



Journal of Geography and Regional Planning

Volume 8 Number 6 June 2015

ISSN 2070-1845



*Academic
Journals*

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JOY KARMAKAR

Review

Impact of silica mining on environment

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Received 16 April 2015; Accepted 27 May, 2015

From the beginning of human civilization, paradigm of man-nature relationship is changing continuously. After industrial revolution human interference in the natural ecosystem increased and technological development made us capable to explore and extract natural resources, while human greed enhanced the pace of their exploitation. With growing development, the man nature relationship became more imbalanced. Mineral resources were always in the centre of human interest due to their economic importance. Silica mineral is the major constituent of Lithosphere and its manifold industrial use makes it more valuable. But, its fast extraction damages the environmental quality of a region. In this paper the pros and cons of silica mining by the environmental perspective has been measured by taking Shankargarh region as a case. Out of 57 mining sites in the study area, one third of the mines are situated in three villages and these villages are at highest threat from environmental point of view. Although State Government has given Mining lease over only 206 acre land but during field survey the author noticed the illegal mining over area more than 2000 acres. Such large scale silica mining has changed the land cover and land use pattern of the region.

Key words: Environmental loss, land backfill programme, water filtration, undulating topography, mining Mafias.

INTRODUCTION

Mining activity exerts a long lasting impact on landscape, eco-system and socio-cultural-economic considerations. It is noteworthy to mention that the actual land mass available to mankind is just 30% of total global surface area. India's land area is about 2-3% of the global land area, where as it supports more than 16% of the global population. This important statistics reveals that the poor per capita land holding stands at 0.32 hectares, which calls for due attention to restoration/reclamation of land after mining in order to utilize the land for useful purpose.

Although the occurrence of minerals in Uttar Pradesh is

rare yet the districts in the southern part viz. Lalitpur, Chandauli, Mirzapur, Sonbhadra, Allahabad hold important place in state's overall mining of coal, diaspora, limestone, pyrophyllite, silica sand, sulphur etc.

Silica sand refers to sand having the composition and grain-size distribution required for industrial applications. Quartz or silicon dioxide (SiO₂) is one of the most common minerals found on the Earth's surface and is found in rocks like granite, gneiss, and sandstone. Industrial silica sand is a higher value product than sand and gravel used in the construction industry (Table 1).

Silica sands have a large number of other industrial

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Table 1. Mineral production in Uttar Pradesh (2010-11 to 2012-13).

Mineral	Unit	2010-11			2011-12			2012-13		
		No. of mines	Quantity	Value ('000 Rupees)	No. Of mines	Quantity	Value ('000 Rupees)	No. of mines	Quantity	Value ('000 Rupees)
All Minerals		26		36337639	25		42973146	23		43043967
Coal	`000t	5	12029	8747200	5	13968	15067800	5	15526	15122300
Diaspore	T		14462	15974		14527	18882		14910	18498
Limestone	`000` t	1	477	50105	1	2455	353545	1	2865	379183
Pyrophyllite	t	8	22634	5631	8	17215	3475	9	27555	5882
Silica sand	t	12	182067	23729	11	183367	34444	8	129639	23104
Sulphur	t		42915			36130			38856	
Minor Minerals				27495000			27495000		-	27495000

Source: Indian Bureau of Mines, 2014.

uses depending on their characteristics, that is,

1. Production of glass
2. Foundry sand
3. Ceramics
4. Sandblasting and other abrasives
5. Building products
6. Filler and extender
7. Production of silicon and silicon carbide
8. Pigments
9. Hydraulic fracturing and propping in the oil industry
10. Ultra high silica products in the electronic and fibre optic industries, fused silica, silicone products
11. Water filtration

Being a key raw material in the industrial development of the world especially in the glass, foundry and ceramics industries, it has continued to support human progress throughout history. Silica contributes to today's information technology revolution being used in the plastics of computer mouse and providing the raw material for silicon chips. Although glassmaking and foundry uses

predominate, numerous minor uses are based on either the chemical purity or physical properties of the sand (such as grain-size distribution or grain shape). These include ceramics, water filtration, fluidized-bed furnaces and chemical manufacture.

Silica sand resources are distributed in Andhra Pradesh, Bihar, Gujarat Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh States of India. Major mines of silica sand are in Allahabad District of Uttar Pradesh State of India. The Shankargarh area - of Allahabad District is famous for its Silica mines and for the quality of the silica deposits. These mines are situated in the Vindhyan Hills of the Allahabad District and extensive open cast silica mining is being performed since over three decades which is causing great damage to the forests and biodiversity.

DATA SOURCE AND METHODOLOGY

The study is empirical and based mainly on survey. The data regarding allocation of mining

leases in the region was obtained from Department of Mines and Geology, Allahabad. To verify the ground reality a detailed survey of the study area was conducted. During the study the author did a schedule survey among the labourers working on mining sites to understand the availability of basic amenities like water, health and sanitation to them, and nature, process and volume of silica mining in the area. He visited more than 50 mining sites to document the impact of large scale surface mining on agricultural and forest land. Water is most important element in processing and refining silica sand and, therefore, to study the nature and amount of water use/reuse, and volume of vehicular movement involved in transportation of the refined sand, many processing plant installed near these mines were visited.

The study area

Shankargarh region is located between 25°10'N to 25°20'N latitude and 81°37'E to 81°45'E longitude

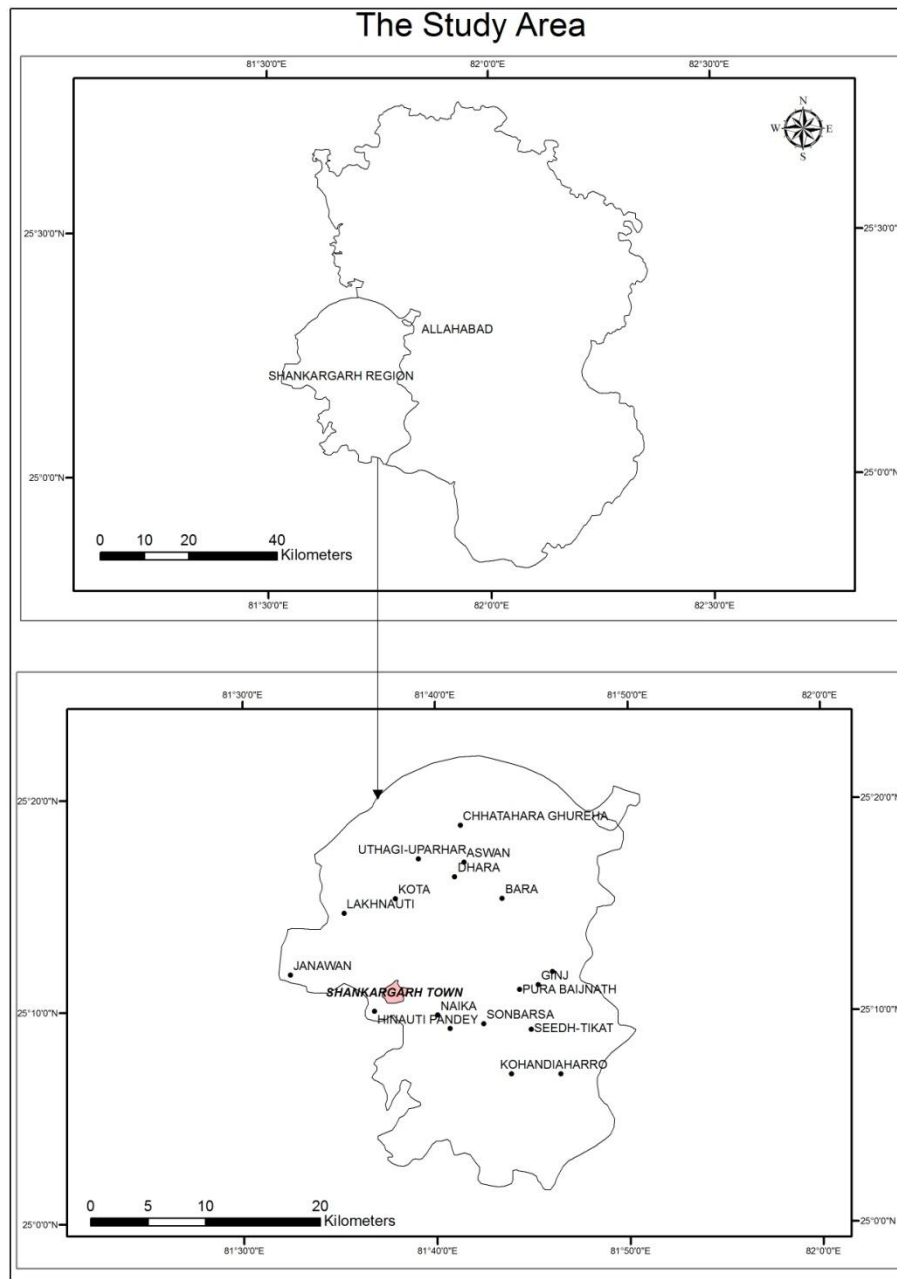


Figure 1. Location of Shankargarh Region in Allahabad District.

(Figure 1). The area forms a gentle undulating topography. This semi-arid area has no major physiographic features such as major rivers, hills and forest areas and the drainage pattern is dendritic. The region is rich in sand stone deposits and structurally the deposits are horizontally layered.

The most of the local people are tribals known as Kole. Literacy level is very poor and almost all females are illiterate who work as mining labourers in silica mines. Economic strata of people lie in one class only, as all are

under very poor group (Mishra, 2015). The community land and surrounding area is rocky. Thus, there is a little possibility of agriculture.

Shankargarh is the biggest supplier of silica sand to the glass industry of the country. The area where these silica mines are situated is a backward despite the rich mineral resources that it has. Its extensive quarrying and open cast mining has resulted into long barren, unproductive and irregular sloppy lands therefore unfit for cultivation. As per government records (DMG, 2014), 57 mines are

Table 2. Silica Sand Mining Leases in Bara Tehsil of Allahabad District.

S/No.	Village	Area in acre	No. of leases
1	Chatehara-Ghurehtha	23.8	5
2	Sonbarsa	27.5	10
3	Janawa	6.5	3
4	Dhara	6.5	2
5	Seedh-Tikat	8	4
6	Kota	10.25	3
7	Lakhnauti	13.27	1
8	Geenj	16	5
9	Hinauti Pandey	18.68	4
10	Naika	3	1
11	Kohandia	19.75	7
12	Uthgi-Uparhar	19	3
13	Poore Baijnath	9.75	3
14	Bara	5	1
15	Aswan	5	1
16	Harro	14	4
	Total	206	57

Source: DMG Allahabad, 2014.

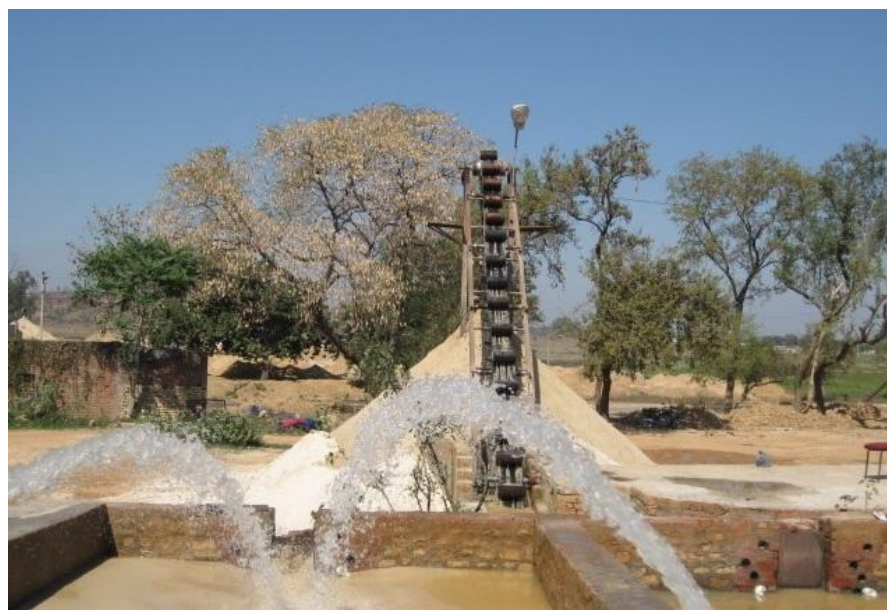


Figure 2. A silica sand processing plant.

being operated in the region on 206 acre land (Table 2). These mines are distributed in 21 villages. Sonbarsa occupies the largest area under mine followed by Chatehara-Ghurehtha, Kohandia, Uthgi-Uparhar, Hinauti Pandey and Geenj. Some silica sand mines in the region process the sand on-site however processing is done mainly off-site. Processing begins by washing the sand

to remove fine particles (Figure 2).

Washing is done by spraying the sand with water as it is carried over a vibrating screen. The fine particles are washed off the sand and the coarse particles are carried along the screen by the vibration. An alternative method uses an upflow clarifier, where water and sand flow into a tank. Fine particles overflow the tank while the washed



Figure 3. A mined silica sand site.



Figure 4. The ravenous topography resulted from large scale open cast mining.

sand falls by gravity to the bottom. After washing, the sand is then sent to a surge pile where water adhering to the sand particles infiltrates back into the ground. From the surge pile the sand is sent to the dryer and screening operation where the sand is dried in a drum with hot air blasted into it. Then the sand is cooled and often further sorted to separate sand that is suitable for fracking from sand that is not suitable. Some non-metallic mining processors use 4500 to 6000 gallons of water per minute. Local aquifers cannot provide this much water, so reuse

of water is necessary.

The land resources of the study area is severely degraded due to open cast silica mining and unfilled explored mines have become a potential shock to the land environment of the region (Figure 3).

These abandoned mines have changed the region's topography. The continuous process of opencast mining has scarred the landscape, disrupted ecosystems and destroyed microbial communities of the area (Figure 4).

Apart from these unsightly impacts, the degraded



Figure 5. A post mining site.

environment created in the aftermath of opencast mining is unable to support biomass development in the region (Figure 5).

Illegal and uncontrolled mining in the region is a big issue of concern. In an inspection of Directorate of Mines Safety, Varanasi, in August, 2014 in silica sand mines of some villages of this region, glaring violations of mining rules were noticed. Unqualified persons without any duly qualified blaster were given the task of blasting, thus endangering the life and safety of persons employed in the mines. During field survey author noticed that the sides of the opencast workings in all these mines were not kept benched or sloped, and stood near vertical over a height of 6m-10m. Loose boulders were allowed to remain within 3 mt. of the top edges of opencast workings. Undercuts and overhangs were also observed on sides of opencast workings and at none of these mines was the top of the opencast working kept fenced. Out-of-use pits had also not been backfilled. Furthermore, proper facilities of drinking water, first aid, ambulance and rest shelters were not provided anywhere.

Pointing out glaring violation of rules, the Mining Directorate, Varanasi states that, quarterly and annual returns of the mines are not being submitted to the Safety Directorate. Due to Mining Mafias, the situation has become uglier and in lack of sufficient regulatory mechanism, large scale illegal mining is posing threat to

regional eco-sustainability. Increase in production and opening of new mines is generating pressure on environmental attributes.

The key environmental problems arising out of mining activities in the study area are;

Land Deterioration: Land degradation is one of the significant impacts of mining activity which is mainly in the form of alteration of land structure due to excavation, interference with natural drainage, ground water depletion, stacking of mine waste, loss of fertile top soil, degradation of forest land, adverse effect on aquatic biodiversity and public health. Due to unaccounted large scale open cast mining, the land is losing its productivity due to removal of top soil. Fast vegetation cover loss has promoted erosion in the area.

Loss of Biodiversity: Natural vegetation play a key role in balancing the local ecosystem and fast green cover loss has disturbed the eco-balance of the region.

Pollution: The SPM (Suspended Particulate Matter) generated by silica mining and from the rubble heaped on the side of mines, is posing threat to the local environment. These particles get accumulated on leaves and thus they disturb the photosynthesis and respiration process. Further they pose health hazard to the

surrounding population residing in the nearby villages. The rain water ponded in unfilled mines percolates downward thereby contaminating the ground water. Surface run-off of muddy water changes the nature of external water bodies and causes water borne diseases.

Deterioration of Ground Water and Natural Drainage

System: In the refining process of silica sand, water is used in large amount for washing. Due to large extraction of ground water, the water table in the area is getting lowered rapidly. Due to surface run-off, accumulation of mud, silt and sand in the natural channels, the natural drainage system is getting disturbed.

Conclusion

The present study shows that at various stages of the mining, the government's involvement is little. No health facilities are being provided to the workers and no proper clean water availability is made at the mining site. These hard labourers are under paid (Rs. 100) even less than the wage set under MNREGA. Total dependence on labour force at every stage of mining increases the chance of resource wastage. No Land Backfill process is carried out at excavated sites. No, forestation and afforestation programme has been implemented in the mining areas. Unregulated and rapidly expanding mining activities have completely changed the region's topography and it has turned into a wasteland. Vegetation loss has promoted erosion, land degradation and loss in biodiversity. Green cover functions as lungs which purifies the air and reestablishes the eco-balance. But increasing human greed is continuously engaged in its removal. Increasing truck haulage, blasting at the sites and high increase in the SPM is reducing the air quality of the region.

In view of the illegal and unjudicious mining in the region government must play a decisive role at each level from allotment of mining license to fair selling of the valuable Silica sand and in turn providing fair and genuine wages to the hard working labourers, better health amenities and education to the working force. Control measures for air and water quality management should be formulated. Land Backfill Programme should be carried out through Reclamation and Restoration Programme. Forestation and afforestation should be carried out in region to increase the green cover. This highland area should be converted into Solar Power Generation Plant through Solar Panel installation to meet the local energy demand. Fencing of the mining area is must to avoid illegal mining and to diminish the environmental loss.

Conflict of Interests

The author have not declared any conflict of interests.

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Full Length Research Paper

Geospatial mapping of Srinagar City

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Received 5 May 2015; Accepted 9 June, 2015

Mapping has remarkably become an essential tool to represent the land surface processes, utility sites and the interactions of the human activities with the environment. The rapid evolution of geographic information data management and the automation of satellite image interpretation through remote sensing techniques are providing increasingly abundant ways of mapping. Geospatial approach is very useful tool to demonstrate the spatial disparity of land use land cover and the distribution of key areas, Heritage sites, and Tourist utilities. In this paper, an integrated approach of remote sensing, geographic information, GPS and field surveys was utilised to map the Srinagar city. Mapping was sub divided in three broad categories: land use land cover dynamics mapping, tourist utility mapping and cultural heritage mapping. To improve the adverse environmental impacts of urban expansion, planning regulations need to be enforced and effective coordination should be ensured to save the declining natural resource base for sustainable development and tourism.

Key words: Geospatial mapping, land use land cover, cultural mapping, tourist utilities and sustainable development.

INTRODUCTION

Land use land cover mapping

Land use is the term which is referred to human uses of the land, or direct actions changing or altering natural land cover. Land cover refers to biophysical characteristics of a particular area. The natural and socioeconomic factors and their utilization by humans in time and space determine the land use land cover pattern of a region (Zubair, 2006; Rahdary, 2008; Bhagawat, 2011; Shiferaw, 2011; Liu et al., 2014). The pace, degree and spatial range of human modifications of the Earth's

land surface are unprecedented (Chunyang et al., 2005). Mankind has been modifying land cover ever since pre-history through the practice of fire to flush out game and, since the dawn of plant and animal taming, through the clearance of bits of land for cultivation and livestock. From the past two centuries the influence of anthropogenic activities on land has grown up massively, modifying entire landscapes, and eventually impacting the earth's nutrient and hydrological cycles as well as

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climate (Skole, 1994; Goldewijk, 2001; Liu et al., 2010). Land use land cover change has substantial effects on elementary practises including biogeochemical cycling, erosion of soils and in that way on global warming and on sustainable land practise (Penner, 1994; Douglas, 1999). LULC transformations are native and place specific, occurring in ways that frequently escape our attention. However, they add up to the important aspects of global environmental alterations.

Information on the rate and kind of changes in the use of land resources is essential for proper planning, managing natural resources and monitoring environmental changes and to regularise the use of such resources (Gautam and Narayanan, 1983).

Remote Sensing (RS) and Geographic Information Systems (GIS) techniques offer effective tools for examining, updating and retrieval of the land use dynamics of the region as well as for monitoring, mapping and management of natural resources in less time, at low cost and with improved accuracy (Star et al., 1997; McCracker et al., 1998; Chilar, 2000). By understanding the driving forces of land use changes in the past, managing the recent situation with contemporary GIS tools, and modeling the forthcoming changes, one is able to develop plans for numerous uses of natural resources for sustainable development and natural management (Smiraglia et al., 2013; Jame and Jaun, 2014; Xuesong et al., 2014).

This paper aims to review the use of integrated approach of remote sensing, GIS, GPS and field surveys for mapping and status of LULC changes, heritage and tourist utility mapping in the Srinagar city.

Heritage mapping

Cultural heritage is the most commonly appreciated and uniformly spread resource in the world. However cultural heritage is under end less risk of loss or even demolition and correct monitoring is essential to reduce the risk of losing heritage or work as foundation for renovation. Cultural mapping has been accepted by national and international organisations and associations as a fundamental tool and method in preserving the world's imperceptible and perceptible cultural resources and assets of a country.

Geospatial information system is a valued tool that captures, stores, examines, manages, and presents information that is linked to places. It involves an extensive range of procedures and activities from community-based involved data gathering and managing to classy representing using geoinformatics based tools i.e. GIS, RS, global positioning systems (GPS) and web-based mapping science and tools. This allows conservation of the data of Cultural and Heritage value and compromises new exploitation potentials, like the instantaneous joining of different kinds of data for

analysis, or the digital documentation of the location for its development (Summerby, 2001; Cherplan, 2013; Zubair et al., 2014).

Tourist Utility Mapping

Tourism in the form of activity affects the areas in which it is developed and received with economic, social, cultural, and environmental dimensions (Brown et al., 1997). Tourism is movement for entertainment, relaxation, or business purposes. The World Tourism Organization (WTO) defines tourist as people "travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes". It forms occasions for occupation in the service division of the economy, connected with tourism. The service activities include transport services such as airlines, buses, taxicabs; hospitality services such as lodgings, including hotels, restaurants and resorts; and entertaining services such as amusement parks, gardens and shopping complexes. For the tourism development of an area, it is essential to consider the interest of its local masses. In terms of tourism management recently, researchers have initiated to study how local inhabitants can be involved in tourism events and get reimbursements from it. Environmental conservation plays a significant part in environment-friendly tourism development and carrying capacity assessment. Various researchers now approve that tourism management should involve a two-way connection between tourism and eco-friendly conservation (Patil and Patil 2008). Thus, tourism necessities to be developed in a planned way and GIS assists as a decision support system in the processes (McAdam, 1999; Jovanović and Njeguš 2013; Aklıbaşında and Bulut, 2014).

This paper aims to review the use of integrated approach of remote sensing, GIS, GPS and field surveys for mapping and status of LULC changes, heritage and tourist utility mapping in the Srinagar city.

Study area

Srinagar City is once called "*Paradise on Earth*"; however, the greed of mankind has converted it in to a conflict sector. The entire region is for the last several years in disorder with political, financial and social conflicts. At the same period, the city has also observed urban forces acting to alter the city landscape. Srinagar is the summer capital of the state of Jammu and Kashmir, India and is located in the valley of Kashmir at an altitude of 1,730 m above sea level. Srinagar lies between the coordinates 34⁰01` N to 34⁰27`N latitude and 74⁰ 36` E to 75⁰ 30` E longitude over an area of 245 km². The city lies on banks of the River Jhelum and is famous for its lakes and houseboats floating on them. The Dal and Nigeen lakes enhance its charming settings, while the shifting play of

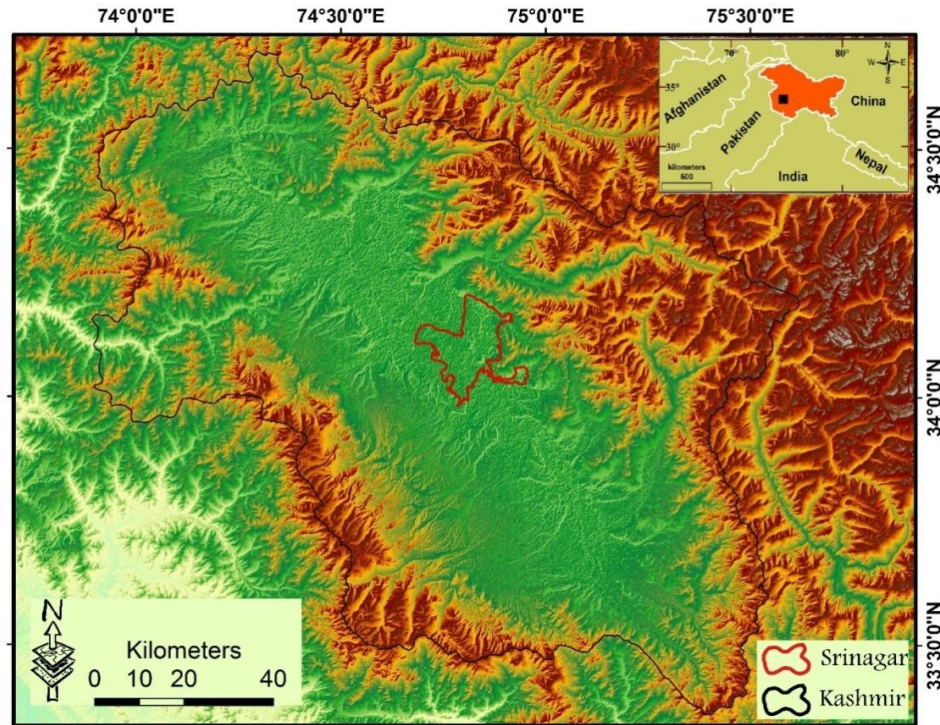


Figure 1. Location of Study area.

the seasons and the salubrious climate ensures that the city is equally attractive to visitors around the year. Srinagar is the commercial hub of the Kashmir valley. Tourism, as well as some other economic sectors, is a major profitable economic sector in Srinagar city (Dar, 2014). As with other parts of the world, the environmental scenario within Srinagar city has tremendously changed. The rapid rise of population together with development in transport, communication, and other areas has drastically altered ecological conditions of the city and destroying the basic functionalities of environment. The reasons “local effects” which have changed altogether the ecological scenario of the city are the direct outcome of the absolute ignorance as far as our natural land use capabilities and their proper use and management is concerned. Therefore, it is necessary to develop land information databases or inventories on temporal basis that could make available information on type, location, spatial distribution, actual extent, rates and patterns of change of each category of land use, heritage and tourist destination places in the city (Rocheleau, 1995; Nightingale, 2003). Figure 1 shows the area location of Srinagar city.

MATERIAL AND METHODS

Data sources

Multi-temporal satellite data from Landsat MSS (79m) acquired in

October 1972, Landsat TM (30m) acquired in October 1992, IRS LISS-III (23.5m) acquired in October 2005 and Landsat OLI (30m) acquired in 2013 were used for the analysis of land use land cover dynamics. Besides satellite data survey of India (SOI) map, field survey using hand held GPS and Google earth were also used for the accuracy assessment of the LULC maps and mapping of Heritage sites and tourist destinations.

Mapping approach

Supervised Image classification was used to classify all the satellite images from 1972, 1992, 2005 and 2013. The quality of supervised classification depends on the quality of the training sites (Palaniswami et. al 2006). All the supervised classifications usually have a sequence of operations that must be followed, defining the Training Sites, Extraction of Signatures and Classification of the Image (Perumaland Bhaskaran, 2010; Mountrakis et. al 2011). Different training sets were developed after analysis of various visual (color, tone, texture, shape, shape, size, association, convergence of evidence, etc.) and statistical characteristics (mean, standard deviation, etc.) of the data. Finally the classification methods are applied. Supervised classification was performed using an appropriate decision rule (maximum likelihood algorithm). The Gaussian maximum likelihood (GML) classifier was used in this study for three reasons. First, it is relatively convenient to implement. Secondly, the maximum likelihood decision rule is by far the most common supervised classification method and is widely used. Finally, the GML is robust and utilizes mean, variance and covariance of training site statistics, where most other decision rules are based on simpler statistics (Perumal and Bhaskaran, 2010, Murtaza and Shakil, 2014).

The authenticity and accuracy of the LULC map of 2013 was validated in the field to determine its accuracy. The accuracy

estimation is essential to assess reliability of the classified map. Kappa coefficient, the robust indicator of the accuracy estimation was also estimated for the final LULC map. In addition, the overall accuracy, user's accuracy, producer's accuracy, were also computed to assess the accuracy of the LULC. This was followed by extensive ground validation in order to obtain an accurate LULC class in the field (Murtaza and Shakil, 2014). Overall classification accuracy is given by the following formula:

$$\rho = \left(\frac{n}{N}\right) * 100 \dots\dots\dots (I)$$

Where 'ρ' is classification accuracy, 'n' is number of points correctly classified on image, and 'N' is number of points checked in the field. The Cohen's Kappa statistics allows accessing the accuracy that takes into account the chance of random agreement. Kappa coefficient, the robust indicator of the accuracy estimation for the final LULC map was estimated by the following formula. The equation for κ is:

$$k = \frac{pr(a) - pr(e)}{1 - pr(e)} \dots\dots\dots (II)$$

Where Pr (a) is the relative observed agreement among raters, and Pr (e) is the hypothetical probability of chance agreement, using the observed data to calculate the probabilities of each observer randomly saying each category.

Extensive field survey of the study area was carried out in order to locate and map the heritage sites and tourist utilities. The coordinated data of heritage and tourist utility sites were collected using Handheld GPS and later on processed in GPS pathfinder software in order to make the data readable in GIS environment and remove errors that had occurred during the field survey. The heritage site database developed in Excel format was converted to .dbf format and integrated with the point locations of heritage sites through a joining process in GIS environment. The heritage ancillary data pertaining to heritage sites procured from different government and non-governmental agencies (INTACH) was classified into different thematic maps or layers as: Residential, Public, Religious, Natural Features, Institutional, Commemorative and Commercial. The thematic maps were stored in the Geodatabase format to generate the final geospatial database of Heritage Sites for Srinagar City. Similarly, the tourist utilities centres were classified into different thematic layers, that is, ATM, Hotels, Travel agencies, Taxi stands, Shikara Ghats, Restaurants, Guest houses, and House boats. The data pertaining to tourist utilities were collected from various governmental agencies (like Tourism Department etc.) and non-governmental agencies (like Banks Offices etc.). Only those utilities were mapped which were registered either with government or non-governmental agencies. And finally all the layers were merged into a single layer to create a final tourist utility map of the Srinagar city.

RESULTS AND DISCUSSION

Land use land cover mapping

This part of the study is focused to analyse spatial and temporal information of land use land cover dynamics. Using supervised classification, Satellite data was classified into thirteen different LULC classes; agriculture, aquatic vegetation, barren land, built-up, exposed rock, forest, horticulture, pasture, plantation, riverbed, scrub land, snow, and water. From the perusal of Table 1 and

Figure 2, it is evident that Srinagar City has witnessed large-scale changes in land use land cover dynamics. Significantly, the city has witnessed major land use changes among classes such as Built-up, Agriculture and Plantation. Built-up covers almost 40% of the total land, followed by Agriculture and Horticulture cover of 23 and 15% respectively in 2013. Land cover changes in Srinagar are driven by a multitude of processes. Such as alterations in land cover due to natural changes in climate. And due to many anthropogenic activities such as, population explosion, poverty, peoples responses to social, economic opportunities which ultimately affect natural environment. However, changes of land cover driven by anthropogenic forcing are currently the most important and most rapid of all changes (Turner et al., 1990). Since, Srinagar is a commercial hub and people prefer to live around their working places in the city which ultimately lead to land cover dynamics changes. Built-up has increased by 36% from 1972 to 2013 followed by Horticulture by 12%. While, agriculture and plantation have decreased by 24 and 13% respectively during the study period. Error matrix was used to assess the classification accuracy and is summarized in Table 2. The overall accuracy was 89%, with Kappa statistics of 0.87.

Heritage mapping

Around three hundred and thirty four heritage sites were mapped during extensive field surveys in the area. The heritage data pertaining to heritage sites was classified into different thematic layers as: Residential, Public, Religious, Natural Features, Institutional, Commemorative and Commercial. Following maps were generated theme wise along with information of each heritage site in order to generate Geo-Database. The attribute information about each GPS point in different themes was mapped. Figure 3 shows the distribution of Heritage sites in Srinagar city. Eighty four residential, Seventy four religious and fifty eight religious heritage sites were among the heritage sites which were mapped.

Tourist utility mapping

Around four hundred five tourist utilities were mapped during the extensive field surveys. Tourist utilities were classified into different thematic layers i.e. ATM, Hotels, Travel agencies, Taxi stands, Shikara Ghats, Restaurants, Guest houses, and House boats. And finally all the layers were merged into a single layer to create a final tourist utility map of the Srinagar city. Figure 4 shows the distribution of the tourist utilities. Hundred hotels and eighty house boats were among the tourist utilities which were mapped. Figure 5 shows some field

Table 1. Area under different LULC classes in Srinagar.

LULC classes	Area (km ²)	Area (km ²)	Area (km ²)	Area (km ²)	Change 1972-2013
	2013	2005	1992	1972	
Agriculture	56.22	62.17	89.00	116.09	-59.87
Aquatic Vegetation	21.05	20.40	19.40	10.91	10.14
Barren	1.31	4.00	5.00	6	-4.69
Built up	95.76	81.42	31.81	6.00	89.76
Exposed Rock	1	0.84	0.73	0.40	0.60
Forest	4.87	8.32	11.70	16.17	-11.30
Horticulture	36.84	20.11	17.14	7.84	29.00
Karewa	0.14	1.55	3.65	5.90	-5.76
Pastures	1.1	3.01	10.05	11.43	-10.33
Plantation	12.5	28.45	40.66	44.55	-32.05
River bed	0.21	0.44	0.56	1.14	-0.93
Scrub land	1.2	0.54	0.30	0.14	1.06
Water	12.82	13.77	15.02	18.45	-5.63
TOTAL	245.02	245.02	245.02	245.02	245.02

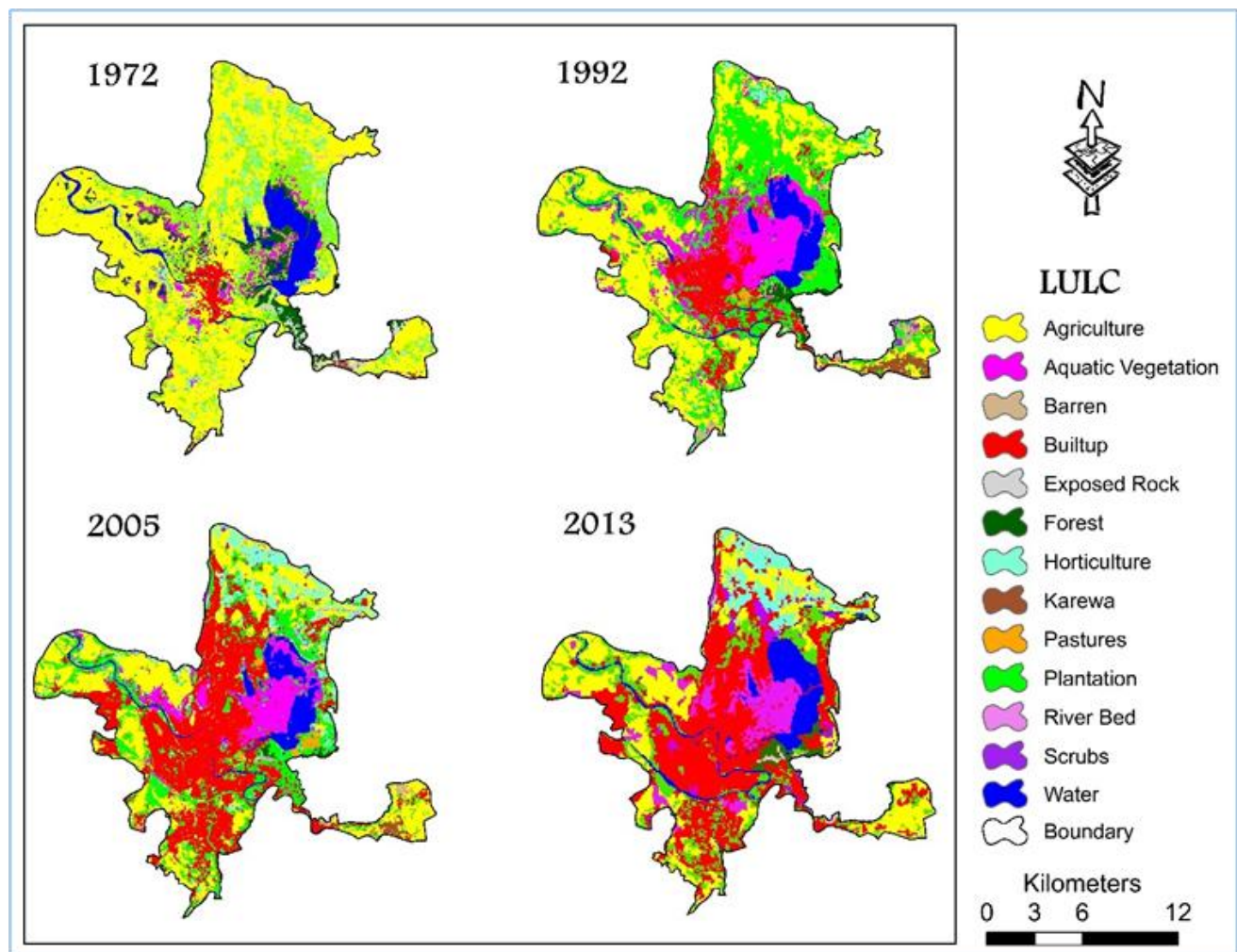
**Figure 2.** Land use land cover maps of Srinagar city from 1972, 1992, 2005 and 2013.

Table 2. Error matrix showing per class accuracy of 2013 land cover data.

Classes	HT	PL	RB	FT	BU	AG	SB	PS	WT	AV	ER	TT	U A
HT	26	1	-	-	-	2	-	-	-	-	-	29	89.66
PL	2	21	-	-	2	-	-	-	-	1	-	26	80.77
RB	-	3	6	-	1	-	-	-	-	-	-	10	60
FT	-	-	-	15	-	-	-	-	-	-	-	15	100
BU	-	-	-	-	60	-	-	1	-	-	-	61	98.36
AG	1	1	-	-	1	18	-	-	-	-	-	21	85.71
SB	-	1	-	1	-	-	8	-	-	-	-	10	80.00
PS	-	1	-	-	1	-	-	10	-	-	-	12	83.33
WR	-	-	2	-	-	-	-	-	7	-	-	9	77.78
AV	-	-	-	-	-	-	-	-	-	3	-	3	100
ER	-	-	-	-	-	-	-	-	-	-	4	4	100
TT	29	28	8	16	65	20	8	11	7	4	4	200	
P A	89.7	75.0	75.0	93.8	92.3	90.0	100	90.9	100	75.0	100		

Where; HT-Horticulture, PL-Plantation, RB- Riverbed, FT-Forest, BU-Built-up,AG-Agriculture, SB-Scrubs, PS-Pasture, WR-Water, AV-Aquatic Vegetation, ER-Exposed Rock, TO-Total, PA-Producers Accuracy and UA-Users' Accuracy.

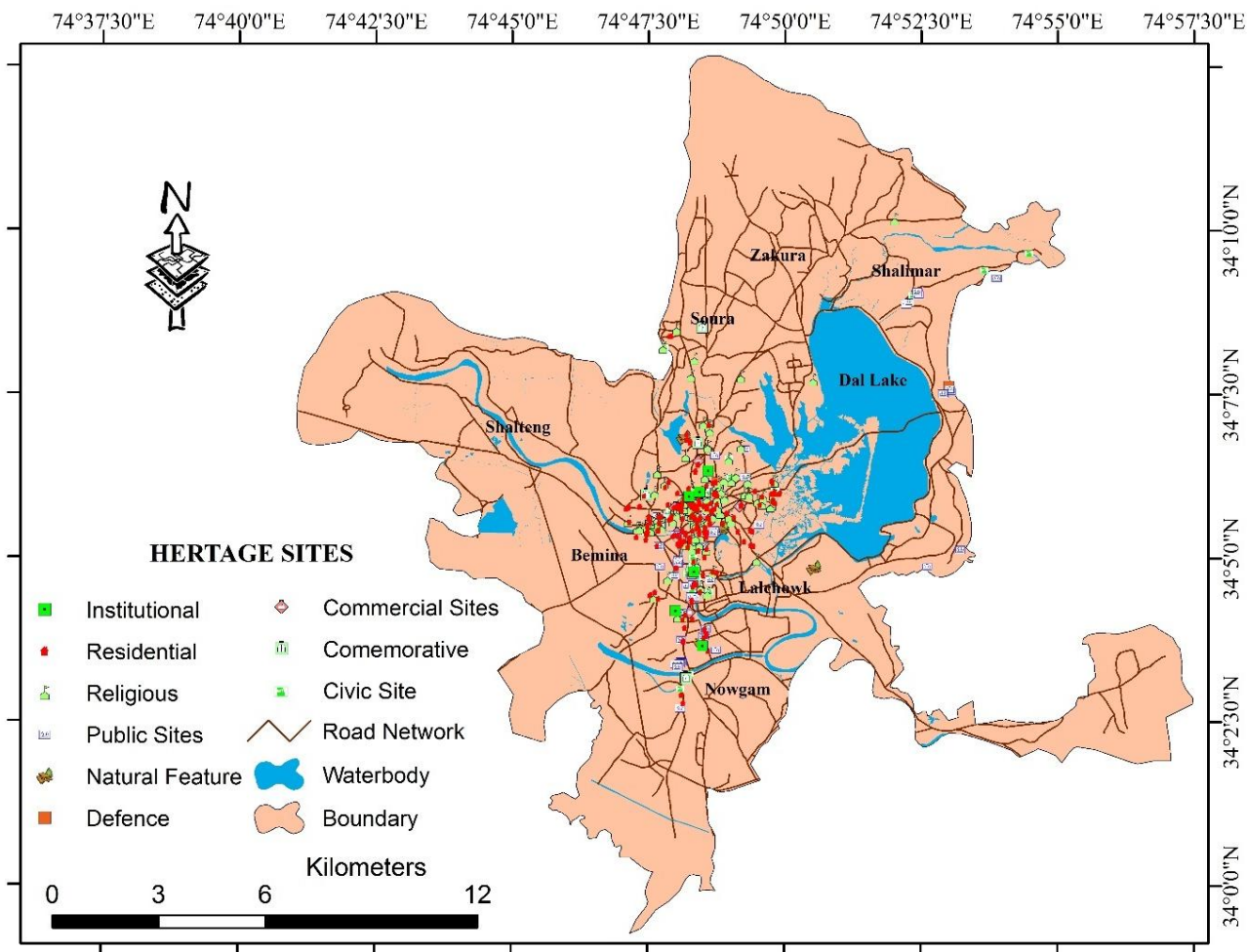


Figure 3. Distribution of Heritage sites.

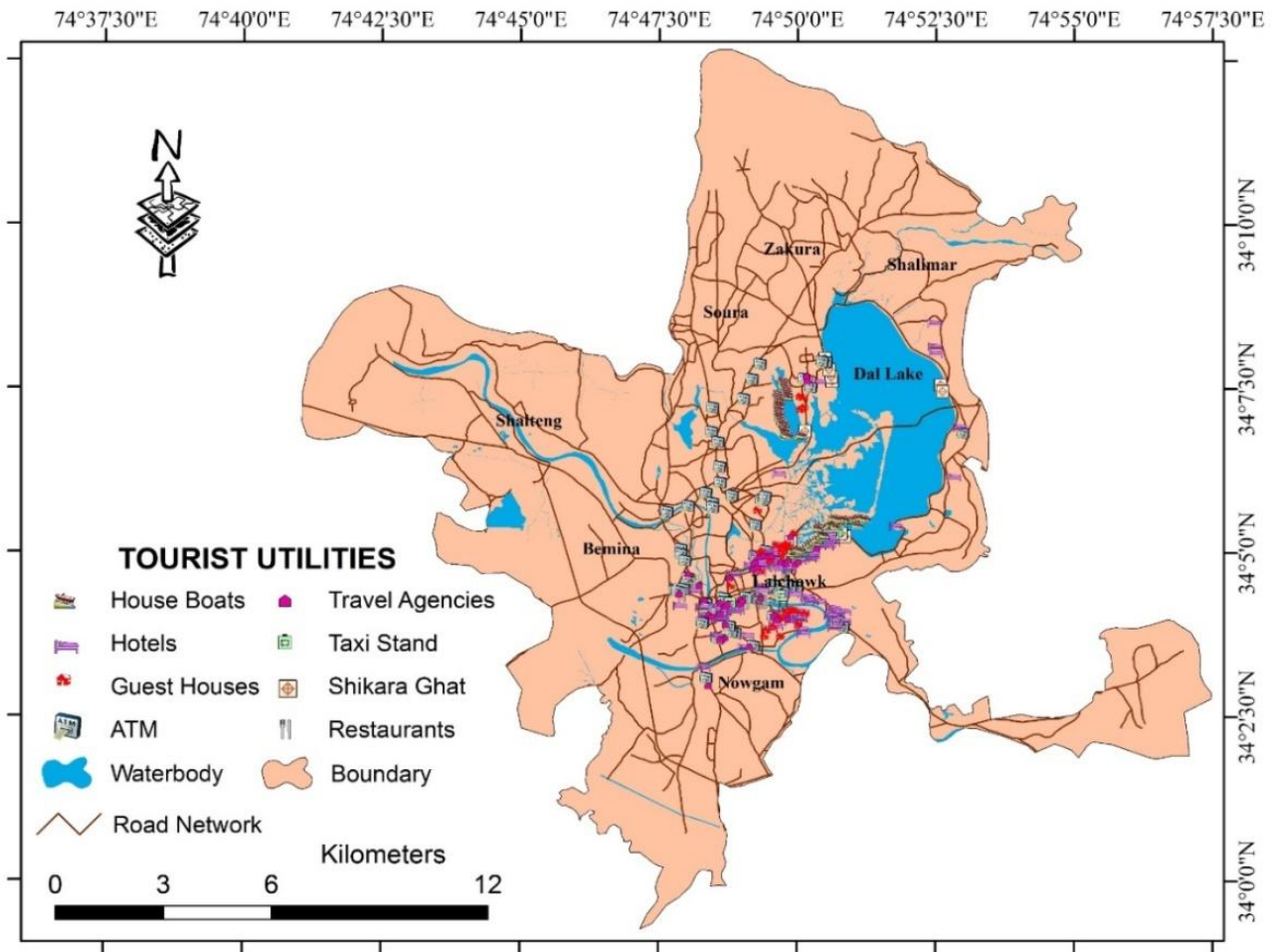


Figure 4. Distribution of tourist utilities.

photographs of land cover, heritage sites and tourist utilities in Srinagar City.

Conclusion

In this study, thematic maps are produced to demonstrate the spatial disparity of land use land cover and the distribution of key areas i.e. Heritage sites, and Tourist utilities in Srinagar city. This research demonstrates the use of an integrated approach utilizing remotely sensed data, field observations and ancillary data for mapping the Srinagar city. Mapping demonstrates that the analysis of land cover potential is the foundation of land planning. The result revealed that land use land cover in study area has under gone significant changes over the 39 years; in particular, the areas of forest and agriculture have been decreasing while as built-up and horticulture land have been increasing. The change of land use land cover in Srinagar city is probably driven by the growth of

population, reckless deforestation, and unplanned urbanization, changes in quantity and quality of water resources, economic and social developments. Similarly, heritage sites and tourist destination are under constant threat of destruction and environmental degradation due to unplanned management of these resources. Satellite remote sensing is an advanced technique for obtaining land cover dynamic information while a GIS is very useful to help analysts to carry out data management and analysis and GPS is an efficient tool to map the utility sites. To improve the adverse environmental impacts of urban expansion, planning regulations need to be enforced and effective coordination should be ensured to save the fast declining natural resource base for sustainable development. Spatial information is easy to understand and useful to policy makers to focus upon surfacing the strategies that safeguard sustainable use of our land resources. The maps presented in this study are expected to serve as a guide for the subsequent regional planning, thus promoting future studies on mapping land



Figure 5. Some field photographs of heritage sites, tourist utilities and land covers.

cover dynamics, tourist utilities and heritage sites.

ACKNOWLEDGEMENTS

Authors are highly grateful to the Department of Earth Sciences, University of Kashmir and State Remote Sensing Centre J&K Government for the moral support, guidance and necessary help.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Retrospect of post-colonial metropolitan planning in India: Critical appraisal

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Received 26 March, 2015; Accepted 12 May, 2015

Metropolitan planning after the six decades has evolved so much. Planning issues are not deviated from that much. Early urban planning was guided by their master plans. Four major metropolises of India namely Kolkata, Mumbai, Delhi and Chennai have formulated their master plans between mid sixties to late seventies. The paper tried to find out the evolution of the urban planning ideas from 1960s onward with respect to four Indian metropolises, to examine their planning strategy and understand if it is enough to solve the problem of the metropolises and lastly how neoliberal paradigm has shaped their strategy. It is apparent that each city masters plan failed to solve the problem. Population growth, land use strategy and housing problem remain the major issue. In the Early 90's India steps in neoliberal approach and urban development organizations shifting their planning strategy from strategic to entrepreneurial deregulates the housing and real estate market.

Key words: Strategic planning, entrepreneurial planning, neoliberalism.

INTRODUCTION

Urban development policy in third world with specific reference to Asia has been transformed for fifty years. In the early 1960 an effort was made on slowing down the rate of urbanization through control of the growth of large metropolitan cities. It was the 1980s when policy makers realized the inevitability of the growth of the largest city in the urban system. They started to begin stress for more diffused pattern of urban growth around the metropolitan area and stimulating the growth of secondary cities and smaller towns (Shaw, 1999). In India such policy shifts occurred earlier in late 1960s. West Bengal and

Maharashtra were the pioneers in the implementation of the diffusing urban growth strategy.

Urbanization policy is significant in Third World countries as the location of new economic activities and the migration of population have an influence on national economic efficiency and the stability of political systems. The rapid growth of urbanization especially of large cities generates imbalances in the socio-economic systems, bringing out maladies such as slums, urban poverty, environmental deterioration and excessive pressure on infrastructure. In countries like India where the state plays

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a dominant role in the progress, the need for urbanization policy is still more important to eliminate unintended and unwanted spatial effects of the macro-economic policies and to promote effective internal management of cities and inter-regional integration (Gnaneshwar, 1995).

Objective

This paper tried to find out the evolution of the urban planning ideas from 1960s onward with respect to four Indian metropolises. It is to be noted that the four metropolises have more than 200 years long colonial past. Therefore it is interesting to understand how these metropolises have truly evolved from 1960s onward with respect to their planning policy and implementation strategy.

METHODOLOGY

The paper deals with in-depth analysis of urban planning policy and program that have evolved in the post colonial and neoliberal period. The analysis is carried out in two different sections. The first section of the analysis undertakes thorough literature review of the selected plan documents of Indian Metropolitan cities and urban planning policy of the planning commission during 1960 to 1990. The key aspects covered are major urban planning policy and program took to arrest the crisis of the metropolitan areas and contextualize the policy and planning as 'strategic' in nature. In the second section, urban policy and planning program of 1990s onward were examined through the lens of entrepreneurial planning. The secondary data sources used to carry out analysis are listed below: Census reports, planning statistics, Annual reports of Government agencies, Technical and Master plan reports. Books, Journals, Conference proceedings, Study reports, and Internet based information.

FINDINGS

Early initiatives of metropolitan plan making

After independence centralization approach was taken to manage the emerging new form of urbanization both administratively, economically and demographically. Evident of this trend is revealed in rapid growth of metropolitan cities and stagnating small towns (Gnaneshwar, 1995). The four super-metros (Calcutta, Mumbai, Delhi and Chennai) constituted 52.7% of the total million-plus cities' population in sixties. However, two decades later government realizes that comprehensive attention should be given to urban planning and land policy because urban area is the engine of the economic growth (Gnaneshwar, 1995).

In 1954 Central Council of Local self-government was established and started to take the urban community development programs. After a decade in 1963 the Central Council of Local Self-Government and state

ministers for town and country planning took some policy measure to solve the prevailing urban problems. The measures are as follows.

1. To make urban local bodies in urban areas where they do not exist.
2. Promotion of the town area committees and Notified Area committees into full-fledged municipalities.
3. Out spreading the limits of bigger municipalities (Das, 1981).

In the early seventies it was realized that spatial disparity was growing very fast. John P. Lewis during the time discussing regional development pointed out that if appropriate measures are not taken then the situation would be worse (John, 1983). Soon in 1975 government of India constituted the Task force to study the problems of small and medium towns (Gnaneshwar, 1995). The committee noted that problem could be solved through manifold approaches which involve social, economic and spatial approach. Two important recommendations were to formulate the national urbanization policy and urban land policy. Although it is to be noted that third plan (1961-1965) already recognized the need of comprehensive urbanization policy for country. Third plan may be called a watershed for urban policy making because it took financial and legislative measure to facilitate the urban development.

Recognizing metropolitan identity

In 1970 with the appearance of the development authorities recognition of metropolitan identity came. Almost at the same time metropolitan scale was created in all the four regions. In 1971 a conference organized by housing and urban development ministry at Delhi determined that an authority should be set up for the coordination of plans and projects. With this a major shift of functional domain occurred from the municipalities to parastatals as well as the government department. This in turn decreases the role of corporations. Here the questions whether the creation of these development authorities helped to develop an awareness of a metropolitan identity in the public mind (Sivaramakrishnan, 2015).

In the early 1970's three major metropolises constituted their development authority to formulate master plans. Following are some of the details of these "Development Authority" (Table 1).

For the first time these planning authority prepared their master plans to solve the problem regionally. In 1966 Basic development plan was formulated for Kolkata Metropolitan District with a perspective of twenty years and for Delhi, Mumbai and Chennai metropolis it was 1962, 1964 and 1976 respectively.

Table 1. Development authorities of Delhi, Mumbai and Kolkata and Chennai.

Name of the development authority	Year of establishment	Area in sq. km 2011	Population 2011 '000
DDA (Delhi Development Authority)	1957	1696	167.53
KMDA (Kolkata Metropolitan Development Authority)	1970	1886.67	141.12
CMDA (Chennai Metropolitan Development Authority)	1974	1189	86.96
MMRD (Mumbai Metropolitan Development Authority)	1975	4354.50	209.98

Source: City Development plans of Kolkata, Mumbai, Delhi and Chennai.

Table 2. Publications of series of master plan.

Name of Metropolitan Area	First Publication of Master / Perspective Plan	Second Perspective/ Master Plan	Third Perspective/ Master Plan	Fourth Perspective/ Master Plan	Fifth Perspective/ Master Plan
DDA	1962-1982	1981-2001	Vision 2021	-----	-----
MMRD	1964-1981	1981-2001	2001-2021	-----	-----
KMDA	1966-1986	1976-1980	1981-2001	1990-2015	Vision 2025
CMDA	1976-1988	1995-2011	2012-2026	-----	-----

Source: City Development plan of Kolkata, Mumbai, Delhi and Chennai.

Third plan prepared a guideline to frame the master plan. Master plan should prepare state government or concerned local authorities but before that concerned states will have to enact the town and country planning legislation (Shaw, 1996). To supply funds for housing and urban development projects to metropolitan authorities, state housing boards, Housing and Urban Development Corporation (HUDCO) was established in the Fourth Plan (1969-74) (Shaw, 1996). The main objective of the HUDCO was "promotion of housing for the persons belonging to low income groups and economically weaker sections" (Table 2) (Routray, 1993).

Delhi followed by Mumbai and Calcutta prepared their first master plan for their respective Metropolitan area during the early sixties while decade later Chennai prepared their first master plans. Although, Bombay's first master plan was devoted to problem of urban Bombay not the entire metropolitan region. In fact first master plan of Mumbai Metropolitan Region was sanctioned in 1973 and next master plan for metropolitan region was published in 1999 for the period of 1996-2011. So Mumbai's comprehensive metropolitan regional planning came much later than Delhi and Kolkata. These perspective/ Master plan mainly dealt with distribution of future population in various parts of their metropolitan area, policies for economic growth and future location of economic activities, future physical developments, circulation pattern, programmes for Traffic and Transportation, developments of land use zoning, requirements of urban infrastructures for the future population, policies

and programmes for sectoral developments and development control regulations.

From their policy objective it was apparent that the objective of the planning at the end of sixties or the beginning of seventies was mainly to manage the existing urban change. It is to be noted that implementation of these plans within their time period was one of the crucial issue. One of the important aspects of these master plan was that it was formulated not only for the urban areas but the surrounding rural areas of the concerned metropolis. So there is clash of interest as well as spatial bias regarding the planning and programme between rural and urban areas.

Major issues of the First Master/ Perspective plans of four Metropolitan Areas:

More or less each of the four master/ perspective plan concerning five basic areas namely

1. Regional population growth.
2. Physical constraints which include land form and densities, sewage and drainage.
3. Economic Problems which include the economic growth considerations and employment.
4. Deficits and future need of urban services which include water supply, housing, transportation, education and health facilities.
5. Administrative and Fiscal policy.

Table 3. Comparative population growths of four major urban agglomerations in India.

Name of Metropolis	Population in lakhs				
	1971	1981	1991	2001	2011
Delhi	36.47	57.29 (5.708)	83.75 (4.618)	127.91 (5.272)	167.53 (3.090)
Mumbai	65.92	94.22 (4.293)	125.72 (3.343)	163.68 (3.019)	209.98 (2.828)
Kolkata	74.20	91.94 (2.390)	109.10 (1.866)	132.17 (2.114)	141.12 (0.677)
Chennai	31.70	42.89 (3.529)	53.61 (2.5)	64.24 (1.982)	86.96 (3.536)

Source: Census report of 1971, 1981, 1991, 2001. Parentheses figures are decadal growth rate of population.

Population growths in the main cities were one of the important problems to all the metropolitan area and almost every plan failed to make correct projection of population growth for next two decades. Growth of the population in the core area of the metropolis was due to migration from the rural hinterland almost by passing the medium and large towns. Practically each plan has failed to accommodate the growing population within the metropolitan region. Planners tried to develop Calcutta as a bi polar growth¹; for Delhi it was poly-centric balanced development through seven “ring towns” namely Loni and Ghaziabad, Faridabad, Ballabgarh, Bahadurgarh, Gurgaon and Narela.² While Bombay and Madras follow the polycentric new town development around the main city. Navi Mumbai was developed as new town in early eighties to solve the over congestion of Mumbai.³ One of the important facets of the land use planning is the process of urban land cover changes or the pace at which non-urban land is converted into urban land. It is to be mentioned that absolute growth of the Mumbai and Kolkata was nearly at the same level during 1970’s while Delhi’s growth was much higher at the same period of time (Taubenböck and Wegmann, 2008)⁴. Therefore land use planning was one of the main challenges that every master plan dealt with rigorously.

Apart from land use planning and population growth, the other important aspect of the planning policy was to make the city a long term viable growth Centre. Calcutta, Delhi and Bombay master plan categorically mentioned that industry should be located outside of the main city. However, Bombay was successful in relocating the industry and Delhi failed to relocate their industry outside the main city according to the recommendation of the master plan (Table 3).

One of the important aspects of any functional region is the strong connectivity. The first master plan of all the four metropolis addressed the traffic and transportation issue of the metropolitan region. It is worthwhile to

mention that alone Calcutta made a separate Comprehensive Traffic and Transportation Plan for CMD in 1966. Late 1970s was the period when four metropolises tried to reconnect with global capital and international financial agencies gave loans in different phases for the development of roads and other infrastructure. However there was absence of any national policy for transportation. In 2006 first National Transport policy was introduced. Objective of the transport policy was to support the required level of economic activity, provide road networks for easy and sustainable flow of goods and people. Unfortunately, however, such flow of goods and people has been facing several problems. Accessing jobs, education, recreation and similar activities is becoming increasingly time consuming. Billions of man hours are lost with people “stuck in traffic”. The primary reason for this has been the explosive growth in the number of motor vehicles.⁴ The other aspect is that the transport sector is the second largest consumer of energy in India. The growth of transport not only increases pressure on the limited non-renewable energy resources and increase in foreign exchange outgo but also considerably increases environmental pollution. Increasing car dependence in India especially in the urban areas is most visible at the local level – vehicular emissions causing air pollution, noise pollution, and corresponding health effects. Increasing energy consumption, operational pollution, land intrusion and congestion are some of the areas of concern.⁵

In the Fifth five year plan (1974-1979) National urbanization policy resolution was made by the town and country planning organization. The Main objectives of the urbanization policy were to handle the problem of metropolitan cities in a more comprehensive and regional perspective. To assist the metropolitan development projects due to its national significance.

Due to the huge population growth in the metropolises 6th Plan central government (1980- 1985) addressed the issue of decentralization/dispersion of population through the introduction of a centrally sponsored scheme called

¹ Government of West Bengal (1966) *Basic Development Plan for the Calcutta Metropolitan District 1966-1986*, Calcutta Metropolitan Planning Organization, Development and planning department.

² Government of Delhi (1962), *Delhi Master Plan* Chapter one, Delhi Development Authority

³ http://www.cidco.maharashtra.gov.in/NM_Developmentplan.aspx

⁴ Government of India (2014) National Urban Transport Policy 2014, Ministry of Urban Development, Delhi

⁵ Ibid

the Integrated Development of Small and Medium Towns (IDSMT). Its main objective was to promote growth in towns with less than 100,000 populations through provision of infrastructure and basic services⁶. Seventh five year plan (1985-1990) for the first time allowed private players to be part of the urban development. Plan declared this move as “radical (Re) orientation of all policies related to housing”. In 1988 two major events happened: one is the announcement of the national housing policy and the other is the submission of the report of the National Urbanization Commission (NCU) under the chairmanship of Charles Correa. Report of the National Urbanization Commission pointed out that “instead of forcefully inducing investments in areas which are backward and have little infrastructure and in which the concessions are likely to be misused, the identified existing and potential urban centres at intermediate levels could be developed to attract the migrants as they are located in closely related regions” (Ganeshwar, 1998). NCU highlights a close link between urbanization and economic development (Batra, 2009). So concept of balanced regional development of the third five year plan was proved as incompatible policy prescription in the late eighties.

Therefore, urban planning at this stage was more strategic by nature rather than ‘entrepreneurial’. Healey and Williams have claimed that the pre-occupation of planning in many European countries in the 1980s was ‘typically with projects, not plans...most notably in Britain, Italy and France. ‘But they suggest that in the 1990s there was a shift to plans and more strategic concerns (Farthing, 2004)’. But in case of Indian urban planning specially the metropolitan area planning and urban policy prescription was strategic in nature from the late sixties onwards.

Strategic Character of Indian Metropolitan Planning

Healey and Williams have identified some important characteristics of the strategic planning with respect to urban areas. These characteristics can be contextualizing while elaborating the nature urban planning in Indian metropolises.

Firstly, each of the four Metro cities was preparing their master/ Perspective plan with respect to a larger area or for several Municipal corporations and municipalities and surrounding rural area.

Secondly, every master/ perspective plan was given special emphasis on spatial organization to improve the quality of the metropolis which included strengthening of the transport network.

Thirdly, they had prepared sectoral development

program for the development of the metropolitan areas. Such program includes slum development program, drainage and solid waste management program etc.

Fourthly, all the plans have taken the wider consequences of their strategy. Due to this reason some plan has changed within the very short period of time considering the fact that planning strategy hve failed to make the needed change. For example Kolkata’s Bipolar Growth strategy has changed within a decade realizing the poly-centric nature growth.

Fifth, each of the consecutive plans has analyzed the causes and consequences of a range of trends. Healey and others pointed out that ‘Preparing strategic spatial frameworks... involves interrelating the various dimensions of social, economic and environmental change in an urban region, as these affect space, place and physical development’ (Healey et al., 1997).

Sixth, Each Master / Perspective plans had set forth the objectives, aims or goals of planning so that justification can be given for subsequent decision.

Lastly, as Stoker and Young (1993) suggest that strategic planning is characterized by a continuous process, it is not about producing plans. Or at least if it is about plans there will be many revisions on them over the years as the policy/action feedback process unfolds (Stoker and Young, 1993). It is relevant in the context of Indian Metropolitan city planning. Kolkata Metropolitan Development Authority (KMDA) so far has prepared five master/ Perspective plans after the publication of First Perspective plan. Mumbai, Delhi and Chennai planning authority have also made two subsequent master plans after the publication of the first master plan.

Growing or declining metropolitan populations

The debate between core and periphery once again become center stage in the Indian metropolitan context. Since the publication of census 2011 it has been identified by the scholar that Indian major metropolis (except Delhi core are declining, but periphery growing) facing both declining core and periphery situation. American planners refer to the phenomena of declining core and growing periphery as the “hole in the doughnut” (Table 4).

It is evident from the data that all the metropolitan core are declining while periphery are growing, indicating the failure of planning programmes which include the housing, transport, environment and the overall development. Due to the growth of metropolitan Periphery the case of an unplanned settlement rises and speculation about land value also increases.

One of the important aspects of India’s urban planning since 1960 to prior 1990 was lack of common national program except in housing development and slum improvement. Each of the metropolitan development

⁶GoI (Undated): Various Five Year Plans, Planning Commission, <http://planningcommission.nic.in/plans/planrel/fiveyr/>

Table 4. Growth rate differentials of core periphery of metropolitan cities in India.

	1981-91		1991-2001		2001-2011	
	Core	Periphery	Core	Periphery	Core	Periphery
Kolkata	0.64	1.72	0.40	1.82	-0.19	1.09
Mumbai	1.86	4.22	1.82	2.62	0.41	2.91
Chennai	1.59	2.23	0.93	1.70	0.75	6.12
Delhi	3.59	3.59	3.09	4.18	1.09	5.88

Source Census of India 1981, 1991, 2001, 2011.

authority tried to solve their problem in different way.

However, central government was very much aware of the growing urban problem but did not take any comprehensive step. At the Sixth (1980- 1985) and Seventh Plan (1985-1990) periods government expressed a great concern about urban issues. In 1983 planning commission prepared four reports on housing and urban development through the task force (Mohan, 1992). Indian metropolises at this time suffer from basic services and shortages of infrastructure due to uncontrolled growth of population (Chadchana and Shankar, 2012). So NCU discarded the backward area development policy and identified 329 cities called GEMs (Generator of Economic Momentum) which were further divided into NPCs (National Priority Centres) and SPC (State Priority Centres) (Batra, 2009). This identification was necessary to disperse the population from the metropolises.

Post 1990's urban planning and program for metropolitan area

Early nineties saw two foremost changes i) economic liberalism "which sanctified the market as the best decision-making process", ii) Camouflage decentralization stand, "which included the strengthening of local government" (Newman and Thornley, 1996). Economic liberalization started by welcoming the private sector for urban housing and infrastructure development. Decentralization of urban governance was started through the 74th constitutional amendment act in 1992. Centrally sponsored megacity scheme was launched in five cities to prepare the municipalities to use institutional finance and eventually market instruments like municipal bonds for capital investment requirements. In October 1994, the Ministry of Finance, the government of India, set up an Expert Group on Commercialization of Infrastructure Projects. The group submitted its report in 1996 and it is called 'The India Infrastructure report: Policy imperatives for growth and welfare' (IIR). This report is widely considered as push towards the liberalization or commercialization of infrastructure.

The IIR pointed out that India requires rupees 2803.5 billion in the next ten years of 1994 prices to meet the

infrastructure needs of the cities. India was unable to meet such huge expenses for infrastructure. Therefore the IIR expert group suggested "necessitated opening up urban infrastructure to private capital and exploring 'innovative' forms of financing such as municipal bonds because it was assumed to be beyond the capacity of the government to mobilize those kinds of resources for the urban sector. It was also argued that to make cities better prepared for attracting private investment in infrastructure and service delivery it is crucial to bring about a major overhauling of the governance, legislative and administrative framework of cities. The IIR considers privatization and deregulation of infrastructure sectors as "bold new approaches (that) promote improvement in efficiency and service quality" (Expert Group on the Commercialization of Infrastructure Projects, 1996). It is believed that Ninth five year plan have highly influenced by the India Infrastructure Report. It was the beginning of the entrepreneurial urban planning characterized by dominance of the private sector in the work of city governance.

Urban development projects main focus was shelter development program including house and township building- use 100 percent FDI, urban employment generation program.

To give a big push in favour of the entrepreneurial planning central government prepared Urban Reform Incentive Fund (URIF) which sought to incentivize urban reforms in the following areas: a) repeal of Urban Land Ceiling Acts and reform of Rent Control Acts; b) reduction in stamp duty; c) revision of bylaws to streamline the approval process for construction of buildings, development of sites etc.; d) levy of realistic user charges and resource mobilization by urban local bodies; e) public-private partnership in the provision of civic services; f) revision of municipal laws in line with the model legislation prepared by Ministry of Urban Development and Poverty Alleviation; and g) simplification of legal and procedural framework for the conversion of agricultural land for non-agricultural purposes. Urban reforms get at its high points when The Prime Minister launched the Jawaharlal Nehru National Urban renewal Mission (JNNURM). The JNNURM is basically a reform linked incentive scheme for providing assistance to state

governments and urban local bodies (ULBs) in selected 63 cities, comprising all cities with over one million population, state capitals and a few other cities of religious and tourist importance for the purpose of reforming urban governance, facilitating urban infrastructure and providing basic services to the urban poor.

Report of the steering committee on urbanization (2012-2017) has prescribed some way to manage the urbanization of a metropolis or city in such a scale. Out of the four "necessary enablers" strengthening of the local governance system and financial empowerment of the ULB are truly important for 'revival of the cities'. The idea of 'revival of the metropolises or cities' is entrepreneurial by nature. Following strategy has taken to implement the revival of the metropolises or cities' approach.

Indian metropolises have acknowledged the neoliberal principles in infrastructure and housing development. Cities are viewed as nodes in international networks of interactions, especially in the case of so called world or global cities like Mumbai, Delhi and Kolkata. Cities are claimed to compete in inter-urban and inter-regional competition; due to rising revenues.

The largest cities emerge as actors on an international scale, often bypassing the state altogether in processes. Changes in national governments' policies vis-à-vis this city towards decentralization of economic regulation and organizational changes related to the city governance. Above all cities are seen as growth engines which constitute the key to economic prosperity, suggesting that cities have to apply the strategies associated with the entrepreneurial city in order to 'survive' and prosper as vital entities (Dannestam, 2012)

Conclusion

Urban policy and planning during the immediate post colonial period was basically focused on the physical constraints, population growth of the metropolises. Perspective plans were the main centre for attention. It was prepared after the comprehensive survey of the present condition and future growth prospect which direct the physical growth of the city. After the decade of the publication of master plan it was realized by the planners that master plans are not able to solve the problems of the metropolitan areas. Short term action was introduced to handle ever-changing situation of the metropolises. Master plan's balanced regional development of the third five year plan was proved as incompatible policy prescription in the late eighties. United Nations economic and social commission for Asia and Pacific entitled "Guidelines: sub-national area planning and sustainable area development of secondary cities in countries of Asia and Pacific- methodological approach" also noted the following drawbacks of master planning.

a) This plan is static in nature and takes long time to

prepare. b) This plans do not point out methods of financing for development. c) Master plans are based on unrealistic appraisal of the economic potential of the planning area. d) Master plans seldom provide the regulation measures. Decade of late eighties and early nineties saw major change in urban policy framework. Urban Planning become the tool for market oriented economy where financing for the development programme (housing, infrastructure) is deregulated for private participation. So urban planning in India changed its courses from strategic to entrepreneurial.

Conflict of Interests

The author has not declared any conflict of interests.

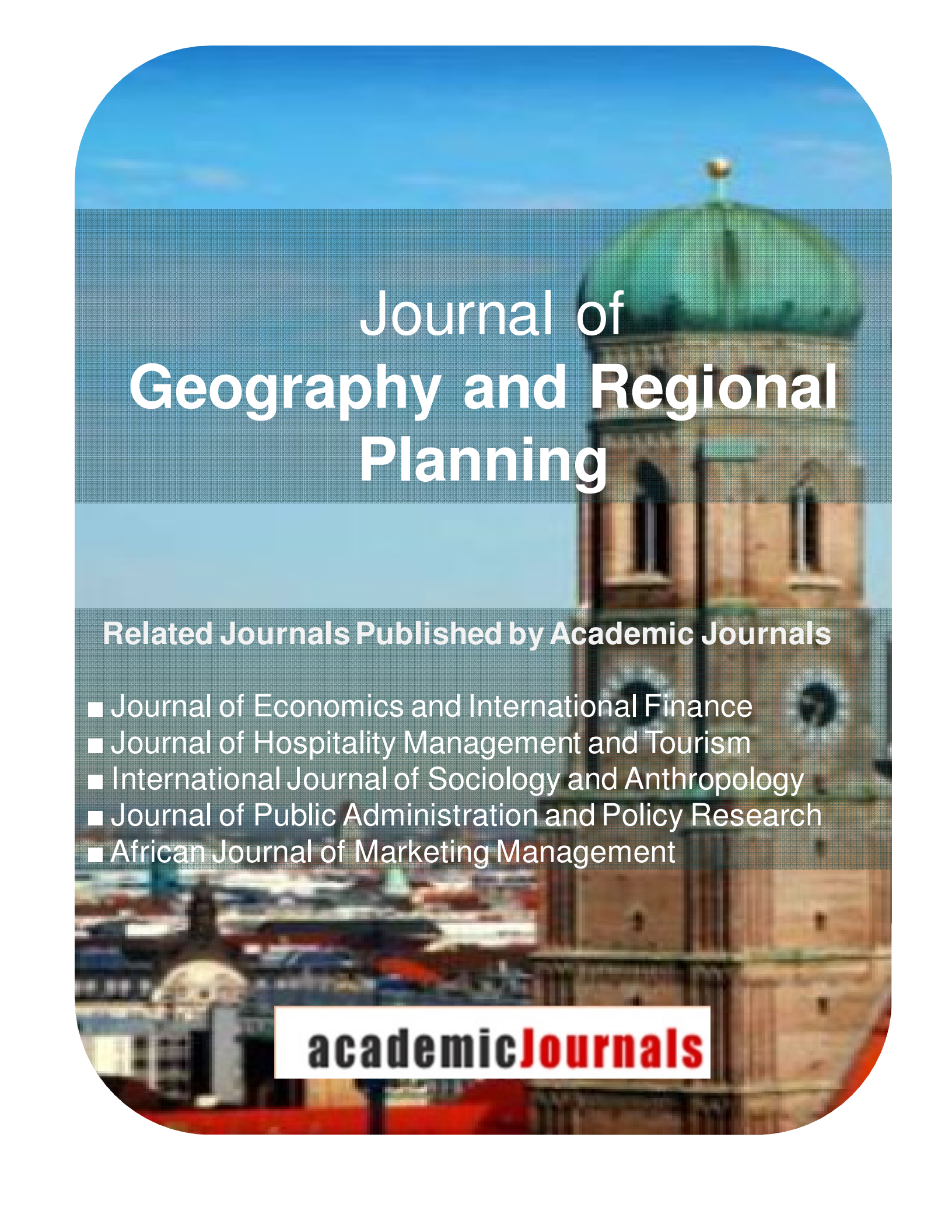
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