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Change in Land Use , Due to Industrialization in Sub-Urban Area of Jaipur City

Ram Manohar Sharma

Assistant Professor, Geography, APGC, Jaipur, Rajasthan, India

ABSTRACT: Land is always in a constant flux of continual change due to transformation resulting from either natural processes or human activities. Large scale of land transformation is presently witnessed in and around major cities of India. Some of these are very dynamic and rapid particularly in the urban fringe. The main factors affecting the urban fringe land transformation are growth of industrial, commercial and institutional activities. Secondly due to urbanization and increasing trend towards urban migration for employment and other developmental opportunity. This helps in spatial extension of urban areas engulfing particularly urban-rural fringe. Apart from the diversion of lands for non-agricultural uses, the extensive damage to ecology and environment due to industrial waste, pollution, and misuse of land can also be seen in the urban areas and its periphery. One other important impact is noticed on the natural hydrological system of the city. As the urban areas spread the natural hydrological features like rivers, nallah, water bodies comes in the heart of the city. They are subjected to encroachment by the people. This results in either completely or partly block of the system.. Hence this process on one hand breaks the hydrological system and on other hand creates a permanent recurrent flood damage zone in the Jaipur city area.

KEYWORDS: land use, industrialization, sub-urban, Jaipur, damage, urbanization, dynamic, human activities, pollution

I. INTRODUCTION

Rapid urbanization, therefore, brings opportunities for new urban developments, however, it also has brought serious losses of arable land, forest land and water bodies. Urban growth, particularly the movement of residential and commercial land to rural areas at the periphery of metropolitan areas, has long been considered a sign of regional economic vitality. But, its benefits are increasingly balanced against ecosystem impacts, including degradation of air and water quality and loss of farmland and forests, and socioeconomic effects of economic disparities, social fragmentation and infrastructure costs. Indian cities have witnessed rapid growth over the past two decades. [1,2] This growth has significantly changed the landscape of many cities. Metropolitan cities of India have been experiencing a lot of land-use and land-cover changes due to both socio-economic and natural factors . Analysis of urban growth in Jaipur city from remote sensing data, as a pattern and process, helps us to understand how an urban landscape is changing through time. This understanding includes: (1) the rate of urban growth, (2) the spatial configuration of growth, (3) whether there is any discrepancy in the observed and expected growth, (4) whether there is any spatial or temporal disparity in growth, and (5) whether the growth is sprawling or not. The Pink city of Jaipur, located at 26°54' north latitudes and 75°45' east longitudes. It's municipal boundary extends from 26°46' north latitude to 27°01' north latitude and 75°37' east longitude to 75°57' east longitude. Our studies are the city is Jaipur which cover 444.72 km² area. During 1975 to 1986 the high density built up land increased by 73 per cent whereas, the medium density showed the increase of 144 per cent but the low density shown less growth of only 38 per cent. The high density urban built up land grow much more during 2009 to 2020 and 2003 to 2009 where it was 285.74 per cent and 88 per cent respectively. During 1991 to 2003 more than 200 per cent growth has been recorded in terms of low density areas. But at the same time high density and medium density did not show much more growth . The last decade the built up land increased by 29.02 per cent growth, whereas highest growth recorded by high density 285.74 percent, followed by medium density 173.62 percent. The other categories like low density decline by 83.35 per cent, agricultural land 38.75, forest 79.37 percent respectively. During 1975 to 2020, the total area of built up land was 46.39 km², in 1975, 83.92 km² in 1986, 113.3 km² in 1991, 172.62 km² in 2003, 197 km² in 2009, and 255 km² in 2020 (Figure 5). Here the area has grown up much rapidly than last decade due to development of infrastructure and industries.[3,4]



The urbanization was assessed with the help of spatial data, namely historic city plan, remotely sensed satellite data, toposheet, existing map. In other words, the study incorporated old and new generation land use data for a change study. Overall land use changes in Jaipur city in different land cover types is one of the major indicators to show general changes of the landscape. The most inevitable aspect of urbanization is horizontal growth of the town and change in land uses

The relative increase of urban/built-up land was the greatest during 1975 to 1986; it was 81 per cent, 1986-91, 35 per cent, 1991-2003, 52, 14 per cent in 2003-2009 and 29 percent in 2020. Cropland (280 km² in 1975 and 147 km² in 2003, 2009 it's only 103 km² and in 2020 shrink to 63.97 km²), and fallow land (132 km² in 1975 and 29 km² in 2003, 23 km² in 2009 and 13.54 km² in 2020) decrease were the major land use changes of city.

Similarly, the percentage land area under industrial land use has increased from 9.07 to 11.49 in 1991. Although the total forest area under forests is seen to have increased from 1975 to 1991, i.e. from 82 per cent during 1975-1986 and 8 per cent 1986-1991. [5,6] The areas of cropland, urban/built-up land, water, and barren land increased, and forestland and grassland slightly decreased from 1975 to 2009, but in last decade the high density and medium density built up land, mining, wasteland increased and other categories were decline respectively.(Table 4A)

Table 4 A. Jaipur- Land Use/ Land Cover Analysis of 1975- 2020

Land Use/ Land Cover	Area in km ²						Change During different time periods (km ²)				
	1975	1986	1991	2003	2009	2020	1975-1986	1986-1991	1991-2003	2003-2009	2009- 2020
Built up Land	46.39	83.92	113.3	172.62	197.96	255.44	37.53	29.38	59.32	25.34	57.48
Agl Land	280.85	221.7	187.34	147.07	126.56	77.51	-59.15	-34.36	-40.27	-20.51	-49.05
Forest (Degraded, Actual, Plantation)	29.11	52.96	57.2	56.8	56.48	46.29	23.85	4.24	-0.4	-0.32	-9.19
Waste Land	62.47	28.75	19.5	43.78	42.24	41.86	-33.72	-9.25	24.28	-1.54	-0.38
River	2.53	2.48	2.51	2.51	1.98	3.01	-0.05	0.03	0	-0.53	1.03
Other	23.37	54.91	64.91	21.94	19.5	20.61	31.54	10	-42.97	-2.44	1.11
Total	444.72	444.72	444.72	444.72	444.72	444.72					

Sources: Multi-Temporal satellite data.

Table 4B. Jaipur- Land Transformation in 1975- 2020

Land Use/ Land Cover	Share in total area percentage						Decadal Percent Growth				
	1975	1986	1991	2003	2009	2020	1975-1986	1986-1991	1991-2003	2003-2009	2009- 2020
Built up Land	10.43	18.87	25.48	38.82	44.51	57.43	80.9	35.0	52.4	14.7	29.02
Agl Land	63.15	49.85	42.13	33.07	28.46	17.43	-21.1	-15.5	-21.5	-13.9	-38.75
Forest (Degraded, Actual, Plantation)	6.55	11.91	12.86	12.77	12.70	10.40	81.9	8.0	-0.7	-0.6	-18.11
Waste Land	14.05	6.46	4.38	9.84	9.50	9.41	-54.0	-32.2	124.5	-3.5	-0.94
River	0.57	0.56	0.56	0.56	0.45	0.67	-2.0	1.2	0.0	-21.1	48.88
Other	5.25	12.35	14.60	4.93	4.38	4.63	135.0	18.2	-66.2	-11.1	5.70
Total	100.001	100.00	100.00	100.00	100.00						

Sources: Multi-Temporal satellite data.

The Table 4B reveals that the urban built up land continually increased from 1975 to 2020. The rate of growth was varying from one time period to another. In 1975-1986, the growth was 80.9 per cent where in 1986-91 it was 35, 1991-2003, 52.4, 14.7 in 2003 to 2009 and 29 percent in 2009 to 2020, respectively. Among built up land, the low density area always shows high rate of growth followed by high density and medium respectively. The impact of urban growth is seen in agricultural land which continues to decline at the rate of 21.1, 15.5, 21.5, 13.9 and 38.75 per cent respectively during different time periods between 1975 and 2020. In the agricultural land the major impact is shown on fallow lands which shrink rapidly. However, the forest area has grown much more during 1975-86.[7,8]

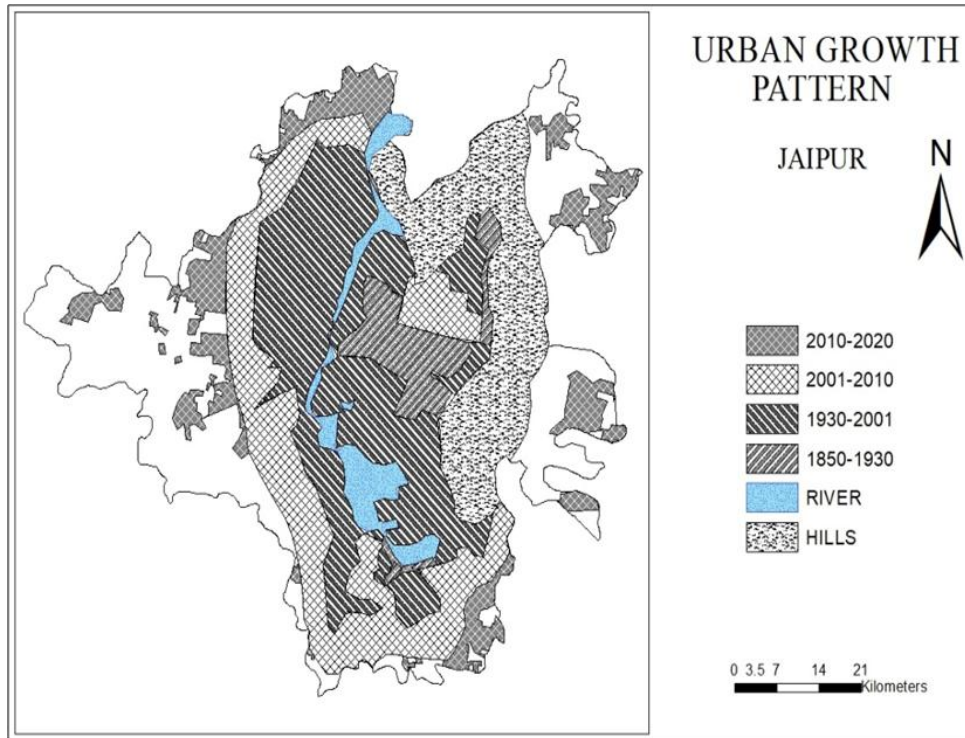


Figure 5. Urban Growth of Jaipur City

In Jaipur, people were attracted from arid and semi-arid area of state for employment, opportunities, education and good infrastructure and also people from India and abroad visit there as a tourist.

II.DISCUSSION

History has countless evidence of civilization growing by the water-fronts. Rivers like Indus, Nile, Tigris, etc., are known for the human settlements which developed here. The river fronts today are degrading due to uncalled interventions and human ignorance towards their ecology. The trend in case of many contemporary urban rivers, surrounded by a modern society and a predominantly technology driven economy, is no different. The dying Dravayawati River in Jaipur, India, in last two decades of urban sprawl in Jaipur has been a witness to occurrence of a significantly large number of industries of different types along its urban edge. These economic growth poles have attracted population, leading to unplanned development and encroachments. Disposal of domestic and industrial waste directly into the river, lack of seasonal rainfall, encroachment on river bed, etc., have contributed adversely to the natural environment and quality of living in the urban city. Strategies to save and improve upon the quality of natural and built environment along these river-fronts are essential for an optimal ecological balance. This would also make them socially cohesive and of help to create breathing spaces amidst the dense built fabric of the urban centre.[9,10] Planning interventions and design solutions, as proposed, can be relied upon as immediate and long term measures to revitalize the river and further enhance its character, locally and regionally. Jaipur, a historic planned city is presently administrative capital of Rajasthan state in north-west frontier of India. Its physical and demographic growth has been significantly higher than other cities in the state. The rapid urbanization here, owes foremost to its strategic location from the national capital, Delhi. As a part of the DMIC project and also being a known tourist destination the city is a prominent socio-economic center of the state. All these have boosted the urban growth of the city over the years (Jaipur Development Authority, JDA). This rapid urbanization at times may have adverse impact on the natural resources, geophysical characteristics, environment, etc., of the city. Dravayawati River in



Jaipur in its role of natural drainage has been the lifeline of the city in the historic times. The Dravayawati River is a concurrent case of natural features under threat of negative impacts of urban growth.

Dravayawati River was a perennial source of water to the planned walled city of Jaipur. Due to irregular seasonal rainfall, it was realized that growing demand of water supply could not be fulfilled by the river. Later on, due to industrialization, with all the industries started to locate near the river; it became the medium to carry waste outside the city. Due to establishment of the aforementioned economic growth poles, the city saw increase in population, reason primarily been migration of people from near-by towns in search of better economic opportunities. Vacant lands around these growth poles were encroached by these populations leading to informal development, further adding to disposal of domestic waste into the river. Hence, Dravayawati River over the years has transformed into a waste disposing nala (drain) (Government of India, Ministry of Water Resources: Central Ground Water Board), reasons being rapid urbanization, urban sprawl and sporadic industrial activity along the river.

Recently, the degrading river has gained attention due to its impact on the immediate context. The lifeline of the city has seen environmental degradation and has lost its aesthetics due to the aforementioned reasons. JDA has taken the initiative in collaboration with Tata Projects in cleaning and cleansing of the river. Tata Projects has proposed a plan for establishment of eleven sewage treatment plants along the river, by identifying the locations of source of waste generation and disposal into the river. Further, the following phase of the proposal includes re-development of land to be acquired along the river after channelization of river bed.[11]

Based on the analysis of the aforementioned data, the city is witnessing growth in population with a medium based spatial density pattern; however, presently the amount of waste generated and disposed by the various city activities is not treated to the standards, resulting in unpleasant aesthetics and environmental degradation. Also, the context is affected by this impact, as it degrades the neighboring land values; concluded from the secondary data, the DLC/Market Rate Ratio is lower than the ideal ratio range.

Jaipur is witnessing rapid urbanization over the last few decades affecting the spatial growth pattern and the natural environment. One of the impacts is on the natural urban river which has been degrading over the years due to human ignorance, which actually needs attention on priority. Appropriate planning and design initiatives for the river front development, thus need to be taken promptly to ensure better quality of life and a healthy environment. Also, it is important to control the future development along the river-front to protect it from excessive development practices. The aim to conserve the only existing urban river, Dravayawati, can be accomplished by integrating activities that promotes human cohesiveness and engagement. To achieve the aforementioned, specific land-use and activities need to be integrated to make the river-front accessible to the public.[12]

Population growth has major driving forces of land use change. For example, the crop area has shrunk by 1.60 sq km per year, fallow land 2.94 sq km per year, and wasteland 0.59 sq km per year in last 34 years, whereas built-up area has increased with the rate of 4.46 sq km per year or 1.02 percent per year. Based on the use of multi resolution and multi temporal satellite data of 1975 to 2009, spatial and temporal changes in the various types of land uses and land cover of the city are detected and discussed. This article will compassion on the ability of Jaipur city to sustain urban change and urban identity as well, while the vocation to protective, civilizing or economic planning remains a problem. There is no relationship between sprawl with its provisional form of sociability and historical centers. Their own administration remains an issue, while nobody realizes how to incorporate these new types of urbanity with the old urban communities, escaping idiotism portraying closed communities. . A specific nature of the spots, individuals and government, in addition to an environmental impression is missing, in light of the fact that there is no central view of the issues and privileges of citizenship which is a piece of. Regardless of the tremendous scholarly capital, there is no longing to ensure and make it open to all residents, esteeming the human capital as a key beneficial factor and the solid connection among arrangement and association in the open circle and region protection



III.RESULTS

Urban growth and change are relentless procedure being developed which must be overseen through appropriate arranging. The arranging procedure can just begin by recognizing the development focuses inside urban territories. Satellite remotely detected information has demonstrated fundamental in this recognizable proof and mapping procedure of such development. Various works have appeared satellite remote detecting can possibly give precise and auspicious geospatial data portraying urban changes.[13] In spite of the fact that LULC changes have in the past been observed by conventional inventories what's more, reviews, satellite remote detecting can be progressively powerful as it can give more prominent measures of data alongside points of interest of expense and time reserve funds for broad regions. Advances in satellite-based land surface mapping are adding to the making of impressively increasingly nitty gritty urban maps, offering organizers better comprehension of urban development elements and spread. As of late, the usage of these procedures to measure, break down, and show the urban development elements has been effective as delineated by this survey. Subsequently being valuable to town and provincial organizers. Urban scene change utilizing remote detecting application and systems is helpful in ecological changes especially in this investigation of urban land use and its foundation. The remote detecting application will be utilized for extricating changes that happen over timeframe in the investigation territory and might be used for worldwide or territorial examinations, for example, worldwide checking vegetation spread, worldwide sustenance change just as provincial asset the executives utilizing change recognition investigation in remote detecting application by the Global Monitoring Remote detecting methods are great in information catching and examination during the time spent measuring the idea of urbanization and fast development. A picture goals of both transient and spatial are currently an essential strategies for testing urban issues by making a topical mapping for the general condition inside the investigation time frames by delivering results from the examination and advisers for strategy creators Remote detecting has huge job in urban examinations and its equipped for checking changes in the general condition. Base on the picture goals, remote detecting pictures give quality information especially a high goals picture which gives effective mapping of an urban zone. By and large, the applications requires two distinctive date pictures for examination during the time spent checking changes and bring out great outcome for basic leadership in taking care of certain issues identified with the urban development and town plan against the uncontrolled advancement.

In an era of global climate change and rapid urbanization, innovations on governance of urban systems are critically required as 50 percent people are now living in less than 3 percent of the earth's urbanized terrestrial surface. Urbanisation in India is neither unique nor exclusive but is similar to a world-wide phenomenon. In an era of global climate change and rapid urbanization, innovations on governance of urban systems are critically required as 50 percent people are now living in less than 3 percent of the earth's urbanized terrestrial surface. Urbanisation in India is neither unique nor exclusive but is similar to a world-wide phenomenon. According to the City Development Plan Jaipur is a fast growing city, ranking 11th in the list of Indian mega cities with a population of 2.3 million and annual growth rate of 4.5 percent. Jaipur forms the urban core being the only million plus city in the state. It is the primate city of the state acting as the centre for education and employment opportunities. It attracts migration from all parts of the state (70 percent of migrants come from within the state). Over 2 lakh migrants were added to Jaipur city during 1991-2001. The city offers jobs in commerce, services and the informal sector and shows a high economic growth compared to several other Indian cities. Jaipur is one of the most sought after tourist destination in the world with about 3000 tourists visiting the city every day.[14] The objective of the study is to find out the urbanisation trend and environmental pollution in the city

IV.CONCLUSIONS

The result of high population growth rates are increasing population density, increasing number of people below poverty line and pressure on natural resources which contributes to environmental degradation through over exploitation of natural resources. The environment protection should not be a responsibility of government alone but local people and leaders should be encouraged to make dedicated efforts to eradicate the environmental problems. It is high time that the general public, public entities, state and central government realize the damage, which our developmental process has made to the living environment. The extent is such that it cannot be resorted. There a necessity to think about the needs of present and future by compulsion and also need to balance the public interest and environment protection. It is to be noted that unless the humanity rises to the occasion for the prevention and control of the pollution and protection of environment with necessary zeal and speedy trial, the progressive and prosperous living and to procure welfare state will become a nightmare.



Rapid population growth retards the economic, social and human development. Enhancement of women's status and autonomy has been conclusively established to have a direct bearing on fertility and mortality decline, which indirectly affects the population growth. More specifically, interrelationships between women's characteristics and access to resources are the mechanisms through which human fertility is determined. The existing legal provisions are inadequate to control the enormous problems of environmental pollution of various types in the country. Therefore, the judiciary has to play a more active and constructive role. This has become all the more essential in view of the lack of awareness in the masses of the pollution problems; lack of planning and the plenty of the industries and the local bodies in this regard. New jurisprudential techniques have to be devised to deal adequately with the problems of pollution control and protection of environment. Environmental law should be implemented effectively by adopting new instruments, mechanisms and procedures like environmental impact assessment and environmental audit and incorporate environmental objectives in manufacturing processes, minimum usage of hazardous materials and toxic chemicals, careful usage of toxic gases will reduce environmental load. Public interest litigation for protection of the natural environment should be permitted in view of the wider social interests affected by environmental pollution. Especially having regard to the peculiar socioeconomic conditions prevailing in the country where there is considerable poverty, illiteracy and ignorance obstructing and impeding accessibility to the judicial process.[15]

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