IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 21, Issue 2, Ver. IV (Feb. 2016) PP 46-51
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

Urban Growth and Its Impact on Land Transformation in Medium Sized Urban Centres of Kashmir Valley

Zoya Naqshbandi[1], Sameer Fayaz[2], M. Sultan Bhat[3]
[1, 2] *Research Scholar in the Department of Geography & Regional Development, University of Kashmir*
[3] *Professor in the Department of Geography & Regional Development, University of Kashmir*

Abstract: *Urbanization is considered as one of the most influential drivers of land use and land cover change and has been shaping societies all over the world. Kashmir Valley is the most urbanized region in the Himalayas and during the last few decades, it has experienced excessive population growth and economic development which has resulted in large scale unplanned urbanization and urban sprawl. The present paper attempts to analyze the demographic and land use/land cover changes in a few selected medium sized towns of Kashmir Valley (Bandipora, Baramulla, Sopore, Kupwara and Ganderbal) to assess the impact of urbanization on land resources. The analysis reveals that the urban growth has mostly occurred at the cost of agricultural land, wetlands and vacant/barren land. The built up area has increased by 10 per cent indicating a positive growth of 112 per cent, while the agricultural land has decreased by 12 per cent indicating a negative growth of 38 per cent, during the period (1981-2011). To analyze the change, Land Absorption Coefficient (L.A.C.) and Land Consumption Ratio (L.C.R.) were also used. The average LAC for the urban centres was 0.011 for 1981 to 2011 and the average LCR has decreased from 0.056 in 1981 to 0.030 in 2011 indicating that the land available per person was higher in 1981 and has decreased during the period.*

Keywords: *Urbanization, Land use, Kashmir Valley, L.A.C., L.C.R., G.I.S.*

I. Introduction

Urbanization is the movement of population from rural to urban areas and the resulting increasing proportion of a population that resides in urban rather than rural places (Hussain, 2001). It is a dynamic, positive and a desirable phenomenon, as it is conducive to economic growth, social change and physical development. Urbanization brings with it several consequences – both adverse as well as beneficial. The benefits are efficiency, convenience, concentration of resources, educational facilities, social integration and improvements in economy and standard of living (Mandal, 1998; Khullar, 2005; Balogun *et al*, 2011; Mohan et al, 2011). However, it also has adverse effects like land scacity, creation of slums, poor living conditions, crime, unemployment (due to large scale migration), air, water and soil pollution, land degradation, water issues, rise in temperature, destruction of habitats and so on (Bryant, 2002; Lo & Yang, 2002; Jantz et al, 2005; Turner et al, 1990). Rapid urbanization causes disorganized and unplanned growth of town and cities. Unplanned urban expansion leads to loss of productive land resources causing negative impacts on socio-economic development of a country, especially in developing countries where urban expansion occurs horizontally rather than vertically, and hence, encroaches on agricultural land, forests, wetlands and open spaces (Fanan et al, 2011; Balogun et al, 2011; Farooq and Ahmad, 2008; Sreenivasulu & Bhaskar, 2010; Fazal and Amin, 2011; Wani and Khairkar, 2011; Rashid et al, 2011; Sekar & Kanchanamala, 2011).

Over the last few decades, Jammu and Kashmir State has recorded massive urbanization wherein the major urban centres have experienced substantial increase both in terms of area expansion and population growth, while on the other hand, most of the small and medium urban centres have either recorded sluggish growth or have shown signs of stagnation (Bhat, 2008; Malik, 2012). The stupendous increase and sluggish growth/stagnation have made urban growth a complex phenomenon and a challenging task for urban settlement planners. In order to ensure a reasonable quality of life and environment to the habitants, task of planners has become quite arduous. The main determinant responsible for such a situation is growing drift of population from rural areas and small urban centres which is increasing day by day. This influx of population only adds to the complexities of the urban centres with growing number of unemployed people which strain the urban services, creates depressing housing conditions, transport problems and generate environmental concerns and unemployment, leading to deterioration in the quality of life (Town Planning Organization, Srinagar, 2012; Malik, 2012).

Apart from this, planning efforts which are mostly compartmentalized, fragmented and concentrated on economic aspects have also steered an unplanned settlement pattern and wide spread disparities in the degree of development of various urban settlements in the State. The impact of such a process of urban growth is directly

manifested in the form of distorted settlement pattern, inequitable distribution of population, imbalanced regional development, lack of economic planning, unidirectional migratory pattern, unbalanced urban growth lack of rural-urban continuum and excessive dependence of hinterland/small towns on main cities for amenities and services. Lack of financial resources for urban development and infrastructure have also significantly attributed to the poor quality of urban living in the State (Town Planning Organization, Srinagar, 2012).

II. Significance Of The Study

The Himalayan region has witnessed large scale unplanned urbanization and urban sprawl where the urban expansion has mainly occurred at the cost of productive agricultural land, precious wetlands and green spaces around the urban centres. This in turn has resulted into a series of urban environmental problems and deteriorating quality of urban life (Wani and Khairkar, 2011). The significance of the present study lies in the fact that it could identify the extent of urban sprawl and detect the changes in land-use/land-cover in the medium sized towns of Kashmir Valley. The results of the study could serve vital inputs for formulating balanced sustainable growth strategy in the ecologically sensitive region of Kashmir Himalaya.

III. Objectives

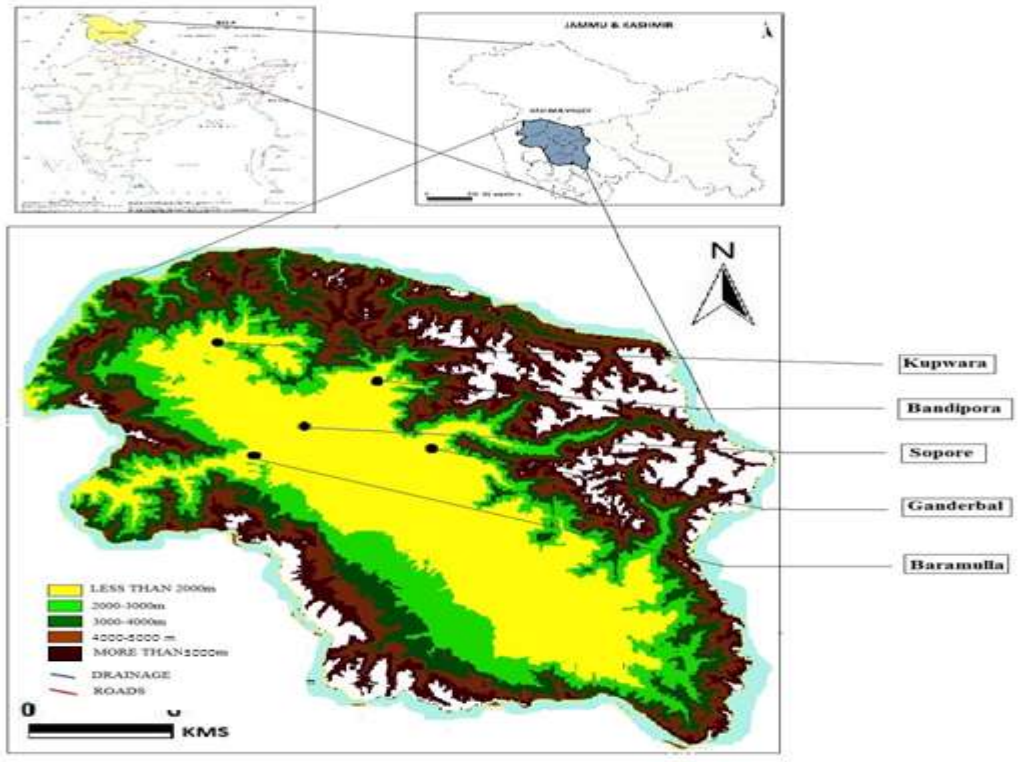
The present analysis shall focus on the following objectives:

i. To analyze urban growth in the medium sized towns of Kashmir Valley.
ii. To examine the spatial and temporal dynamics of the land use pattern in the region.

Study Area

The Kashmir Valley is situated in the Himalayas between the Zanskar Range and the Pir Panjal Range in the Jammu and Kashmir state of India. It has been formed by the River Jhelum and hence is also known as *Jehlum Valley*. The Kashmir Valley is located at an average altitude of 1850m above sea level extending between 30°25' N to 34°45' N latitudes and 73°55' E to 75°35' E longitudes. The valley covers a total area of 15440 sq kms and accounts for 6.9% per cent of the total area of the state Jammu and Kashmir **(**222236 sq. kms.). The valley is about 130 km long and 40 km wide and is surrounded by mountain ranges on all sides (Raza *et al*., 1978; Bhat, 2008). The following figure shows the location of Kashmir Valley and the selected towns for study (see Fig. 1).

Fig 1: Location of Kashmir Valley



Source: SOI Toposheets (1971)

IV. Database And Methodology

The study is based on both primary as well as secondary data. The survey of India topographic sheet of 1971 on the scale 1:50000 were used to generate the base map. Census of India data (1901 to 2011) was used to analyze the socio-economic and demographic profile of the urban centres.

Land use and land cover maps were generated from two satellite images of different time periods:

i) Landsat Image (TM sensor) 15-10-1992
ii) Landsat Image (TM sensor) 18-09-2011

The maps of the towns were generated after digitizing the maps obtained from the respective Municipal Corporations and were then georeferenced in ArcGIS 9.3 to create base maps for the towns. Other relevant data about the socio economic and demographic setup of the urban centres was collected from the Town Planning Organization, Srinagar and also from Remote Sensing and Environment Department, Srinagar.

The Land consumption rate (LCR) and land absorption coefficient (LAC) have been worked out by using the following equations: (Yeates and Garner, 1976)

$$L.C.R. = \frac{A}{P} \qquad \text{- - - (i)}$$

where A = areal extent of the city in hectares, & P = population

$$L.A.C. = \frac{A_2 - A_1}{P_2 - P_1} \qquad \text{- - - (ii)}$$

where A_1 and A_2 are the areal extents in hectares for the early and later years, and P_1 and P_2 are population figure for the early and later years respectively.

L.C.R is a measure of compactness which indicates a progressive spatial expansion of a city and L.A.C is a measure of change in consumption of new urban land by each unit increase in urban population (Amin & Fazal, 2012; Opeyemi, 2008; Yeates and Garner, 1976; Fanan et al, 2011; Oladele & Oladimeji, 2011).

V. Results And Discussion

Kashmir valley is currently the most urbanized area in the Indian Himalayan region. However, it is still predominantly rural with around 27.37% of the population in the state of Jammu & Kashmir lives in urban areas (Bhat, 2008). In Kashmir Valley, the level of urbanization is 31.6% as per Census of 2011 which is slightly higher than the average urbanization at national level (31.16%) and state level (27.37%). The population living in urban areas in Kashmir Valley is inhabited in a total of 46 urban centres distributed unevenly in the region (Census of India, 2011). The present study deals with five medium sized urban centres, namely Bandipora, Baramulla, Ganderbal, Kupwara and Sopore. Out of these, Bandipora, Baramulla and Sopore were classified as urban centres as per Indian Census of 1911, while Ganderbal and Kupwara were declared as urban in Census of 1981 (Census Records, 1911-2011).

At present, Baramulla is the third largest urban centre in Kashmir Valley in terms of area as well as population. It is followed by Sopore, Bandipora, Ganderbal at fourth, fifth and sixth positions respectively, while Kupwara ranks twelfth in the region in terms of population size. Areally, Sopore ranks fifth, Bandipora ranks ninth, Ganderbal seventeenth and Kupwara ranks thirtieth amongst all the urban centres in Kashmir Valley. Baramulla and Sopore are classified as class II size towns, Bandipora, Kupwara and Ganderbal are classified as class III size towns (Census Records, 2011).

Table 1: Growth of Medium Sized Urban Centres in Kashmir Valley (1981-2011)

Name of Urban Centre	Population (persons)		Population Growth (in %) 1981-2011	Area (sq.kms)		Areal Growth (in %) 1981-2011	Share of Urban Population 2011 (in %)
	1981	2011		1981	2011		
Bandipora	14218	37081	160.80	12.12	13.4	10.56	1.81
Baramulla	33945	71434	110.44	15.54	23.98	54.31	3.48
Ganderbal	9143	28233	208.79	7.72	7.72	0.00	1.38
Kupwara	3072	21771	608.69	2.57	4.1	59.53	1.06
Sopore	33584	71292	112.28	15.03	18.9	25.75	3.48

Source: Compiled from Census Records (1981 &2011)

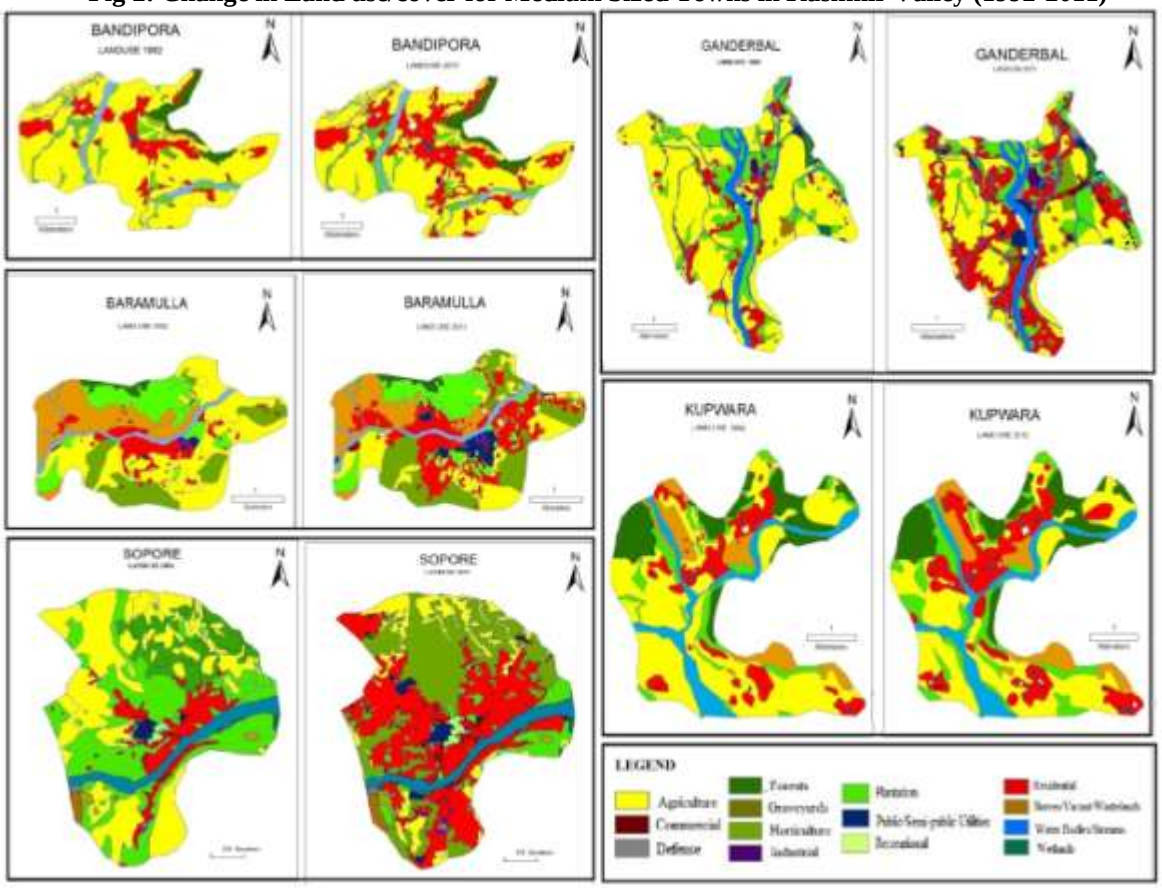
Table 1 depicts the population growth and areal growth of the selected medium sized towns of Kashmir Valley from 1981 to 2011. The urban centres have shown a considerable population growth rate of over 100 per cent in all the towns where Kupwara is leading with a growth of over 600 per cent during the period of thirty years. In terms of areal expansion, Ganderbal town has the not shown any areal growth from 1981 to 2011 (census records) , Bandipora depicted an areal growth of around 11 per cent, followed by Sopore witnessing an areal growth of over 25 per cent, and Baramulla and Kupwara were leading with an areal growth of over 50 per cent (table 1). These five towns together constitute approximately 11 per cent of the total urban population in Kashmir Valley. The share of urban population of each urban centre is very low which can be clearly observed

from table 1. This is mainly because Srinagar city alone constitutes about 60 per cent of the urban population in Kashmir Valley and the remaining 40 percent is distributed in the rest of the 45 urban centres (Census Records, 2011).

Land Use Change Analysis

Land use/land cover mapping of the selected urban centres was carried out using satellite data of the years 1992 and 2011. The classes identified include built up land (including commercial land, industrial area, public/semi-public utilities, residential land and defence area), agricultural land, forests, horticulture, water bodies and wetlands, plantations and barren/vacant land. Fig 2 shows the land use/cover maps for the five urban centres.

Fig 2: Change in Land use/cover for Medium Sized Towns in Kashmir Valley (1992-2011)



Source: Generated from Landsat Imagery (1991 &2011)

Table 2: Change in Land use/cover for Medium Sized Towns in Kashmir Valley (1992-2011)

Land-use/cover Classes	Baramulla		Sopore		Bandipora		Kupwara		Ganderbal	
	Percent Change	Growth	Percent Change	Growth	Percent Change	Growth	Percent Change	Growth	Percent Change	Growth
Agriculture	-18.76	-51.63	-21.01	-49.9	-11.11	-16.8	-10.98	-25.7	-19.9	-38.5
Forests	-0.17	-13.8	--	--	--	--	-0.31	-2.11	-0.09	-11.5
Horticulture	6.13	43.88	7.81	87.71	0.28	53.23	--	--	1.37	88.15
Vacant/ Barren	-5.67	-30.8	-0.21	-30.7	-0.15	-18.1	-0.38	-4.21	-0.20	-33.06
Water Bodies & Wetlands	-0.03	-0.78	-0.16	-48.8	-0.07	-1.23	-0.13	-1.21	-0.37	-56.4
Plantation	0.78	4.97	0.11	0.4	-0.37	-5.12	4.63	52.7	0.52	2.56
Built up	17.72	175.4	13.49	110.04	11.39	77.25	7.03	49.9	18.66	49.99

Source: Generated from Landsat Data (1991 & 2011)

Table 2 gives the percentage change and growth of the various land use classes in the selected urban centres. Agricultural land, forests, vacant/barren land and water bodies have decreased in all the urban centres, while built up area and horticulture have shown a positive growth, and plantations have increased for all the urban centres except Bandipora. The overall category wise changes in the different land use classes for all the

selected medium sized urban centres in totality were quantified from the land use maps and are depicted in table 3.

Table 3: Average Changes in Land Use Classes for Medium Sized Urban Centres

Land Use/Cover Classes	Area (sq km) 1992	Area (sq km) 2011	Change in Area (sq km)	Growth (%)
Agriculture	31.26	19.31	-11.95	-38.23
Forests	1.56	1.5	-0.06	-3.85
Horticulture	5.22	8.32	3.1	59.39
Vacant/Barren	5.07	3.61	-1.46	-28.80
Water Bodies & Wetlands	4.24	4.17	-0.07	-1.65
Plantations and Scrubland	11.7	12.09	0.39	3.33
Built up	8.95	18.96	10.01	111.84

Source: Generated from Landsat Data (1991 & 2011)

The analysis revealed that the agricultural land in the urban centres has decreased by 38 per cent, forest area shows a negative growth of almost 4 per cent, vacant land shows a negative growth of 29 per cent, while water bodies and wetlands have shown a negative growth of 2 per cent. On the other hand, the total built up area has registered a positive growth of 112 per cent, plantations and scrublands show a positive growth of 3 per cent and horticulture has increased by 59 per cent in the region during the period (1992-2011).

Land Consumption Rate and Land Absorption Coefficient

The Land consumption rates and absorption coefficients were computed for the urban centres for 1981 and 2011 and are given in table 4.

Table 4: Land Consumption Rate and Land Absorption Coefficient

Name of the Urban Centre	LCR 1981	LCR 2011	LAC 1981/2011
Bandipore	0.085	0.036	0.006
Baramula	0.046	0.034	0.023
Ganderbal	0.084	0.027	0
Kupwara	0.084	0.019	0.008
Sopore	0.045	0.027	0.010
Average	**0.056**	**0.030**	**0.011**

Source: Computed from Census Records (1981 & 2011)

The table 4 indicates that the land consumption rates have decreased from 1981 to 2011 for all the urban centres under study. Land consumption rate is a measure of compactness which indicates that the progressive spatial expansion of the towns was high in 1981 but has shown a decreasing trend between 1981 and 2011. It indicates that the land-man ratio or the land available per person was higher in 1981 and has decreased during the period (1981-2011). Among the five urban centres, the LCR shows maximum change for Kupwara, followed by Ganderbal and Bandipora respectively, while Baramulla and Sopore show lower rates of changes in the LCR during the period. It indicates that the land available per person has decreased at higher rate in Kupwara, Ganderbal and Bandipora compared to Sopore and Baramulla. On the other hand, land absorption coefficient (LAC) being a measure of consumption of new urban land by each unit increase in urban population, and therefore suggests that the rate at which new lands are acquired for development is high, with the exception of Ganderbal where it comes out to be zero because the urban centre shows no spatial growth during the study period (as per census records). The new land available for each unit increase in population is highest for Baramulla amongst the urban centres under study indicating that this urban centre has shown considerable areal growth along with growth in population during the period (1981-2011).

VI. Conclusion

Bandipora, Baramulla, Sopore, Kupwara and Ganderbal are amongst the important medium sized towns of Kashmir Valley. The study indicated that the urban and demographic variables indicated a positive growth trend from 1981 to 2011. The land use change analysis reveals that the built up area indicates a positive growth in all the towns, and reveals that the built up area has increased mainly at the cost of agricultural land, wetlands, water bodies and some vacant/barren land. Some of the agricultural land was converted to horticulture during the period. Agriculture land has been witnessed as the prime victim of this land transformation which has lost 12 sq kms during the study period. Vacant/barren land and water bodies are the other prominent victims of land transformation in the urban centres. Land Consumption Rate has shown a decreasing trend during 1981 to 2011 and the average Land Absorption Coefficient is computed to be 0.011.

References

[1]. Balogun, I.A., Adeyewa, D.Z., Balogun, A.A. And Morakinyo, T.E.; (2011); Analysis Of Urban Expansion And Land Use Changes In Akure, Nigeria, Using Remote Sensing And Geographic Information System (GIS) Techniques; Journal Of Geography And Regional Planning, Vol. 4; pp. 533-541.

[2]. Bhat, M.S.; (2008); Urban System in Himalayas; Dilpreet Publishing House, New Delhi, pp 135-147

[3]. Bryant, C. R., Russwurm, L. H. & McLellan, A. G.; (1982); The City's Countryside: Land and its Management in the Rural – Urban Fringe. Published Project, pp 5.

[4]. Fanan, U., Dlama, K. I. and Oluseyi, I. O.; (2011); Urban expansion and vegetal cover loss in and around Nigeria's Federal Capital City; Journal of Ecology and the Natural Environment Vol. 3(1); pp 1-10.

[5]. Farooq, S. and Ahmad, S.; (2008); Urban Sprawl Development Around Aligarh City: A Study Aided By Satellite Remote Sensing and GIS; J. Indian Soc. Remote Sensing, pp. 77-88.

[6]. Fazal, S. & Amin, A.; (2011); Impact of Urban Land Transformation on Water Bodies in Srinagar City, India. Journal of Environmental Protection, 2, pp 142-153.

[7]. Fazal, S. and Amin, A.; (2012); Land Transformation Analysis Using Remote Sensing and GIS Techniques (A Case Study); Journal of Geographic Information System, 4; pp 229-236.

[8]. Fazal, S.; (2000); Urban Expansion and Loss of Agricultural Land-A GIS Based Study of Saharanpur City, India; Environment and Urbanization; pp 133-149.

[9]. Husain, M.; (2001); Human Geography; Rawat Publications, Jaipur, pp. 366-396.

[10]. Jantz, P., Goetz, S. & Jantz, C.; (2005); Urbanization & Loss of Resource Lands in the Chesapeake Bay Watershed.

[11]. Khullar, D.R.; (2005); India-A Comprehensive Geography; Kalyani Publications, Delhi; pp.435-439.

[12]. Lo, C.P. and Yang, X.; (2002); Drivers of Land-Use/Land-Cover Changes and Dynamic Modeling for the Atlanta, Georgia Metropolitan Area; Photogrammetric Engineering & Remote Sensing; Vol. 68, No. 10; pp. 1073-1082.

[13]. Malik, M. I.; (2012); Spatio-temporal analysis of urban dynamics in Kashmir valley (1901-2011) using geographical information system; International Multidisciplinary Research Journal 2012, 2(8); pp 21-26.

[14]. Mandal, R.B.; (1998); Urban Geography; Rawat Publications, Jaipur; pp.459-461.

[15]. Mohan, M., Pathan, S.K., Narendrareddy, K., Kandya, A. and Pandey, S.; (2011); Dynamics of Urbanization and Its Impact on Land-Use/Land-Cover: A Case Study of Megacity Delhi; Journal of Environmental Protection; pp 1274-1283.

[16]. Opeyemi, Z.A.; (2008); Monitoring the Growth of Settlements in Ilorin, Nigeria; The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Vol. XXXVII. Part B6b. Beijing; pp 225-232.

[17]. Rashid, M., Lone, M. A. and Romshoo, S.A.; (2011); Geospatial tools for assessing land degradation in Budgam District, Kashmir Himalaya, India. J. Earth Syst. Sci. 120, No. 3, June 2011, pp. 423–433

[18]. Sekar, S.P. & Kanchanamala, S.; (2011);An Analysis of Growth Dynamics in Chennai Metropolitan Area; Institute of Town Planners, India Journal 8; pp. 31-57.

[19]. Sreenivasulu, V. & Bhaskar, P.U.; (2010); Change Detection in Land-use and land-cover using Remote Sensing and GIS Techniques; International Journal of Engineering Science and Technology, Vol. 2; pp. 7758-7762.

[20]. Turner II, B.L., Kasperson, R.E., Meyer, W.B., Dow, K., Golding, D., Kasperson, J.X., Mitchell, R.C., Ratick, S.J.; (1990); Two types of global environmental change: definitional and spatial-scale issues in their human dimensions; Global Environmental Change: Human. Policy Dimensions, 1; pp 14-22.

[21]. Wani, R. and Khairkar, V.P.; (2011); Quantifying land use and land cover change using geographic information system: A case study of Srinagar city, Jammu and Kashmir; International Journal Of Geomatics And Geosciences, Volume 2, No 1; pp 110-120.

[22]. Yeates, M. and Garner, B.; (1976); The North American City; Harper and Row Publishers, New York.