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Land use changes in Agra-Mathura Region

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Abstract

Land use is the usage of land and its resources according to the need of human beings. The study area i.e., the Agra-Mathura region has the richest historical background which is traced from ancient as well as medieval Indian history. The study used data obtained from 'Bhuvan Thematic Data dissemination' The other sources of data are census reports, village records, land ownership reports, Forest department reports, and local Institutions, of the Agra and Mathura districts. To find out the changes in the area data generated from different sources has been compiled and analyzed by interpreting the data. There is an increasing trend in the land use of agriculture and built-up area and agriculture is dominant in the region. The "forests", which include forests, non-agriculture plantations, open scrub, and deciduous, constitute 5.32 per cent, (390.2 sq. km). The "wastelands", include gullied land, saline land, and barren, rocky, and scrubland, which constitutes 4.05 per cent, (297.34 sq km). The environmentally fragile areas such as the Yamuna and its surrounding area are affected by the dumping of garbage and illegal sand mining.

Keywords: Agra, Agricultural area, Forest area, Land use, Mathura, Sand mining, Wastelands.

Introduction

Land use is the usage of land and its resources according to the need of human beings. It is the transformation of natural land as per the requirement. Land use is the term that is used to describe human uses of land, or immediate actions modifying or converting land cover (de Sherbinin 2002). It changes every nook and corner of the world from time to time but major changes occur with a particular event in that area. Land use changes at a particular location may be the shift to a different use or the intensification of the prevailing use of land. The land transformation did not abate, but rather accelerate with the globalization of the world economy, and expansion of population and technological capacity (William et al 1994). In India, it is more evident after the onset of Liberalization, Globalization, and Privatization. Generally, land use is compelling by soil characteristics, topography, vegetation, climate, and other such environmental factors. But it also reflects the importance of land as a crucial and finite resource for most human activities. Land use is a product of interactions between cultural backgrounds, state, and physical needs of the society with the natural potential of land (Karwariya and Goyal 2011). Land use

changes can occur because of socio-economic and technological factors. It might be the most conspicuous form of global environmental change phenomenon occurring at spatial and temporal scales. Determining the effects of land-use change on the Earth system depends on an understanding of past land-use practices, current land-use patterns, and projections of future land use, as affected by human distribution, economic development, technology, and other factors (Tahir et al 2013).

Analyzing land use and understanding the subsequent trends of change contribute to the present complex dynamics of land cover and are important for policy-making, planning, and implementation of natural resource management. Land use shifts are caused by external and internal drivers and have been influenced by many traditional and modern resource management practices (Tahir et al 2013).

Timely and precise information about land use change detection of the earth's surface is extremely important for understanding relationships and interactions between human and natural phenomena for better management of decision making (Lu et al 2004). There should be a regular assessment of land use changes for the socio-economic development of people. For a sustainable environment and to prevent environmental degradation continuing demand for accurate and up-to-date land use changes information is required. The ultimate aim of land use change analysis is to evaluate the impacts and bring out preventive actions against the adverse environmental consequences. Many changes in land use may be small on their own but together may have an incremental effect on the landscape and harm regional and global society and the environment. Houghton (1994) pointed out that the major reason for land use change was to increase the local capacity of lands to support human enterprise.

One of the main problems with countryside areas is that these lands have a range of demands and there are conflicts between, for example, agriculture, forestry, urban expansion, and industrial development. It is interesting to see the changes in the landscape which can be easily conveyed when you go through the National Highway-2 in the Agra-Mathura region of Uttar Pradesh. This change is more visible in the past ten years because of liberalization privatization and globalization of the Indian economy. As the LPG started in 1991 in India but its impact in this area came some ten years back. Hence, there needs to be an inspection closely of the pattern of changes taking place in the countryside area. There should be the estimation and prediction of land use potential and scenarios of change, to compare policy options that may affect the patterns and land uses present in the countryside.

Study Area

The Agra-Mathura region has the richest historical background which is traced from ancient as well as medieval Indian history. This is well developed commercial center both in the ancient and medieval periods. The region came under the Agra division of Uttar Pradesh. Agra division is consisting of four districts of Uttar Pradesh but the present study took two districts of the region e.g., Agra and Mathura (Fig 1). The region is located between 26º46' to 27º57' N latitude and 77º27' to 78º48' E longitude. The Area is well developed in industrial production. One of the major contributors to the economy of Uttar Pradesh is Mathura Industries. Mathura Refinery located in the city is one of the biggest oil refineries in Asia. Tourism also contributes to a large extent to the economy of the region as this has lots of ancient and medieval monuments. The city's industrial base also produces automobiles, leather goods, handicrafts, and stone carving.

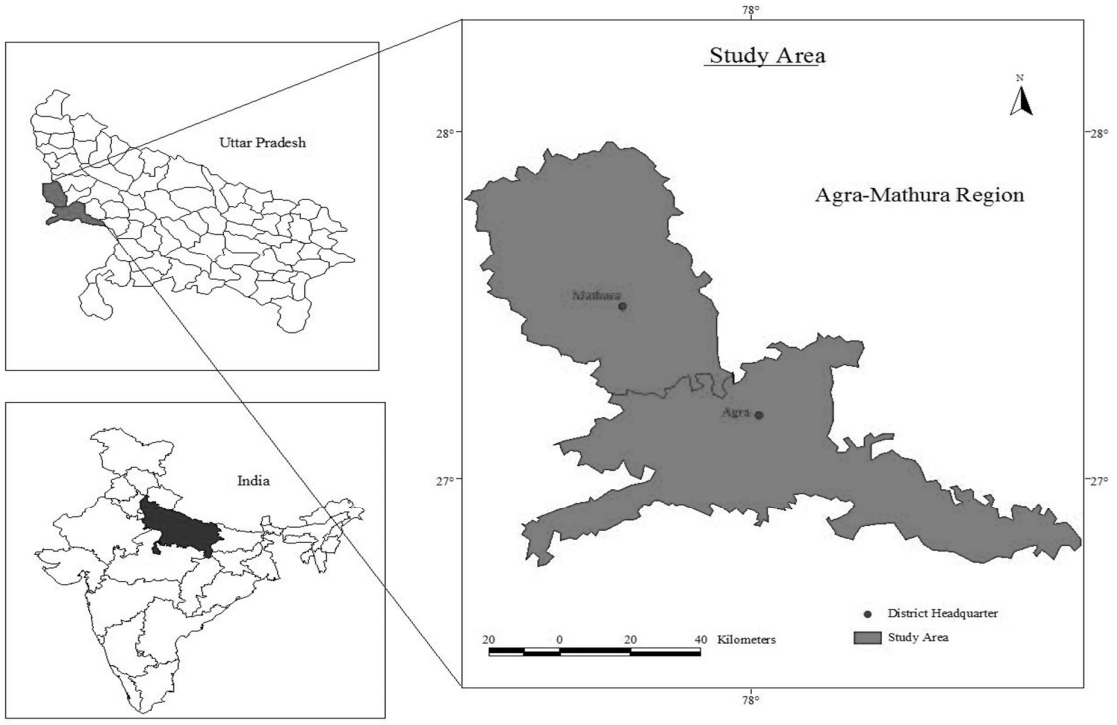

Fig.1: Location of Study Area.

The main purpose of the study is to analyze the land use change in Agra, Mathura district in particular, and the Agra-Mathura region as a whole and assess the socio-economic impact of change. As these areas are in the countryside of the National Capital Territory of Delhi, therefore it also examines the effect of NCT Delhi on this area.

Database and Methodology

The study used data obtained from 'Bhuvan Thematic Data dissemination' The other sources of data are census reports, village records, land ownership reports, Forest department reports, and local Institutions, of the Agra and Mathura districts. To find out the changes in the area data generated from different sources has been compiled and analyzed by interpreting the data.

Results and Discussion

The land use analysis through the Remote Sensing data about 2005 indicates that the "agricultural use", which includes cultivated land or cropland, fallow, plantation, and grazing, being the predominant use of land, constitutes 83.33 per cent, (6115.18 sq. km) of the total land area of the region (Table 1). The sub-region or district-wise distribution of agricultural land reveals that Agra has more area under "agriculture use", which constitutes 42.82 per cent of the total region and Mathura is 40.50 per cent as a whole but Mathura as the district has more area than Agra which is 89.77 per cent and 78.04 per cent respectively. The region has more cropland (79.05 per cent) followed by fallow (4.08 per cent) and plantation land (0.11 per cent).

The "built-up area", which includes rural as well as urban settlements, all sub-uses such as residential, transport, industries, commercial, etc. within it, is the second largest use of land in the region, constituting 5.83 per cent, (427.87 sq. km). Agra has more of the area under "built up" category (3.14 per cent) in the region in comparison to Mathura which has the area under the built-up category (2.68per cent) but as the individual district, Mathura has

more area under built-up (5.95 per cent) than Agra which has (5.72 per cent) area under this category.

The "wastelands", include gullied land, saline land, and barren, rocky, and scrubland, which constitutes 4.05 per cent, (297.34 sq km). The concentration of "wastelands" has been recorded in Agra constituting 3.26 per cent of the total wastelands of the region and Mathura has 0.79 per cent of the total area as a whole. Agra district has more wasteland than Mathura district which contributed 5.93 per cent and 1.76 per cent respectively.

The "forests", which include forests, non-agriculture plantations, open scrub, and deciduous, constitute 5.32 per cent, (390.2 sq. km). In the case of forest cover, Agra again recorded the highest concentration constituting 5.03 per cent of the region than Mathura which has 0.29 per cent. The less concentration of forest cover is in Mathura, in the region as a whole as well as in the district because more area is under agriculture and built-up area. As a district, Agra and Mathura have a forested area of 0.64 per cent and 9.16 per cent respectively.

The "water bodies" include rivers, canals, inland wetlands, reservoirs, lakes, tanks, and ponds covering 0.93 per cent (68.42 sq. km) of the region's total land area. Mathura has more share of the area under water bodies which contributes 2.07per cent (61.71 sq km). Agra has an area under this category is 0.17 per cent (6.71 sq km).

Table 1: Land Use of Agra-Mathura Region 2005

S.N.	Class	2005					
		Mathura		Agra		Total	
		Sq.km	Percent	Sq.km	Percent	Sq.km	Percent
1	Built-up	197.18	5.95	230.69	5.72	427.87	5.83
2	Agriculture	2972.58	89.77	3142.6	78.04	6115.18	83.33
3	Forest	21.28	0.64	368.92	9.16	390.2	5.31
4	Wastelands	58.25	1.76	239.09	5.94	297.34	4.05
5	Water bodies	61.71	1.86	6.71	0.17	68.42	0.93
	Total	3311		4027		7338	

Source: http//bhuvan-noeda.nrsc.gov.in

A comparative analysis of the Agra and Mathura district in the region reveal that both districts have more area under agricultural land than other activities. Mathura has more percent of the area in agriculture, built-up land, and water bodies while Agra has the maximum percentage in the wasteland as well as the forested area (Table 1). As it has discussed earlier the built-up area consists of rural and urban, more area is in rural land under the built-up area (142.56 sq km) in Mathura as compared to the urban area which is only 54.62 sq. km. This is a large difference which is not seen in the case of Agra which has the almost same area as the rural (113.97 sq. km) and urban (116.72 sq. km); here urban area is slightly more than the rural area.

It is interesting to see that uncultivable land has a maximum area of wasteland which is 96.41 sq. km as compared to salt-affected land, rocky, and scrubland which account for 6.11 sq. km, 80.05 sq. km, and 56.52 sq. km respectively in Agra district while in Mathura scrub land cover more area in the wasteland. In water bodies, river

contributes maximum area in both Agra and Mathura.

The status of land use in the region in 2010 is very interesting (Table 2). It is seen that a large number of the area comes under agricultural land. Agriculture occupied 85.44 per cent area of the region contributing maximum land area in the region. Agra and Mathura account for the region as a whole are 44.55 per cent and 40.88 per cent respectively. In Mathura 90.60 per cent of the total area of the district, while in Agra it is 81.19 per cent comes under agricultural land. The highest number of agriculture areas shows that agriculture is the main occupation in the region, the observation shows that area has well-mechanized agriculture as an impact of the green revolution.

It is found that about 7.08 per cent of the area of the region is under the settlement/built-up category and 3.12 per cent of Mathura and 3.96 per cent of the area under this category in Agra of the region as a whole. The built-up area comprises the rural and urban residential areas roads railways etc. District-wise area in Agra and Mathura is 6.90 per cent and 7.08 per cent respectively as their area.

It is evident that the forest class accounts for 4.69 per cent area in the region and has regional disparity as Mathura district contributes only 0.15 per cent in the total area of the region while Agra 4.49 per cent. Agra and Mathura contribute 8.25 and 0.35 per cent respectively as of their geographical area.

Table 2: Land Use of Agra-Mathura Region 2010

		2010					
S.N.	**Class**	**Mathura**		**Agra**		**Total**	
		Sq.km	**Percent**	**Sq.km**	**Percent**	**Sq.km**	**Percent**
1	Built-up	229.02	6.90	290.69	7.21	519.71	7.08
2	Agriculture	2999.93	90.60	3269.78	81.19	6269.71	85.44
3	Forest	11.63	0.35	332.42	8.25	344.05	4.69
4	Wastelands	33.92	1.02	128.96	3.20	162.88	2.21
5	Water bodies	40.23	1.21	4.71	0.12	44.94	0.61
	Total	3311		4027		7338	

Source: Land Revenue Department Agra-Mathura.

It is seen that wasteland account for the area of 162.88 sq. km which is 2.21 per cent of the total area of the region. In the district of Agra and Mathura, the area comprises 1.75 and 046 per cent of the region as a whole, while regarding their geographical area the area is 3.20 and 1.02 per cent respectively.

Area shared by water bodies among all the land use account for 0.61 per cent in the region, while Agra and Mathura regarding their geographical area contribute 0.12 and 1.21 per cent respectively. Mathura has more water bodies in comparison to Agra.

A comparative analysis of data from 2005 and 2010 reveals that there is an increasing trend in the land use of agriculture and built-up area and agriculture is dominant in the region (Table1 and 2). There has been an increase in agricultural land by 2.11 per cent (i.e., from 83.33 per cent to 85.44 per cent). This increase in the short span of five years is very significant. In between Agra and Mathura, Agra shows a larger increase than Mathura. Agra has an increase of 3.15 per cent while Mathura has only a 0.83 per cent increase in the agricultural area.

The built-up area increases from 427.87 sq. km to 519.71 sq. km which is 1.25 per cent. In this category also Agra shows a maximum increase than Mathura. Agra has an increase of 1.49 per cent while Mathura has 0.95 per cent.

As it is explained earlier that except for agriculture and built-up area all other land uses have decreasing trend i.e., forest, wasteland, and water bodies. Forest area decreases by 0.62 per cent in the region as a whole. In Mathura, the forest area decreased from 21.28 sq. km to 11.63 sq. km. Agra has decreased from 5.31 per cent to 4.69 per cent regarding their geographical area.

There has been a decrease in the area of wasteland from 297.34 sq. km to 162.88 sq km which is 1.84 per cent of the total area of the region. Although there is a decrease in the wasteland in the area is an insignificant number. In 2005 Agra has 297.34 sq. km area under waste land which decrease to 162.88 sq. km. in 2010.

Water bodies are also shrinking in the region which is being converted into agricultural land as well as built-up area. Its area, which was .093 per cent in 2005, came down to 0.61 per cent.

In the absence of proper legislation to control the land uses there has been the illegal conversion of land in the area, which create regional imbalance and socio-economic problem in the area. As it is seen that water bodies are shrinking in its area which might create the problem of drinking water in the region. It is seen by the survey that environmentally fragile areas such as the Yamuna and its surrounding area are affected by the dumping of garbage and illegal sand mining. Though the Regional Plan suggested a broad policy for the development of selected centers for acting as nuclei for rural development, however, in the absence of a coordinated development strategy for the rural areas, has remained urban biased.

References

De Sherbinin A. 2002. Land-Use and Land-Cover Change, ACIESIN Thematic Guide. Centre for International Earth Science Information Network (CIESIN) of Columbia University, Palisades, NY, USA.

Houghton R A 1994. The worldwide extent of land-use change. Bioscience. 44(5): 305-313.

Karwariya S and Goyal, S 2011. Land use and land cover mapping using digital classification technique in Tikamgarh district, Madhya Pradesh, India using Remote Sensing. International Journal of Geomatics and Geosciences. 2(2): 519-529.

Lu et al 2004. Change detection techniques. International Journal of Remote Sensing, 25: 2365-2407.

Tahir M, Imam E and Hussain T. 2013. Evaluation of land use/land cover changes in Mekelle City, Ethiopia using Remote Sensing and GIS. Computational Ecology and Software. 3(1): 9-16.

William B, Meyer B L and Turner I I. 1994. Changes in Land Use and Land Cover: A Global Perspective, Cambridge University Press, 15-Sep-1994.