

Urban Land Use and Urban Morphology of Ajmer City: A Tempo - Spatial Change Analysis



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Abstract

An attempt has been made in this paper to analyze the temporal spatial changes in land use and urban morphology as a consequence of rapid urban development in the city of Ajmer from 2001-2011. The city has gone through a number of changes in context of its urban land use from last few years. The data collection involved both primary and secondary data. To understand the complexity of dynamics of land use changes, expansion pattern of the city and population growth are captured from Ajmer master plan. The study identifies substantial loss of hilly area and a phenomenal expansion of urban built-up area over the recent decade in the city of Ajmer. This is examined that, there is an expansion of urban built up of land from the inner city to the outskirts as a consequence of sub urbanization. The uneven distribution of population and outward expansion of the major road system of the city is found to be the most important driving forces explaining the temporal and spatial pattern of land use. Morphology of Ajmer city is the result of different stages of development and growth in its urban landscape which is the result of its site, situation and functional development. The findings of the research would provide identification of the issues related to urban land use and morphology analysis for efficient planning and implementation of any project related to the city region of Ajmer.

Keywords: Land Use, Urban Morphology, Urban Development.

Introduction

It is evident that there has been a marked acceleration in the rate of urban growth in India according to all conventional measurements but that it is still slow as compared with the rest of the world. It is striking that India exhibits a very stable settlement structure such that much of the urban growth that has occurred has been because of the accretion to existing towns and settlements and only marginally because of the emergence of new towns. As a result, the proportion of urban population residing in towns above a certain population cut-off point continues to increase, but there is little evidence of correlation between city size and rates of population growth (mohan and pant 1982)

Rapid urban development results in dramatic changes in the landscape have been recently witnessed in many developing countries as a result of fast economic advancements (A. G.-O. Yeh & Xia, 2001). Urbanization is considered as the most influential drivers of land use and land cover change in human history associated with growth of populations and economy (Q. Wenq, 2001). The rapid growth of urban areas has led to complex problems, including traffic congestion, environmental pollution, reduced open space, the deterioration of old downtown centers, and unplanned or poorly planned land development (Lee, 2008). Because of the incessant urbanization land covers in urban areas tend to change more significantly over a short period of time than compared to any other spatial processes and forms (Jieli Chen et al., 2010).

Changes in urban land use patterns directly affect the atmospheric circulation, hydrological processes, the microclimate, soil, biodiversity and environmental pollution, the normal development processes that affect the harmonious development of human society and ecological environment and sustainable development (li, yin and lui 2011)

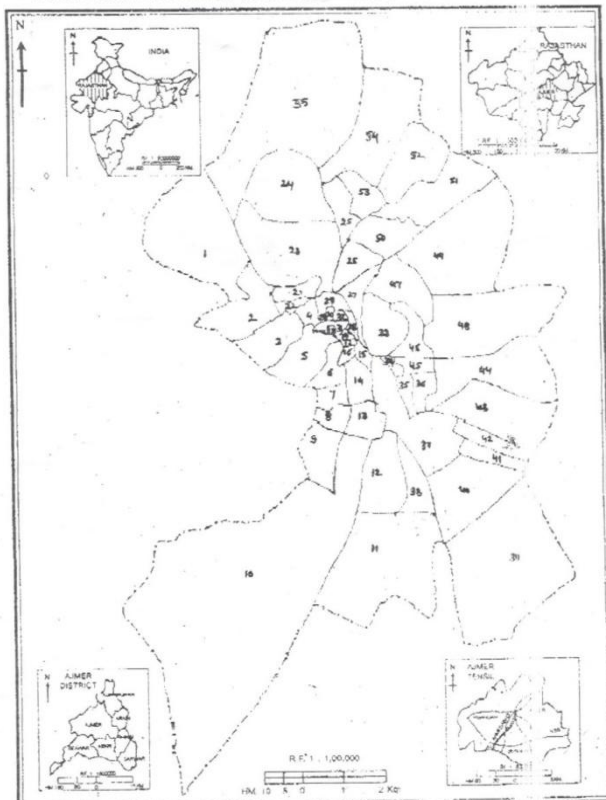
The growth of the cities normally extends more to the fringe areas and it creates the unplanned development of the cities. The development of the cities in the concentric pattern or radial pattern had raised the challenges for the planning of the cities (zope 2013)

A number of factors such as socio-economic and political are responsible for the economic development and land use changes. Study reveals that that city has experienced rapid changes in land use, particularly in terms of unplanned residential area and agricultural land (sagwan et.,al 2014). Urban growth is a worldwide phenomenon and is mainly driven by unorganized expansion, increased immigration, rapidly increasing population. In this context, land use and land cover change are considered one of the central components in current strategies for managing natural resources and monitoring environmental changes (hegazy and kaloop 2015)

Study Area

Ajmer is located in the center of Rajasthan (INDIA) between $25^{\circ} 38'$ and $26^{\circ} 58'$ north Latitude and $73^{\circ} 54'$ and $75^{\circ} 22'$ east longitude covering a geographical area of about 8481sq. km. hemmed in all sides by Aravalli hills . Ajmer has hot dry summer and cold bracing winter. The city is well connected by rail and road transportation network to rest of the country. NH 8 pass through the city. The city lies on Ahmedabad Delhi route. The transport system of Ajmer is mainly road based . The transport system of Ajmer is mainly road based . The population of Ajmer was 5.51 Lakh as per 2011 census growing at a decadal growth rate of 12.4% as compared to the 2001 population. The present population of Ajmer is estimated at around 6.2 Lakh (at the rate of 1.2% annual growth).

LOCATION MAP - AJMER CITY



Source- Municipal corporation Ajmer

Objectives of the Study

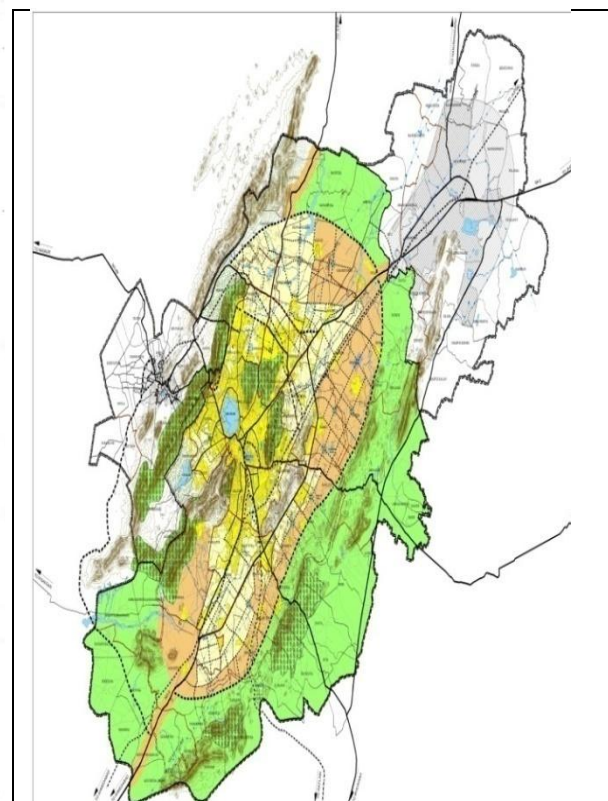
1. To analyze the tempo-spatial change in urban land use pattern in the city of Ajmer
2. To identify the existing morphological characteristics of the city of Ajmer

Research Question

1. What are the changes taken places in urban land use pattern in the city of Ajmer?
2. What are the existing morphological characteristics of the city of Ajmer?

Data Source and Research Methodology

Both primary and secondary data has been used. Secondary data related to land use and urban morphology, land use map and morphology map collected from Ajmer municipality, Ajmer master development plan (2023 and 2033) and city



Source- Ajmer development master plan 2033

development plan. Population related data from census of India, statistical information from statistical handbook.

Primary data collected from detailed field survey to check land use and urban morphological area of different parts of town. This is an empirical study based on secondary data and field level observation.

Urban Land Use Pattern (2011)

Land use analysis has always remained an important aspect in geographical studies as it provides a sound base for sustainable management which shows that how humans use the biophysical or ecological properties of land.

It is indicated that the total area of the Ajmer city is 75752.56 hectare in 2011. Total urban developed

area is 8575.29 hectare. Out of which 5922.07 hectare (7.82 per cent) area is of residential use which is 69.06 per cent of total developed area. Commercial land use constitute 282.01 hectare (0.37 per cent) which is 3.29 per cent of the total developed area. More than 1000 hectare area (1.44 per cent) is subjected to Industrial land use which is 12.76 per cent of the total developed area. Government, public and semi public together constitute 1169.47 hectare area. Transport constitute with 76.42 hectare area (0.10 per cent) with less than 1 per cent of developed area. The minimum area is held under the Recreation category with 30.94 hectare (0.05 per cent) with only 0.36 per cent of the developed area. Green area constitute with 47059.69 hectare which is 62.12 per cent of the total urban area. Water body, waste land, hilly area and forest together constitute 19763.83 hectare which is 26.09 per cent of total urban area as indicated in the Table 1.

Table: 1 Urban Land Use Ajmer City (2011)

Sr. No.	Land Use	Area in Hectare	% of Developed Area	% of Urban Area
1	Residential	5922.07	69.06	7.82
2	Commercial	282.01	3.29	0.37
3	Industrial	1094.38	12.76	1.44
4	Governmental	95.92	1.12	0.13
5	Public-Semi-public	1073.55	12.52	1.42
6	Transport	76.42	0.89	0.10
7	Recreation	30.94	0.36	0.05
Total Developed Area		8575.29	100.00	11.32
8	Green area/ Open space (include Dairies)	47059.69	-	62.12

Table: 2 Urban Land Use Change Ajmer City (2001 To 2011)

Sr. No.	Land Use	Area in 2001		Area in 2011		Variation in per cent	
		Hectare	per cent	Hectare	per cent	Hectare	per cent
1	Residential	2428.11	43.00	5922.07	7.82	+3493.96	+143.9
2	Commercial	228.24	4.04	282.01	0.37	+53.77	+23.56
3	Industrial	237.15	4.20	1094.38	1.44	+857.23	+361.47
4	Governmental	56.66	1.00	95.92	0.13	+39.26	+69.29
5	Public/Semi-public	635.76	11.26	1073.55	1.42	+437.79	+68.86
6	Transport	55.85	0.99	76.42	0.10	+20.57	+36.83
7	Recreation	1004.83	17.79	30.94	0.04	- 973.89	- 96.90
Total Developed Area		4646.60	82.28	8575.29	11.32	+3928.69	+84.55
8	Green area/ Open space (include Dairies and poultry farms)	206.39	3.65	47059.69	62.12	+46853.30	+22701.34
9	Government Reserved	265.47	4.70	353.75	0.47	+88.28	+33.25
10	Water bodies	322.13	5.70	375.03	0.49	+52.90	+16.42
11	Forest, waste land, Hilly Area	206.39	3.65	19388.80	25.59	19182.41	+9294.25
Total Urbanized Area		5646.98	100.00	75752.56	100.00	+70433.37	+1324.12

Source: Ajmer city development master plan 2023 and 2033

Changing Urban Morphology

Singh U, 1966, in his study of Allahabad, studied the growth and development of the city. He examined the morphological character of the town

	and poultry farms)			
9	Government Reserved	353.75	-	0.47
10	waste land	8501.86	-	11.22
11	Forest	9118.10	-	12.04
12	Hilly Area	1768.84	-	2.34
13	Water bodies	375.03	-	0.49
Total		75752.56	-	100
Urbanised Area				

Source: Ajmer city development master plan 2033

Changing Urban Land Use

Population growth, economic development and rural migration to urban areas have caused rapid extension of the city of Ajmer and hence it has been seen that the city has gone through a number of changes in context of its urban land use from last few years. Therefore analysis of land use pattern along has become an important aspect in this context as it would provide a sound base for sustainable management.

The total area of the city in 2001 was 5646.98 hectare which has increased to 75752.56 hectare in 2011. This means that the decadal increase is 1324.12 per cent because of the changing land use pattern. The total developed area of the city in 2001 was 4646.60 hectare while it increased to 8575.29 hectare in 2011 with a growth of 84.55 per cent. During 2001-2011, industrial and residential area recorded 361.47 per cent and 143.9 per cent growth respectively while there is a fall of -96.90 per cent in Recreation category. Commercial land use category recorded a growth of 23.56 per cent. Green space recorded a rise of 22701.34 per cent while others along with reserved forest, water bodies recorded an increase of 9294.25 per cent.

and demarcated the geographical and cultural zones along with the functional regions describing the segregation of different land uses

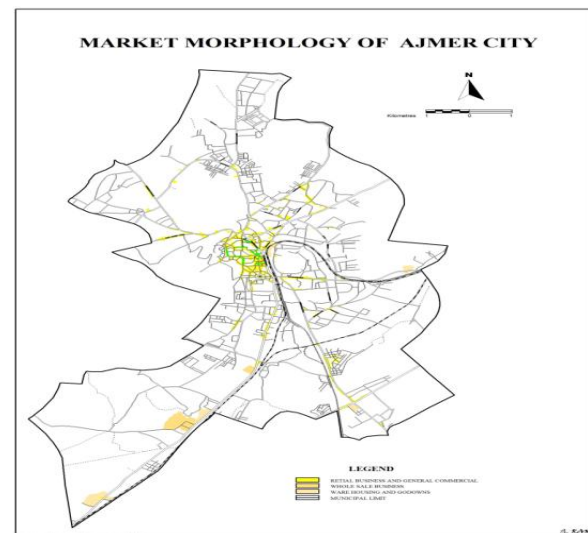
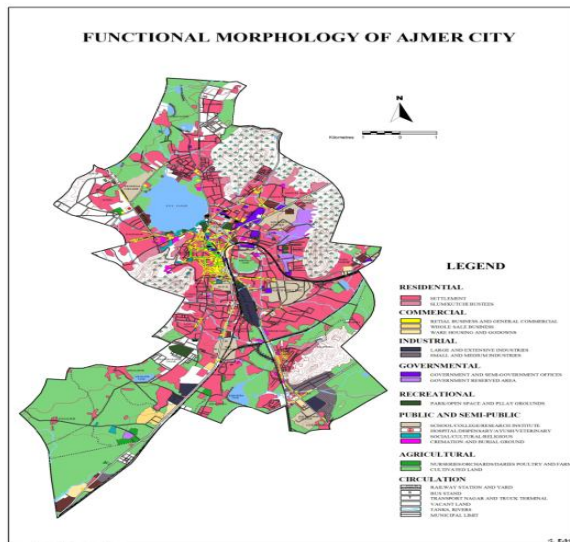
Urban morphology is the study of city as human habitat. Buildings, gardens, streets, parks and monuments are among the main elements of morphological analysis (Moudon, 1997)

In case of an Indian town, E. Ahmad has identified some of the components of urban morphology as site characteristics, historical background, sky-line, green open spaces, and water bodies, physical and cultural dominants. In combination these elements from the 'urban landscape' which is actually the soul and spirit of physical morphology of a town. Urban morphology comprises the structure of a city and pattern or plan of its development. It is actually the layout of a city both in its historical as well as geographical contexts which gives it individuality. Therefore, the internal pattern or structure of each city is "unique in its particular combination of details. (yourarticlelibrary)

Urban morphology approaches human settlements as generally unconscious products that emerge over long periods, through the accrual of successive generations of building activity. This

leaves traces that serve to structure subsequent building activity and provide opportunities and constraints for city-building processes, such as land subdivision, infrastructure development, or building construction. Articulating and analysing the logic of these traces is the central question of urban morphology. Urban morphology is not generally object-centered, in that it emphasizes the relationships between components of the city (Senthil 2015)

Because of its central location Ajmer remains the heart of Rajasthan. It remained the capital of Chauhan's during Rajput period because of its important location. During Mughal period also this is one of the important center of trade. Its maximum development took place during British period which was not in a planned manner. Roads were irregular and narrow. Morphology of Ajmer city is the result of different stages of development and growth hence the urban landscape is the result of site, situation and functional development.



Due to land use and functional growth, the city has developed resulting in the development of its morphology. During 1980-90, by Nagar Sudhar Nyas new planned colonies were established along with the establishment of Khailand shopping complex, Krishi Mandi in Beaver Road and Paraav Commercial Plans were developed.

During 1900-2000, development of residential along with commercial plans were initiated and later extended like Panchsheel Nagar, Vaishali Nagar, Transport Nagar, Indira Complex. Development of new planned city was mainly northward and southward. Residential area constitutes the highest area which is 7.82 per cent of the total urban area during 2011. Residential area comprised of 2428.11 hectare in 2001 which increased to 5922.07 hectare in 2011 resulting growth of 143.9 per cent. Residential development of the city is taking place in outskirts in horizontal manner.

Commercial area comprises of 282.01 hectare during 2011 which is 0.37 per cent of the total urban area. In 2001 it was 228.24 which has

increased to 282.01 in 2011 hence the total growth is 23.56 per cent. The development has taken place in walled city and new planned colonies in the form of shopping complexes. Old market of walled city, situated along narrow roads and streets which are in poor condition like Langar Khana Gali, Ghaseti Bazaar, Digi Bazaar. These markets are so narrow that there is no place for proper parking. Very high buildings, old havelis, encroachment of roads, a total unplanned morphology. A process of gentrification is going on.

17 commercial centres have been identified in walled city while 46 identified in outer walled city during 2015 by the researcher. Commercial area is not that much developed in accordance with the residential area or population growth.

Industrial area comprised of 1094.38 hectare in 2011 which is 1.44 per cent of total urban area which is a very less percentage. In 2001 it was 237.15 hectare which increased to 1094.38 hectare in 2011. Hence the total growth is 361.47 per cent as a result in Makopura and Parbatpura medium and large scale industries were developed and light

manufacturing industries were developed near nasirabad road and beaver road. Nearly 60 per cent administrative offices were developed in civil lines and todamal marg (lohakhan road) out of total urban area 95.92 hectare is confined to government and government reserved area. Maximum numbers of administrative offices are situated along kachari road. Road network was 1004.83 hectare in 2001 decrease to 30.94 hectare in 2011 which reduced to 96.90 per cent. Total urban area in 2001 was 5646.98 hectare which increased to 75752.56 hectare in 2011. There is a growth of 1324.12 per cent.

Findings

It has been examined that huge urban development of the city has taken place during the last decade. From 2001 to 2011 population in the city has grown about 12.4 per cent while the amount of total developed area grew by about 84.55 per cent, which is more than six times the rate of population growth. This implies that the land is being used for urbanization at the faster rate, which indicates that per capita consumption of land has increased. There can be seen a gentrification in the walled city. There are different kind of activities taking place in walled and outer walled city and the percentage of poorly maintained buildings makes it more demanding for redevelopment.

Conclusion

Identification of current issues and problems creates a chance for further analysis and gives a concrete picture of the existing morphological characteristics of the city of Ajmer with the logical explanation along with the morphological characteristics of the city for planning perspective.

Reference

1. Chen, J., Li, M., Liu, Y., Shen, C., & Wei, W., 2010., *Extract residential areas automatically by New Built-up Index.*, *Geoinformatics, 2010 18th International Conference.*
2. Hegazy, I.R. Kaloop, M.R., 2015., *Monitoring urban growth and land use change detection with GIS and remote sensing techniques in Daqahliya governorate Egypt*, *International Journal of Sustainable Built Environment Volume 4, Issue 1, Pp 117-124*
3. <http://www.yourarticlelibrary.com/essay/urban-morphology-morphology-of-towns-in-india/39969/>
4. Lee H.Y. 2008., *An analysis on development capacity of an urbanized area for urban growth management. Journal of the Korean Urban Geographical Society, vol.11, no.1, pp.1-18*
5. Li, Yin and Liu 2011., *Research Overview on Urban Land Use Change Based on Remote Sensing Images.*, *International Journal of Environmental Science and Development, Vol.2, No.1.*
6. Meena, S.R., 2010., *market morphology of Ajmer city, unpublished ph.d thesis, university of Rajasthan, Jaipur, pp. 56-58.*
7. Mohan, R Pant, C 1982., *Morphology of Urbanization in India Some Results from 1981 Census Economic and Political weekly.*
8. Moudon, A.V., 1997., *urban morphology as an emerging interdisciplinary field, urban morphology, vol.1 pp.3*
9. Sangwan, S., Singh, B., Mahima., Suhag, K.S., 2014., *Analysis of Urban Land Use Changes: A Case Study of Sonapat City in Haryana, India.*, *American International Journal of Research in Humanities, Arts and Social Sciences.*
10. Senthil, M., 2015 *urban morphology, Department of Architecture, Hindustan University, Chennai., pp-1*
11. Weng, Q., 2001., *A remote sensing and GIS evaluation of urban expansion and its impact on surface temperature in the Zhujiang Delta, China, International Journal of Remote Sensing, vol.22, no.10.*
12. Yeh, A. G.-O., & Xia, L., 2001, *Measurement and monitoring of urban sprawl in a rapidly growing region using entropy. Photogrammetric engineering and remote sensing, vol. 67, no.1, pp. 83-90.*
13. Zope, R., 2013., *The planning strategies for urban land use pattern: a case study of Pune city, India, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 2, Issue 7.*