelihood conditions. Forest, scrubs and reserved forest area are also declining by replacement of pavement, built-up areas. Forest located in Kursi Road, Kukrail Reserved area, near CIMAP, Sitapur road, Kanpur roads etc are endangering to sprawl. The deforestation for construction of four lane Highways has also aggravated the problem in serious condition because varieties of birds which were seen earlier are now invisible in city and even aquatic ecosystem of river Gomati is also in endangered.

VIII. Acknowledgement

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