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Urban Expansion and its impact on Land Use Land Cover Change-A study of Amritsar, Punjab

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Abstract
. Amritsar serves as a major commercial, cultural, and transportation hub with Golden Temple & Raja Sansi international airport. It lies about 25 km east of the border with Pakistan and gateway for travelers coming to India on the overland route from central Asia. Monitoring land use/land cover changes and its response to urban growth is very important to understand the urban dynamics for sustainable urban planning. On the other hand, agriculture and settlements recorded a sharp increase in recent decades. The growth of agricultural area and human settlements are putting pressure on the natural resources and depleting the human environment relationship in the floodplain. The paper discusses about Urban Expansion and Land Use Land Cover in Amritsar, northern Punjab, India.This study utilized multi-temporal satellite data from Landsat for the classification of land use and land cover. The results revealed that the total population in the city has increased many folds. It contributes to the enlargement of the city that resulted in conversion of farming land use dominant landscape into urban land use dominant landscape during the last three decades. The analysis would be helpful for sustainable urban land use planning decisions for the metropolis.

Introduction

Urban sprawl, also called sprawl or suburban sprawl, the rapid expansion of the geographic extent of cities and towns, often characterized by low-density residential housing, single-use zoning, and increased reliance on the private automobile for transportation. Urban sprawl is the unrestricted growth in many urban areas of housing, commercial development, and roads over large expanses of land, with little concern for urban planning. the rate of land-use pattern changes and urban expansion is essential for the sustainable development and management of natural resources. The rapid urban growth is a major challenge for local government and urban planners in small cities of India due to an insufficient database and inadequate analysis of chaotic urban expansion. The effective spatial organization of urban activities for future development (Sunanda Sharma 2017). Urbanization is a major change taking place globally and India too. The urban global tipping point was reached in 2007 when for the first time in history over half of the world population 3.3 billion people were living in urban areas.According to the 2011 census, the urbanization in India has increased in a remarkably way as share of urban population which is 10.83% age in 1901 to 31.16 %age in 2011 which is 377 million people approx. are now living

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in cities. According to United Nation estimates within the next five years, more than half of the world population will be living in the urban area. The following table shows the change in the number of metropolitan cities which are only 5 in 1951 to 50 in 2011; this increase in number of metropolitans not only reflects the positive indication for the development of the country but alongside the same the other problems of metropolitans will also come into origin present paper has evaluated the land use/land cover change (LULCC) dynamics of the Barrack Pore Subdivision area, India using remote sensing data and utilized the urban growth. the rate of urban expansion is quite alarming in developing countries, especially in India. This hasty rate of urban expansion has significantly transformed the natural landscape and creates negative impact on environment. For planned development, we need to understand the urbanization process clearly, and also need to understand the changes in land use/land cover (LULC). Currently, remote-sensing data and GIS technique have been used extensively to understand the urbanization processes and its impact on land use. The urban expansion has been accompanied by loss of forests and urban sprawl. Integration of demographic and socio-economic data with land use/cover change revealed that economic growth and proximity to transportation routes have been the major factors promoting urban expansion. Topography, geology and soils were also analyzed as possible factors influencing expansion. The integration of remote sensing and Geographical Information System (GIS) was found to be effective in monitoring land use/cover changes and providing valuable information necessary for planning and research. A better understanding of the spatial and temporal dynamics of the city's growth, provided by this study, forms a basis for better planning.

Objectives

To analyze the factors of urban expansion in Amritsar
To examine the urban expansion in Amritsar
To analyze the urban expansion on land use land cover

Study area

Amritsar is one of the most ancient and fascinating cities of India and an important seat of Sikh history and culture. The main objective of the current study is to examine the dynamic phenomenon of urban sprawl/growth and pattern in the highly populated city of Amritsar. The findings may help in studying some of the motivations and spatial patterns of the urban growth in Amritsar (Shivani Singh.2017). Amritsar historically also known as Rāmdāspur and colloquially as Ambarsar, is a historic and the second most populous city in the Indian state of Punjab. The city is the administrative headquarters of the Amritsar district and is located in the Majha region of Punjab. Amritsar is located at 31.63°N 74.87°E with an average elevation of 234 meters (768 ft.) Amritsar is located in the Majha region of the state of Punjab in North India lies about 15 miles (25 km) east of the border with Pakistan. Administrative towns include Ajnala, Attari, Beas, BudhaTheh, Chheharta Sahib, Jandiala Guru, Manjitha, Rajasansi, Ramdass, Rayya, Verka Town and Baba Bakala(wikipedia).

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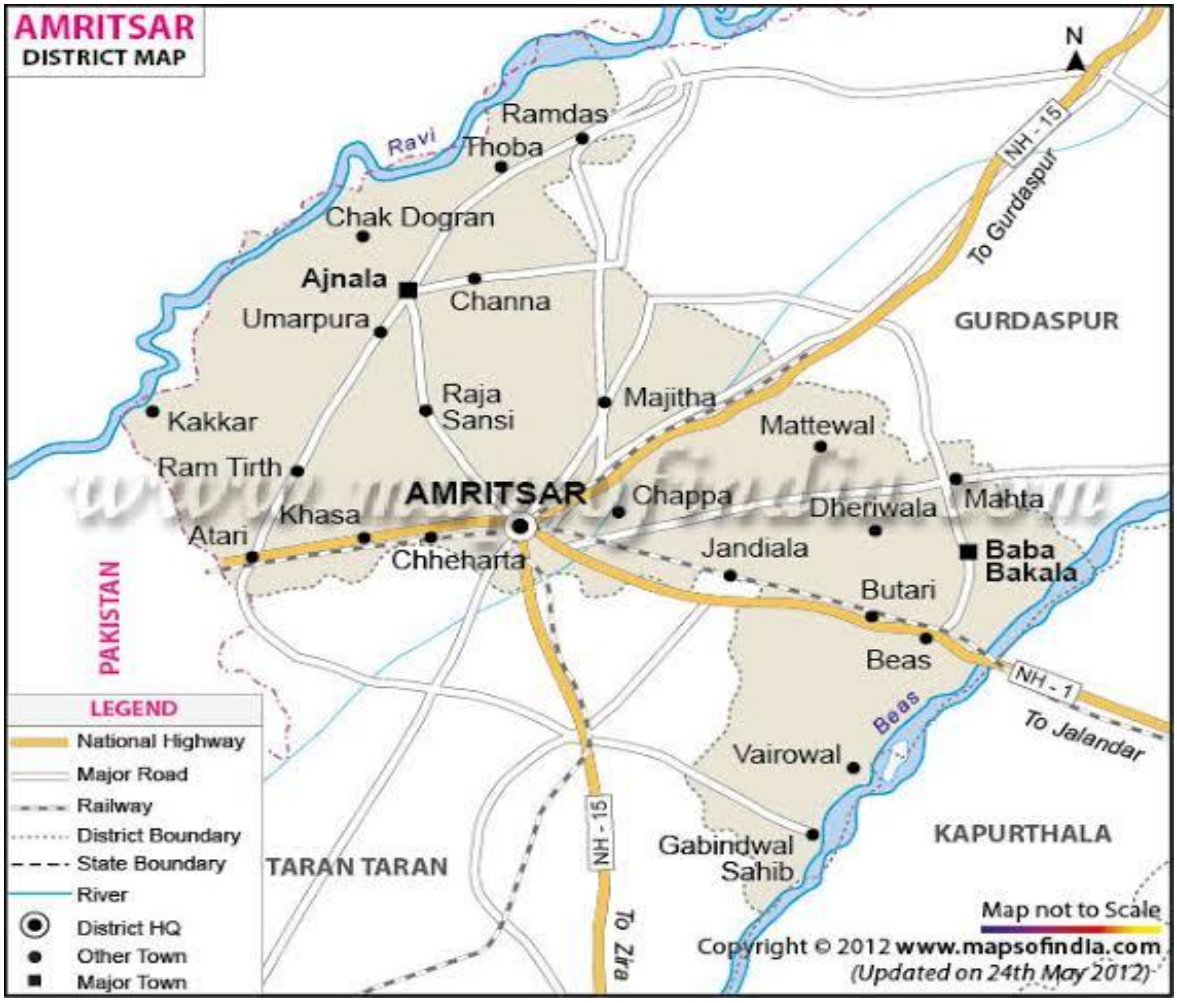

Fig. 1: Amritsar city

Source: www.mapsofindia.com

Urban expansion in Amritsar

Amritsar is Border city located in Northern western part of Punjab. Second metropolis of state & one of the major trade centre in the region. Growth Rate of Urban Population is 17.16%. Total area (142.37 Sq. Km), Developed area (68.54%), Agriculture use (31.46%). City was divided in 50 wards (1991) but currently it has 65 wards (2011). Municipal Corporation, Amritsar: the most urbanized settlement of the Local Planning Area comprising of 61% population of the Local Planning Area. It constitutes 91.5% of urban population of the Amritsar district. Emerged as a largest city of Punjab in 1855 with population 1,12,186. Spatial growth of city from 840 acres in 1849 to about 8317 acres in 1941. Ninth largest city of India as per census 1941.

Population density increased six times from 1,190 persons per sq. km in 2001 to 7,137 persons per sq. km in 2011. Congestion particularly in core areas, increase in concrete structures, lack of open spaces, urban sprawl, no mass space relationship (S. Khaitan,2014). It lies in a depression in the middle of the Bari Doab, occupying 142.37 sq. kms. with a population of 11,32,761 persons (Census 2011). It had been served by a class I municipality since 1868, but was

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converted into a corporation in 1977. It is one of the 21 district headquarters of the Punjab state. It is, and has been one of the largest cities in north western India. (SANDHU et.al,2013)

Urban expansion on land use land cover

Land use/land cover changes in an area are the consequence of the anthropogenic activities. These activities depend on the requirements of the population growth. It contributes to urban expansion of the urban center and development of infrastructure, including transportation, institutional development, and public offices. Consequently, changes in the land use/land cover occurred within and at the outskirts of the city. These alterations are counted as the response of land use/land cover to the urban growth. (Rani, 2014). Unplanned urbanisation is one of the main reasons for flood (Malik and Hashmi,2020).The present study of land use is based on the recently prepared draft master plan of Amritsar by Sai Consulting Engineers Pvt.Ltd. Ahmedabad for Punjab Urban Planning and Development Authority (PUDA). They got the base map of Amritsar city from Punjab Remote Sensing Centre, Punjab Agricultural University, Ludhiana and it was updated and authenticated by Divisional Town planner Amritsar, consequently, final land use map was prepared. Amritsar M.C has total area of 14237.22 hectares in the year 2010.Out of this 8334.05 hectares is developed area of the city, which constitute 58.54 percent of the total area. The detailed breakup of the existing land use within the Municipal Corporation limits is given below in the dig.The Existing Land Use of Amritsar 2010 is given in reveals that 58.54 percent of the total municipal corporation area is developed while the remaining 41.46 percent of the area is under agriculture land and plantation and orchards etc. vacant at present. Thus less than two third of the M.C. area has already been developed for various uses such as residential, commercial and industrial etc. (TEOTIA et.al,2013)

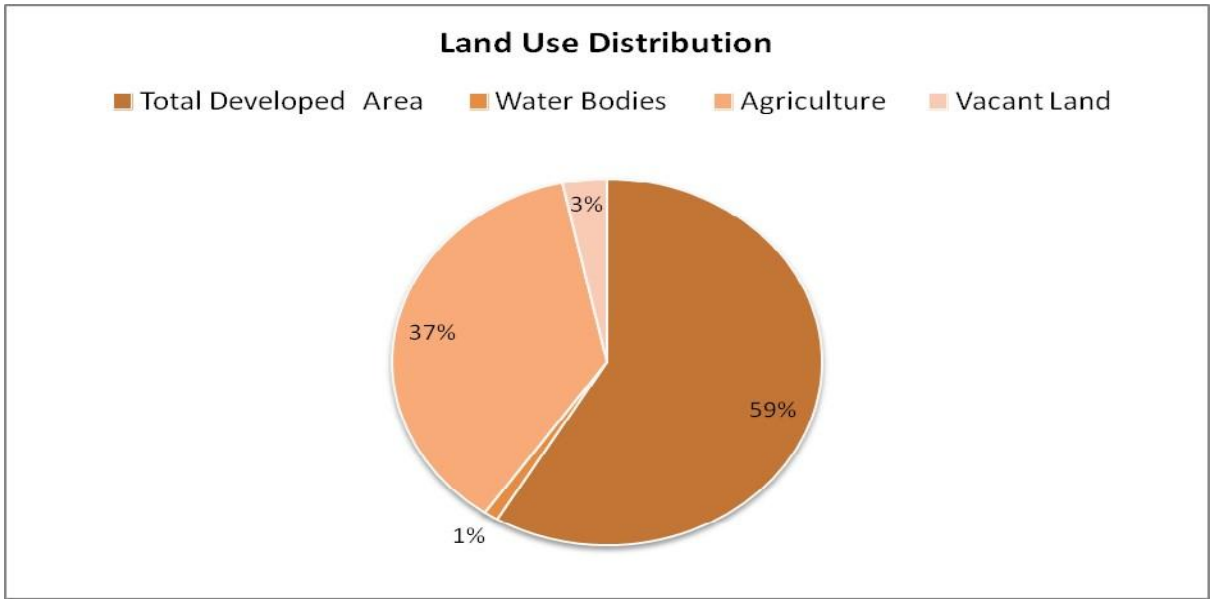

Fig.2: Land use Distribution

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Source: The State of Cities in North-Western India: A Case of Selected JNNURM Cities (Study Focus City: Amritsar), March 2013

Table: Existing Land Use of Amritsar City, 2010

Landuse	Area (Hectare)	Percent of Developed Area	Percent of M.C. Area
Residential	**4245.08**	**50.94**	**29.82**
Residential	2927.22	35.12	20.56
Plotted Land	1315.22	15.78	9.24
Official Residence	2.64	0.03	0.02
Mixed Land Use	**66.48**	**0.80**	**0.47**
Commercial	**393.22**	**4.72**	**2.76**
Retail and wholesale Shopping	261.79	3.14	1.84
Godowns, Warehouses, Regulated Markets	98.73	1.18	0.69
Hotel and Marriage Places	32.7	0.39	0.23
Industrial	**445.73**	**5.35**	**3.13**
Brick Kilns	9.15	0.11	0.06
Service & Light Industry	341.1	4.09	2.40
Planned industrial Areas	95.48	1.15	0.67
Public\Semi public	**738.22**	**8.86**	**5.19**
Educational and Research Institutions	482.08	5.78	3.39
Medical and Health	64.82	0.78	0.46
Social, Cultural & Religious	72.36	0.87	0.51
Cremation & Burial Grounds	11.28	0.14	0.08
Govt. Office	106.51	1.28	0.75
Govt. Quarter	1.17	0.01	0.01
Govt. Land	**882.14**	**10.58**	**6.20**
Govt. Land (Use un-determined)	882.14	10.58	6.20
Utilizes& Services	**27.2**	**0.33**	**0.19**
Water Works	7.52	0.09	0.05
Electric Grid	5.07	0.06	0.04
Sewage Disposal	7.59	0.09	0.05
Solid Waste	7.02	0.08	0.05
Traffic and Transportation	**1388.67**	**16.66**	**9.75**
Roads and Parking	1185.94	14.23	8.33
Bus Terminal	4.17	0.05	0.03
Railway Station	74.76	0.90	0.53

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Railway	123.19	1.48	0.87
Truck Terminus	0.61	0.01	0.00
Recreational	**124.89**	**1.50**	**0.88**
Parks/Public Open Spaces	114.71	1.38	0.81
Play Grounds, Stadium	10.18	0.12	0.07
Special Area	**22.42**	**0.27**	0.16
Heritage &Conservation Areas	22.42	0.27	0.16
Total Developed Area	**8334.05**	**100.00**	**58.54**
Water Bodies	153.71	-	1.08
Agriculture	4996.93	-	35.10
Plantation & Orchards	277.4	-	1.95
Vacant Land	474.17	-	3.33
Dairy and poultry Farms	0.96	-	0.01
Total Municipal Area	**14237.22**	**-**	**100.00**

Source: Draft Master Plan for Amritsar- 2010-2031. The State of Cities in North-Western India: A Case of Selected JNNURM Cities (Study Focus City: Amritsar), March 2013

Landuse refers to the spatial distribution of various functions like Residential, Commercial, Industrial etc. Landuse changes with the changing needs of growing population in the city. Municipal limits have increased 2.5 times than the limits in 1991. Increase in Residential developments in the form of new townships like Ansal city, Global City, Metcalfe Nirvana city etc. along major arterial roads (Jalandhar Bypass, Ajnala road etc). Deterioration of Environment by haphazard development & substandard illegal colonies. Leading to high land values & burden on infrastructure. Traditional bazaars & shopping streets have been replaced by modern facilities like Malls, complexes etc. Absence of Freight corridor is the major cause for decreasing industrial sector. No facility for export & transportation of manufactured goods so no investment in this sector due to border constraint. As per the prescribed standards the area under recreation or green spaces should be 20-25% but presently only 1.5% of the area is under green spaces which is negligible as compared to the standards. It reflects the environmental degradation problem in the city that shows the picture of the city as a concrete jungle in which no natural green space is there resulting the city to become a heat island. The vast green land in the country side has been cleared for development activities or through changing their land use **(**Shubham Khaitan,2014).

Effects on land use and land cover

The product of urban explosion and cause physical and social stress to urban settings. Deteriorated conditions i.e. improper availability of basic infrastructure & utilities. occupied by urban poor or EWS of the society or the migrants from nearby villages or other states that come to the urban areas in search of employment in order to earn their livelihood. Slums lead to the encroachment over valuable parcel of land & poor sanitary conditions leading to unhygienic

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environment. Total 64 slums in the city which have been identified by the Municipal Corporation under The Punjab Slum Areas (Improvement and Clearance) Act,1961. Out of these, 36 slums are notified and 28 are un-notified. Main industries of the city are wool, cotton & textile mills as well as dairy & light engineering works. 69% of the total industries in district lies within the city limits. There are four industrial zones being marked by pollution board Amritsar that are Jandiala road, Focal point, Chehharta and Batala road zone. The width of the roads of the industries at Batala road zone is about 20 feet which is unfit for the industrial transportation. More than 50 percent of the industries do not lie in either of the zones and are within the MC limits which create lots of problems regarding pollution, traffic congestion. Dye and Rubber industries present in and around the walled city release pollutants like sulphur dioxide and hydrogen sulphide which are very harmful for the heritage buildings (Shubham Khaitan,2014).

Conclusion

The study is an attempt to understand the land use/land cover response to urban growth in the city. The sustainability is important as for as land is concerned, and the peri urban of the cities seeks the attention because of planned unplanned, authorize, unauthorized, week organizational and legal characteristics, so that the broad mechanism by proper comprehensive and integrated planning of peri –urban area can be ensured, and the mother city is compensated for the services rendered to the peri urban area. Since majority of economy in India is based on small scale businesses and artisanal skills are still widely prevalent, these must get mainstreamed into wider economy development agenda. This will also support local community and help to curb gentrification and most importantly ensure holistic and sustainable protection of tangible and intangible heritage of historic urban areas. There are physical as well as socio-economic reasons behind these changes. It resulted in urban expansion. As a result, land use/land cover has changed drastically at the periphery of the city. It thus leads to the transformation of the rural landscape into the urban landscape. Consequently, most of the agricultural land converted into urban areas. The study would help the planners in sustainable urban planning in the city.

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