A REVIEW PAPER ON ANALYSIS OF URBAN SPRAWL

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ABSTRACT-Urbanization is defined as the process of development of new city which has both good and bad aspects. Rapid urbanization rate has been seen in India due to high economic, industrial and commercial growth. It leads to continuous degradation in vegetation, forest land and open land cause to decreament in environmental services. This study is an attempt to analyze the rate of urban growth and effect of urban sprawl on land use and land cover change of the years 1971-2011 for Lucknow City. Today, techniques of Remote Sensing and GIS are also used for the dileneationand comparatively accurate analysis of urban sprawl.

Keywords: Sprawl, Landscape,

I. INTRODUCTION

Sprawl is basically spreading of the city. It is driven by population and economic growth. Urban area is basically an area which represents a complex association of population, varied economic activitiesand diversified life styles(**A.P. Subudhi et. al**). Economic structuring, growth and many other geographical and environmental changes are the dynamic drivers of landscape change(**Iqbal et. al, 2012**). Low density, Ribbon sprawl and Leapfrog development sprawl are the different patterns of urban sprawl. Outward spreading of low-density suburban land use is called as Low-density sprawl. This highly consumptive use of land is due to expansion of urban infrastructure for e.g. water, sewer, transportation and power (Kiran et. al). Ribbon sprawl is defined as development of urban areas along major transportation arteries and Leapfrog sprawl is defined as a discontinuous pattern. It includes patches of developed lands which are widely separated from one another and from the boundaries, of recognised urbanised areas (Kiran et.al).

There is a need to evolve a strategy for optimum land use and to make a proper urban development plan by a reliable, comprehensive monitoring of urban growth, change in pattern of landscape, land use and cover change periodically and extension of urban land(Subudhi et. al).Quantifying the landscapepattern and change is important for assessment and monitoring the process of urbanizationand relatively ecological consequences (Wu and Luck 2002; Zhao 2006; Sha et al. 2008).Techniques of Remote sensing and GIS are the most advanced method of data acquistion which are pre-requisites for analysing the periodical changes in urban pattern. In this study, demographic pattern and land use and cover change has been analyse for the years 1971 to 2016 of Lucknow City. Lucknow city is one the rapid growing city of India experienced a major population and socio-economic growth during 2001.

II. STUDY AREA

Lucknow City is located on the Northern Gangetic plains of India, at an altitude of 123 meters (404 ft) above sea level.Lucknow is the capital of Uttar Pradesh and it is the eleventh most populous city in India. It lies between $26°30'$ north latitude and $80°30'$ eastern longitude. City is located on both sides of River Gomti having almost flat terrain with some depression towards north-east. Urban growth has spread over both sides of the river. The city is bounded by Barabanki on the east, Unnao on the west and Raebareli on the south, Sitapur and Hardoi lie in the north. The city is divided in different zones and wards i.e. 6 zones and 110 wards and wards are also further divided into mohallas. The city can be divide into three physical divisions, such as Gomti Basin, Sai and its catchment's area and central upland. These divisions are distinct to one another. To the North and East of Gomti, there is an undulating plain which is traversed by number of small streams during rainy season and subsequently join the river Gomti on its left bank.

The climate of the region is tropical monsoon. It experiences dry and hot summer andvery cold winter every year. temperature in summers may go as high $48.3°$ C and may drop as below as $-1.0°$ C in winter. City receives most of the annual rain fall in the months of (85.5per cent) June, July, August and September and rest of the amount comes during winter season through North East and retreating monsoon. The annual rainfall is 953 mm.
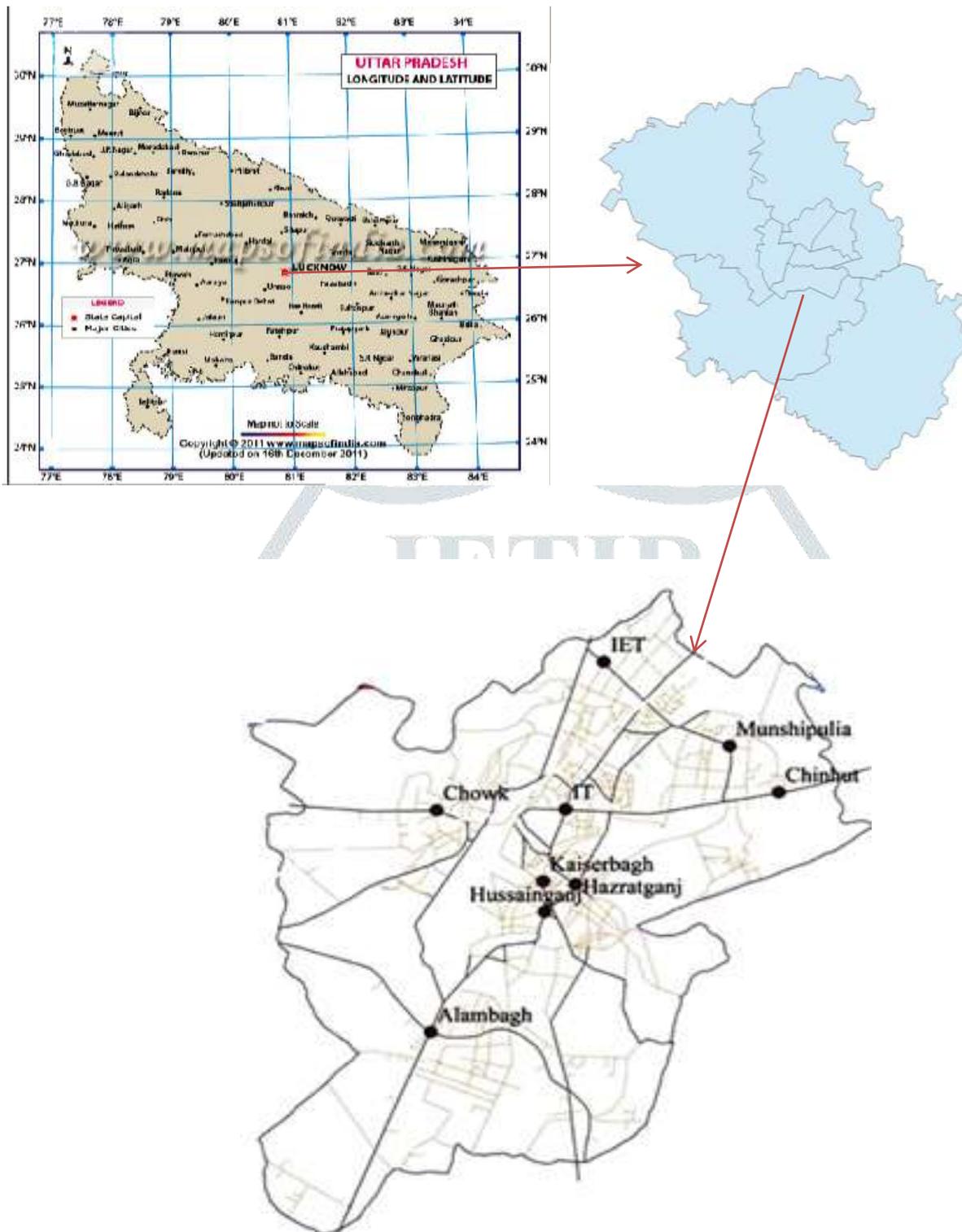
Fig.1 Location map of Study area

III.   DATABASE AND METHODOLOGY

➢ Preparation of Base Map from toposheets(taken from Survey of India) of Lucknow district 63F/1 and 63F/2 on scale 1:50,000.

➢ Mapping by visual interpretation.

➢ Comparison and change detection analysis in pattern of land use.

➢ Analysis of pattern change in landscape and spatial analysis.

➢ Statistical analysis of sprawl pattern in city

Types of Land Uses

TABLE 1
Land use and Land cover classes

Classes	Description
Urban and built up areas	Residential, commercial areas & built-up areas are those which are under construction.
Rural Built up area	These are isolated settlements (built-up areas) outside the perimeter of main build up area of city.
Water bodies	This class includes all type of land covered by water such as drainage, water tanks, reservoir and canals.
Forests land	Land with tree crown cover of more than 10per cent and area of more than 0.5 hectares.
Agricultural areas	Agricultural land includes both croplands and fellow land.
Open Areas	Lands which are neither used for cultivation nor any other purpose at present. May be at the verge of transformation to get converted into any type of built-up area.
Industrial area	Some well defined and symmetrical buildings acting as producing units. These areas under factories are located away from main residential area.
Parks/Gardens	Park is used for human enjoyment. It is defined as semi-natural, or planted area, and set aside for human recreation. It may consist of rocks, water, soil, flora-fauna and grass areas.

IV.   RESULT AND DISCUSSION

A.   Land Transformation and dynamics of urban land use

Lucknow city's urban development pattern as investigated in the study isn't linear or nodal.In the examination zone two major landutilize/cover trends between 1971 and 2011 can be recognized. Convergence of the population has affected the land use pattern of the study area causing various issues like change in physical and social condition, slum development, generation and collection of a wide range of wastes, colossal pressure on various amenities, emerging hydrological shortage and so on.Background study shown that it has major land use changes among different classes, for example, business region (548.65percent increment), residential area (386.67 percent), recreational zone (563.11 percent increment), offices/utilities zone (921.74 percent increment) modern zone (612.23 for every percent increment), managerial zone (1134.84 percent increment) open land, water bodies,forest and agricultural land diminished from 1973 to 2004 as - 50.86, - 33.76, - 45.48 and - 100 percent respectively and other land utilize category 836.60 percent expanded.

TABLE 1.

Changes in Land use Pattern in Lucknow City :

Land use type	1987 (Area in hectares)	% use	2004-05 (Area in hectares)	% use
Residential use	4485.97	48.92	8945.1	54.97
Commercial use	223.78	2.44	359.9	2.21
Industrial use	596.24	6.50	990	6.08
Office area	474.67	5.17	560	3.44
Communities and facilities	902.03	9.83	1409	8.66
Recreational(Park & playgrounds)	346.47	3.77	436	2.67
Transport	951	10.37	1241	7.62
Rivers/lakes/water bodies	193.67	2.11	309	1.89
Open areas	996.14	10.86	2020	12.41
Total	**9170.00**	**100**	**16270**	**100**

Source: Master Plan 2021
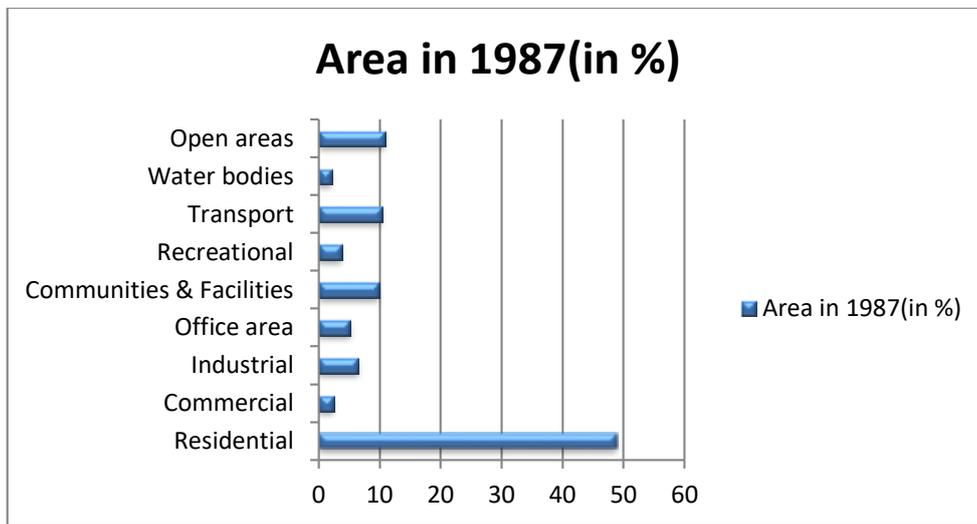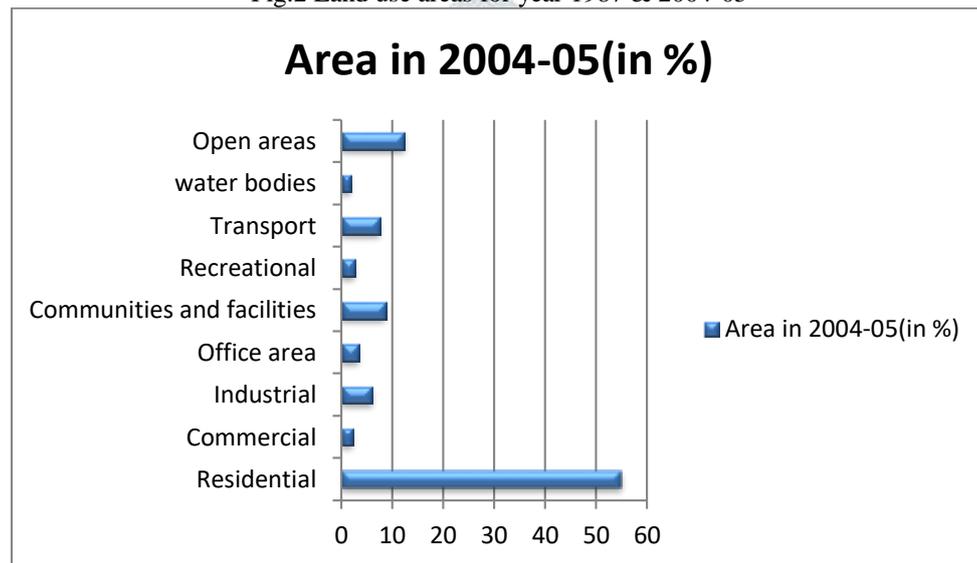
Fig.2 Land use areas for year 1987 & 2004-05

Fig.3 Land use areas for year 2004-05

B.   Change in land use for different Years

Land use change has been calculated from 1987 to 2004-05 and furthermore from 2004-05 to 2011.There is negative increase in vegetation areas while the residential areas experience high growth.

Change percent is shown in Table 2

Land use type	From 1987 to 2004-05 (% change)	From 2004-05 to 2011 (% change)
Residential	99.4	14.90
Commercial	60.82	73.15
Industrial	66.04	-4.99
Office Area	17.97	58.70
Communities/Facilities	56.20	51.68
Recreational	25.84	128.83
Transport	30.49	531.96
Water Bodies	59.54	87.25
Open areas	102.78	-90.39

Source: Master Plan 2021

From the graphs and tables, it has been evident that residential, public utility or communities has the upward growth while open zones and water bodies has descending development. Residential areas have outnumbered the open, vacant land and residential areas in the year 2011.
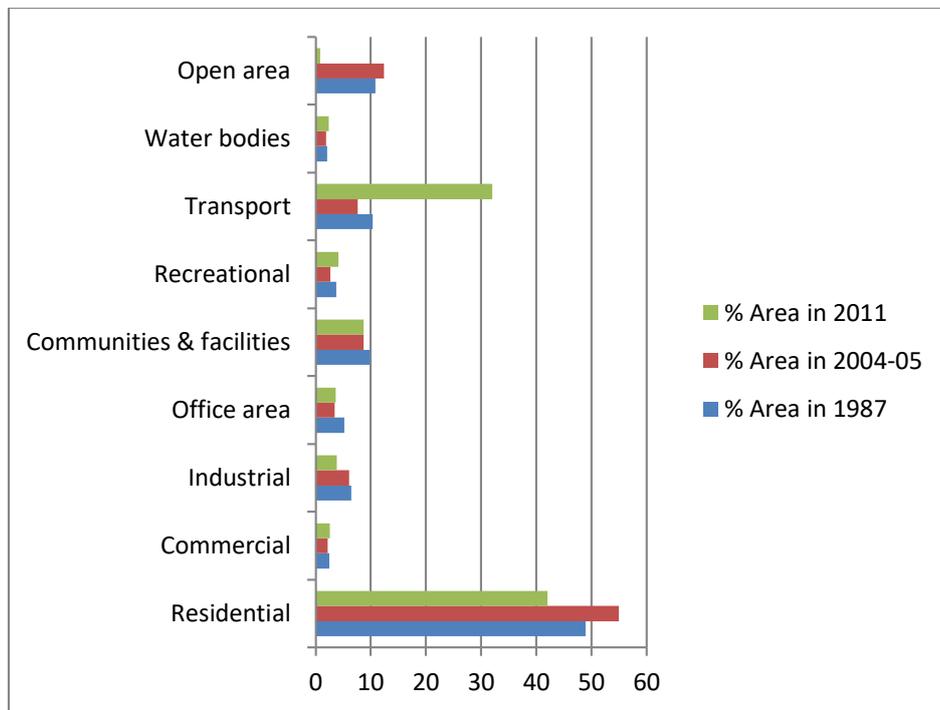
Fig.4 Percentage variation in land use types yearwise

It is observed that North-western direction of Lucknow city has experienced 4.71% of relative decrease in rural built-up, 17.18% increase in urban-built up, it leads to extension of urban land-use. The expansion towards Malihabad is unexpected as before it was seen that this zone would experience minimum urban development.North-eastern site (along Lucknow-Barabanki national roadway) has experienced 18.25% decrement in cropland region because of rapid industrialization and increasing industries/factories which are unplanned. Improper sewage treatment and waste management also cause environmental degradation.
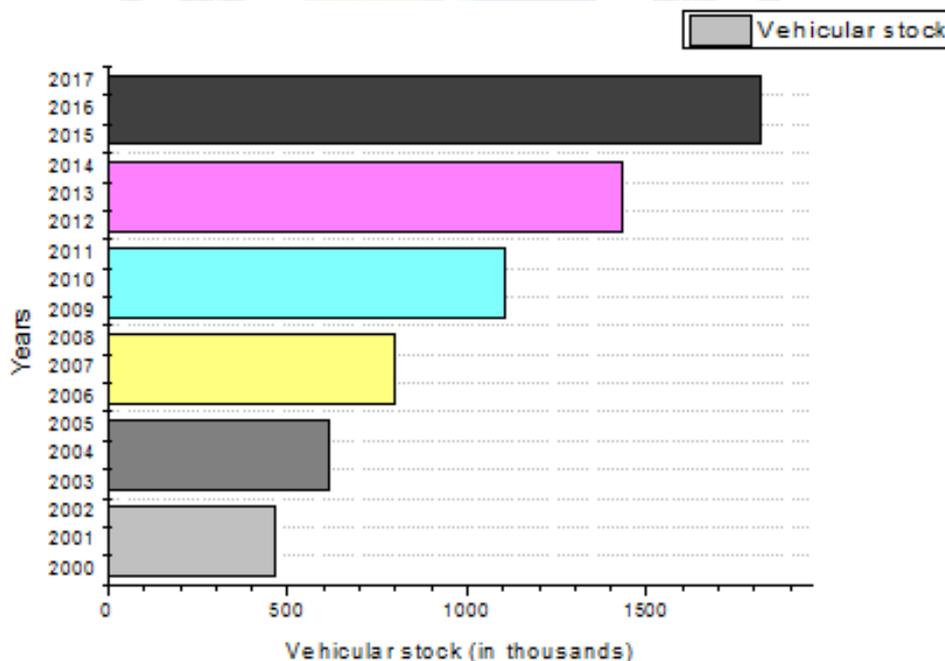
C.   *Vehicular Stock in Lucknow*

Fig.5

V.   CONCLUSION

Present study reveals that satellite data is extremely significant in demarcating the urban spread and land use classification. The study demonstrated that Lucknow City has been growing rapidly during 1991 and 2001.The dynamic growth rate is estimated upto 45 lakhs in 2021 and 65 lakhs upto 2031 as given in Table 3, which will be the significant reason of urban sprawl and vegetation decrement.The structure of city has expanded and turned out to be more complex. Major development has seen towards north and north-eastern direction and along major transportation routes.

Proposed Land use:

TABLE 3:

Sr.No.	Land use	MasterPlan-Area	2021 %	Detailed Master plan-Area	2031 %
1.	Residential	21018.45	48.65	33395.10	46.89
2.	Commercial	1345.85	3.11	3672.81	5.16
3	Industrial	1647.60	3.81	3683.58	5.17
4.	Office use	421.48	0.98	837.64	1.18
5.	Communities & Facilities	3970.68	9.19	6967.76	9.78
6.	Recreational	9469.42	21.92	13455.82	18.89
7.	Transport	5332.53	12.34	9207.66	12.93
	Total	**43206.03**	**100.00**	**71220.39**	**100.00**

Source: Master Plan of Luclnow City-2031
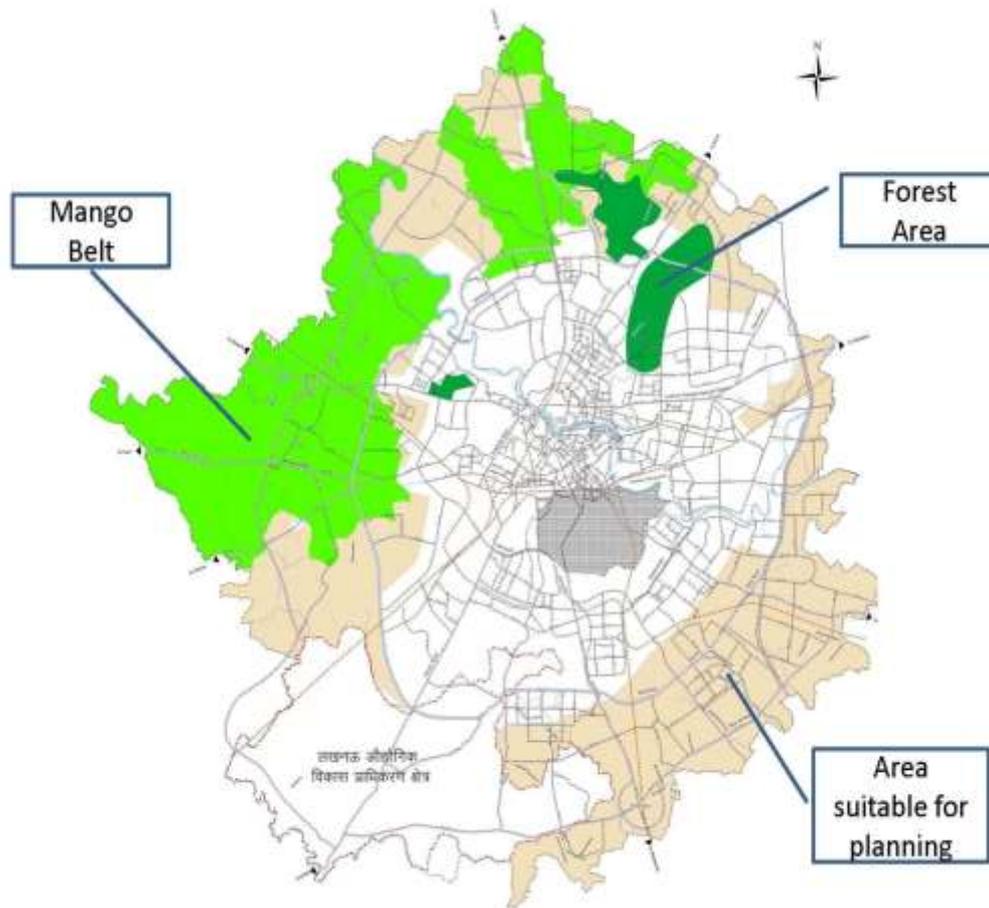
Source: Master Plan 2031 of Lucknow city
Fig.6 Proposed land use

This unplanned and uncontrolled growth of the city has been caused major decrease in green area. Green land and alum areas also transformed into residential area which leads to fulfill housing demand.This has made to look issue on environmental unbalance and conventional farming exchange towns like floriculture villages crops vanished. Forest, open or vacant land and reserved green areas are also declining due to replacement of pavement arteries and urban areas. Green areas located in Kursi Road, Kukrail Reserved area, Sitapur road, Kanpur roads etc are endangering to sprawl. Backwoods, scours and saved woods territory are likewise declining by substitution of asphalt, developed territories. Woodland situated in Kursi Road, Kukrail Reserved region, close CIMAP, Sitapurstreet, Kanpur streets and so on are jeopardizing to sprawl. The deforestation for development of four path Highways has additionally exasperated the issue in serious condition since assortments of winged animals which were seen before are presently imperceptible in city and even aquatic system of river Gomti is also in endangered.

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