Change Detection of Land Use and Land Cover of Pushpavati River Basin, Using GIS and RS Techniques

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Abstract

This study was aimed at examining land cover changes for the last 10 years and its causative factors in Pushpavati watershed by using GIS and remote sensing, there was land cover change in the watershed because of demand for agriculture and settlement land for increasing population, problems related to land policy and lack of infrastructures. There should be also land use planning by identifying the proper land for specific purpose so that the marginal lands will not be put into use. The area under the agriculture decreases from 35.64 % and 47.55 % in 2005 and 2015 respective year and The study area included forest cover is 26.09 % and 11.56% respectively in the year 2005 and 2015. The forest is decreased due to deforestation.

KEYWORD : Landuse and Landcover, Remote Sensing, GIS

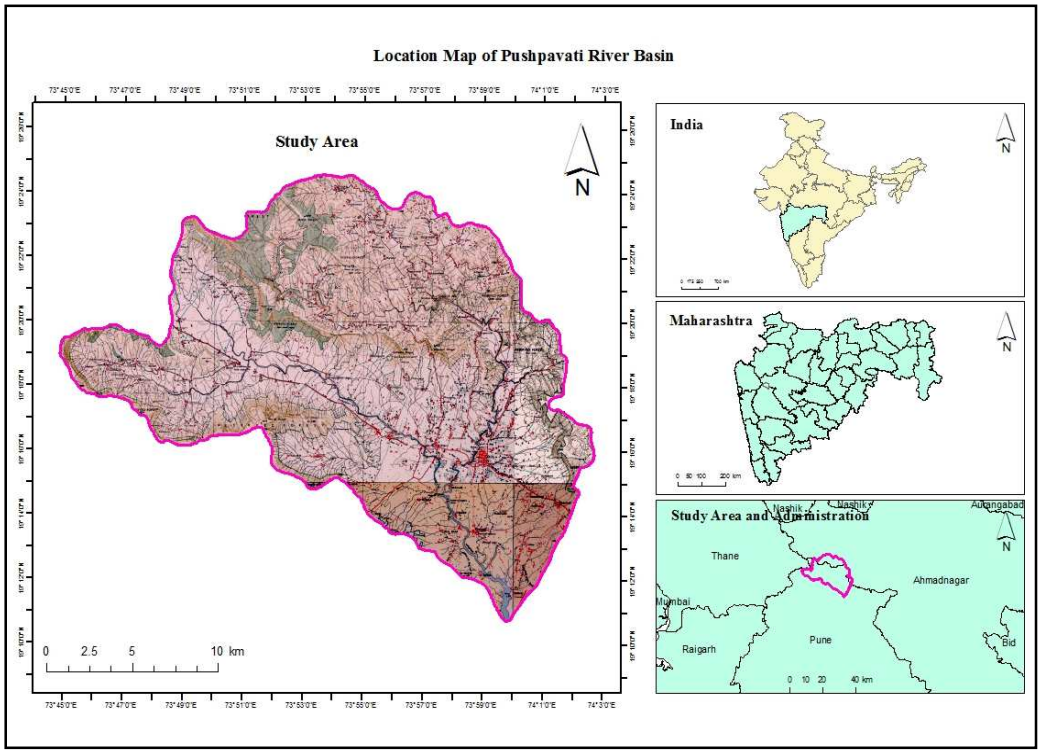
Introduction

The changes of land use patterns certainly provide many social and economic benefits. However, they also come at a cost to the natural environment. One of the major direct environmental impacts of development is the degradation of water resources and water quality (USEPA, 2001). The study has been done through remote sensing approach using two time series data. The findings revealed that the study area experienced drastic change in land use / land cover during the last two decades. Land use is a more complicated term; it has been defined in terms of syndromes of human activities such as agriculture, forestry and building construction that alter land surface processes including biogeochemistry, hydrology and biodiversity. Amare S. M. (2013) finally concluded that, the results of the study have shown that during the last 35 years forest, grass lands, wetlands and lake areas were converted to farm and settlement areas. There was rapid increase of population with growth rates of 4.9% and 3.5% (1984-1994 and 1994-2007), respectively per annum which caused more land cover changes.

The Study Area:

Pushpavati river basin is located in the Pune and Ahmednagar district of Maharashtra, The total catchment area of Pushapavati river basin is about 413.20 sq. km. which extends from 19^0 10’ 44”N to 19^0 24’ 34” N latitudes and 73^0 44’ 50” E to 74^0 2’ 34” E longitudes. Study areas comprise the upland basin of Pushpavati river which is a major tributary of Kukadi River in the upper river basin of Bhima. The Pushpavati River originate on the eastern slope of the western ghat at 950 meters above sea level. It flows

in North West to south east direction for 40.15 km. before the confluence of Yedgaon reservoir dam.



Objective

- To Assesses land use land cover of watershed
- To Study Land use land Cover Change detection between 2005, and 2015 years

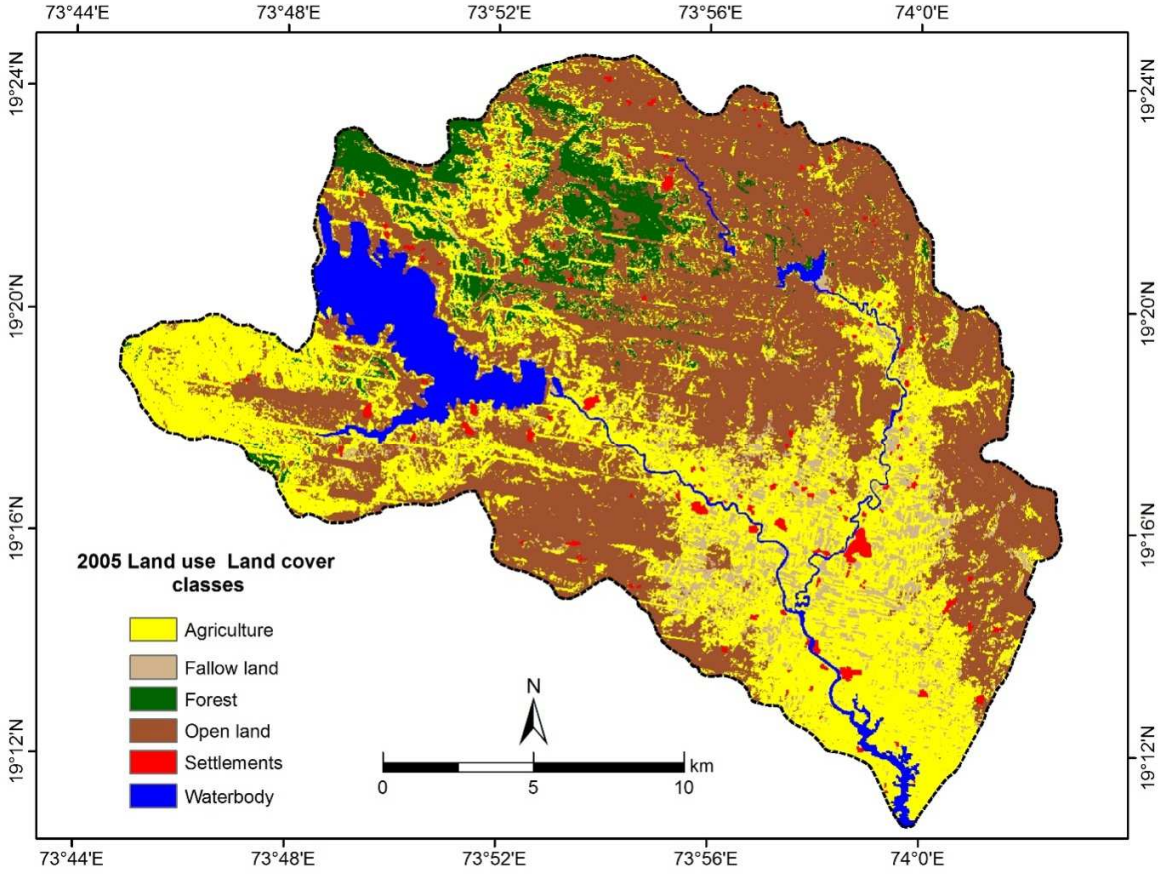
Methodology

The Remote Sensing techniques is used in Pushpavati watershed for analyzing land use and land cover changing pattern. In this study, use of unsupervised and supervised image classification is done for detecting Land use and Cover classes. Landsat ETM+ images of March, November2005 and 2015 were used to test the Supervise classification. Supervise classification involves developing training patterns using unsupervised classification followed by classifying the pixels using supervised classification. The technique utilizes the spectral recognition of the unsupervised classification in the performance mode and the selection of sampling sites from a Principal Component Analyzed image of the supervised classification in the training mode.

Result discussion

The most cited causes of land cover change in many literatures are population increase. However, the relation-ship between population and land cover change is debate-able issue. The upper Pushpavati basin has classified using Supervise classification techniques divided in to six Land use and Land cover classes. The composition and distribution of land use and land cover classes of images include included agriculture, fallow land, forest, open land.

Settlement, water body.



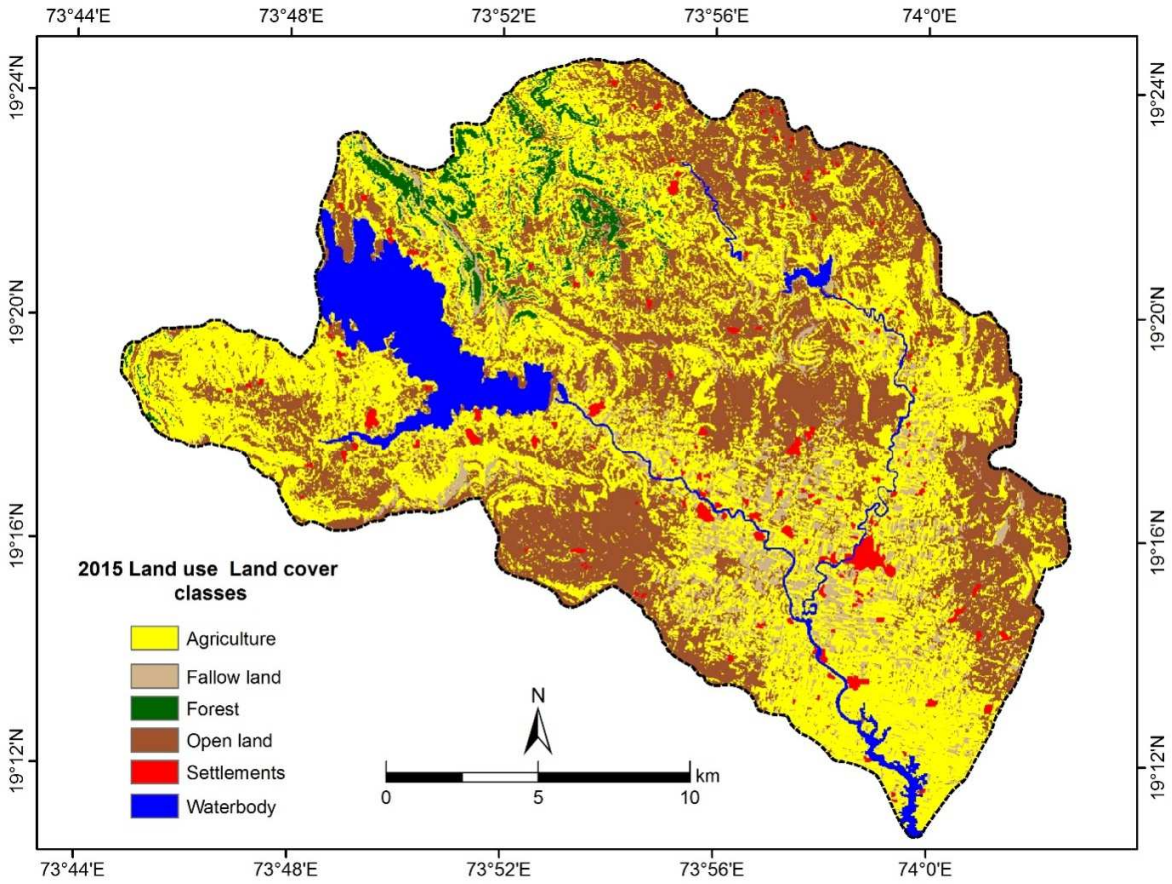


Table No. 1.1 LU and LC 2005

Class	Area in sq km	Area in Percent
Agriculture	147.86	35.64
Fallow land	23.10	5.57
Forest	26.09	6.29
Open land	187.66	45.24
Settlements	4.65	1.12
Waterbody	25.41	6.12
	414.79	100

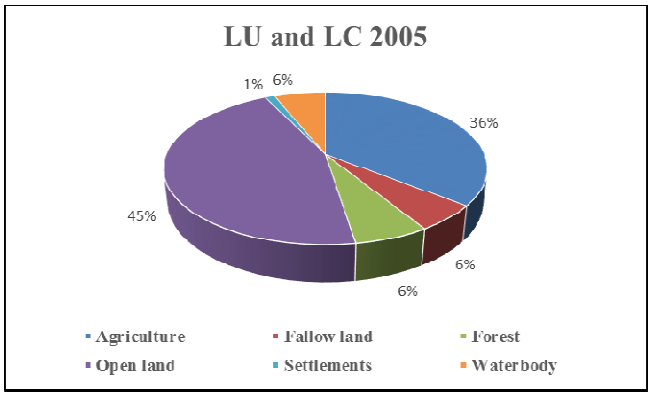


Table No. 1.2 LU and LC 2015

Class	Area in sq km	Area in Percent
Agriculture	197.24	47.55
Fallow land	26.81	6.46
Forest	11.56	2.78
Open land	145.18	35.00
Settlements	6.88	1.66
Waterbody	27.08	6.53
	414.79	100

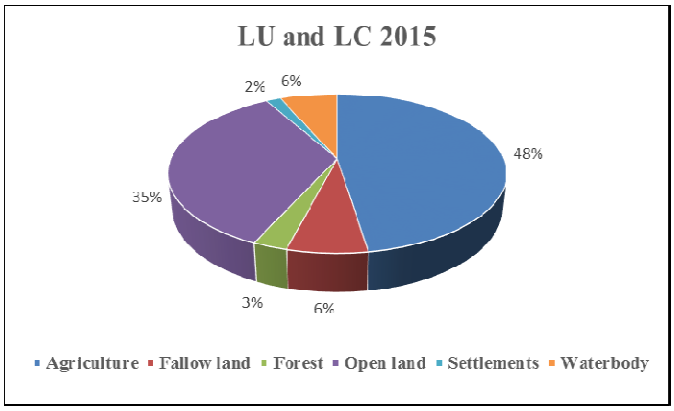
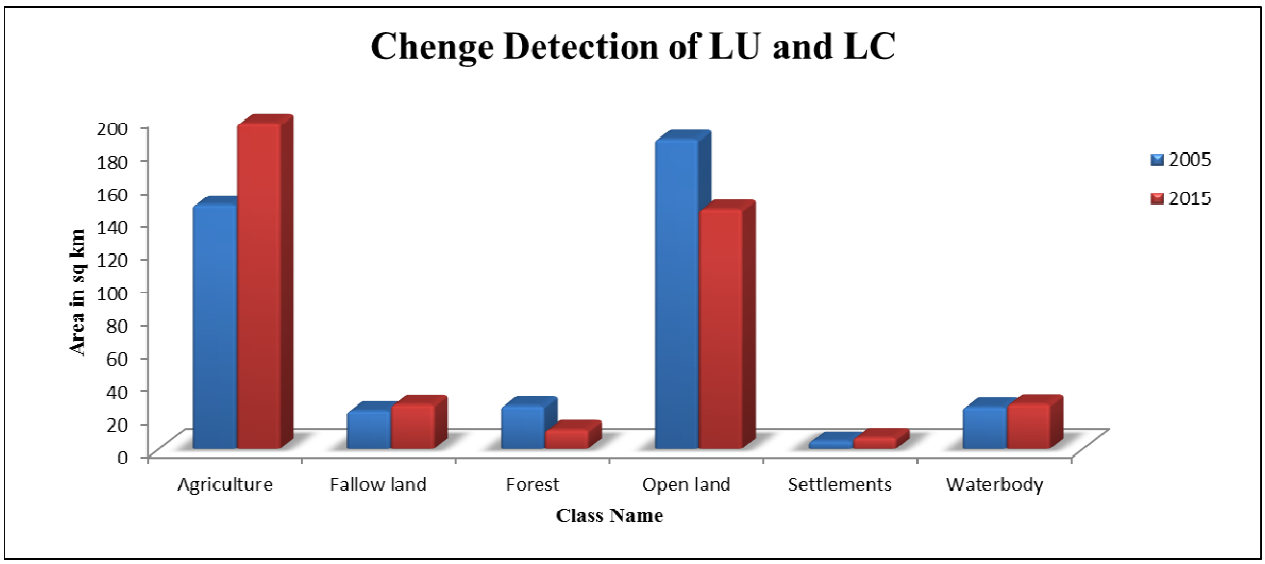


Table No. 1.2 LU and LC Change Detection

Class Name	Year 2005	Year 2015
Agriculture	147.8637	197.2494
Fallow land	23.1057	26.8119
Forest	26.0937	11.5659
Open land	187.6626	145.1889
Settlements	4.6557	6.8895
Waterbody	25.4106	27.0864



Agriculture

The analysis of spatial change indicates that the explanation of urban settlement is taking place of the prime agriculture land in the area. The area under the agriculture decreases from 35.64 % and 47.55 % in 2005 and 2015 respective year.

Fallow Land

This land is able to grow crops. After few years again crops are grown in this land. The Fallow land are 5.57% and 6.46 %in year respectively 2005 and 2015.

Forest

In the study area forest cover is well. It is above the average forest cover of India and Maharashtra. The study area included forest cover is 26.09 % and 11.56% respectively in the year 2005 and 2015. The forest is decreased due to deforestation.

Open Land

Open land is waste land in watershed. It is not useful to agriculture. There are only barren rocks situated in top of hill or watershed divide. Open land is slowly decreased from 2005 to 2015 respectively 45.27% and 35.00%.

Settlement

The study area further indicate respectively that the built up area has increase from 1.12 % km and 1.66 %in 2005 and 2015 years respectively. The Built up area has increase because increase in population, therefor agricultural low laying area are converted in built up area.

Waterbody

Water bodies in the Pushpavati Basin is 6.12 and 6.53% in year of 2005 and 2015. The Waterbody include Yedgaondam, Pipalgoan joga, Chilewadi dam and channel etc. of Pushpavati Basin.

Conclusion

The productive agricultural land is being transformed in settlement area due to increasing demand of population. The composition and distribution of land use and land cover classes of images include included agriculture, fallow land, forest, open land, settlement, waterbody. The area under the agriculture decreases from 35.64 % and 47.55 % in 2005 and 2015 respective year, The Built up area has increase because increase in population, therefor agricultural low laying area are converted in built up area and the explanation of urban settlement is taking place of the prime agriculture land in the area. The area under the agriculture decreases from 35.64 % and 47.55 % in 2005 and 2015 respective year.

References

1. Amare S. M. (2013) “Retrospective Analysis of Land cover and Land use Dynamics in Gilgel Abbay Watershed by Using GIS and Remote Sensing Techniques”, Northwestern Ethiopia. International Journal of Geomatics (IJG) 4, 1003-1008.
2. Kale N. P. and More J. C. (2015), “Hybrid Classification of Land use and Land cover in Change detection of Upper Ghod Basin in Pune (Maharashtra) Using remote sensing techniques” ISSN:0971-6785, MBSP,Pp. 9-17.
3. Population census government of India
4. Pradhan R. (2010), “Land Cover Classification of Remotely sensed satellite Data using Bayesian and Hybrid classifier. IJCA, (0975-8887), Vol- 7, No-11.
5. Prakasam C. (2010), “Land use and land cover change detection through remote sensing approach: A case study of Kodaikanal taluk, Tamilnadu.” Int. J. Geometrics Geosci. 1(2):150-158.
6. Prenzel B. and Treitz P. (2004), “Remote sensing change detection for a watershed in north Sulawesi, Indonesia.” Progress Plan. 61:349-363.
7. www.google.in