



### Short Communication

## Application of Bhuvan platform in deciphering land use land cover (LULC) changes of recent time in Bikaner part of Thar Desert, India

Monali Sen

Indian Forest Service Officer on Special Duty, Forest cum Joint Secretary, Environment, Government of Rajasthan, India  
monal7th@gmail.com

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### Abstract

Many studies have been done over Land Use Land Cover (LULC) change trend analysis in India, particularly in Thar Desert since long. But none has been done by coupling a forest and/or green cover angle to that of Bhuvan (Indian Geo Platform of Indian Space Research Organization). In this study the attempt has been made to analyse the LULC trend reflected in Bikaner part of Thar desert in recent decades by using data from Bhuvan.

**Keywords:** Thar Desert, Land Use Land Cover (LULC), Bhuvan, GIS.

### Introduction

Thar Desert or the Great Indian Desert is worlds' 17th largest desert forming a natural boundary between India and Pakistan. With 85% (about 320,000 km<sup>2</sup>) area in Indian subcontinent. In India 90% desert area is in Rajasthan state, where the major desert districts are Barmer, Bikaner, Jaisalmer and Jodhpur (Figure-1). Over the past 50 years major geological, hydrological, land use pattern and vegetation cover changes has been repeatedly studied by agencies and scholars to report the changing trends of desertification, degradation vis-à-vis afforestation and land reclamation<sup>1-3</sup>. Unfortunately, other than few general surveys and sand dune change detection works done in 1990s, all the works were focused in the districts of Barmer, Jaisalmer and Jodhpur: Keeping aside Bikaner region<sup>4</sup>. Thus a primarily GIS based analysis is coupled with exhaustive field surveys to analyse the current trend of change in land cover as well as desertification combat through increasing vegetation cover. For this purpose, ground survey has been coupled with secondary data from Forest Survey of India (FSI) and Bhuvan (Indian Geo Platform of Indian Space Research Organization) for mapping and statistical analysis purpose. The primary objective of present study is to analyse the present trend and predict the future condition.

Comparative analysis has been done to determine rate of decrease of non-forest area, changes in land use land cover pattern and finally desertification spread rate changes for the past couple of decades. Both the positive as well as negative findings are analysed to the present context of increasing population and developmental changes. The ultimate goal being prediction in future reference. The results found to be promising as being the only targeted analysis of Bikaner Desert-scape in recent times.

### Materials and methods

Data starting from 2005-06 to 2015-16 was taken for different Land class (in sq. km) from State of Forest Report (SFR) published by Forest Survey of India (FSI) under Ministry of Environment, Forests and Climate Change (MoEF & CC), India. This data then compared and synchronized with LULC data and Normalized Difference Vegetation Index (NDVI) for the same years, from Bhuvan Platform<sup>5</sup>. Both the status of vegetation and/or green cover lost as well as LULC pattern change has been analysed from the data such obtained.

### Results and discussion

The 1<sup>st</sup> comparison were done based on LULC data of 2005-06 with that of 2011-12. The result as shown in Figure-2a and 2b has shown a gradual reduction of grass/ green cover with simultaneous spread of wastelands in the Thar Desert-scape. This fact can more strongly be verified from the combined FSI and Bhuvan data as shown in Figure-3. The ground level loss or gain of area (ha) are actually very prominent; showing a 56.6% decrease in grassland combined with a 19.6% increase of wastelands.

The reason of such huge changes can be the extreme summer temperature aided by minimal rainfall, as a very normal climatic state of deserts. Moreover, being the arid zone, the heat and draught may had witnessed increased grazing pressure on the available grass lands. But one positive result shown by the comparison is the 1.1% reduction of the sandy area, the reason can safely be accorded to afforestation cum sand dune stabilization activities done by State administration in the desert region.

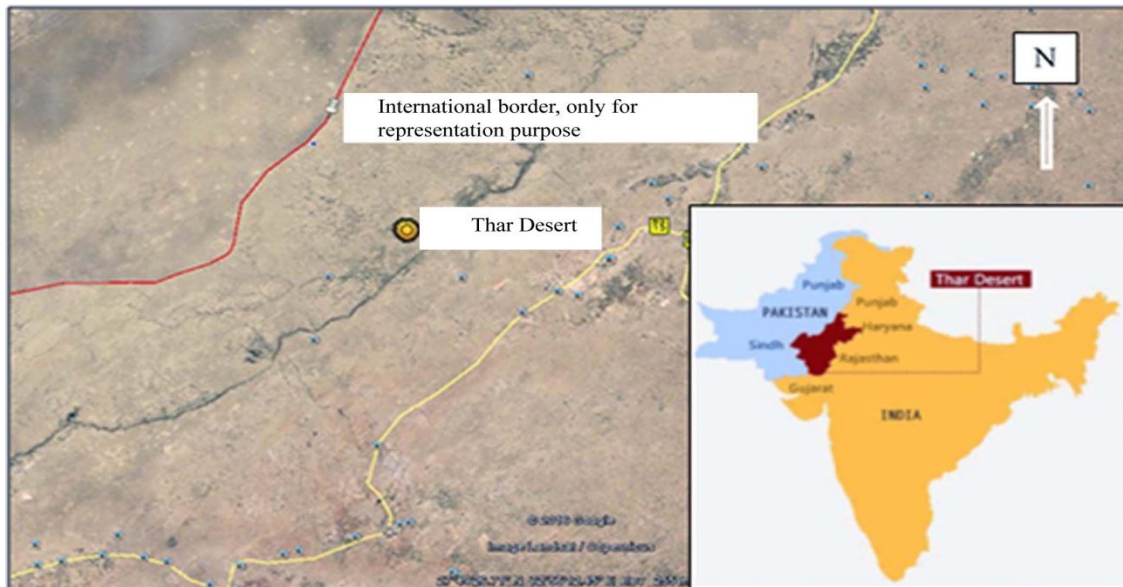


Figure-1: Google Earth imagery showing location of Bikaner Part of Thar Desert, along with International Border<sup>6</sup>.

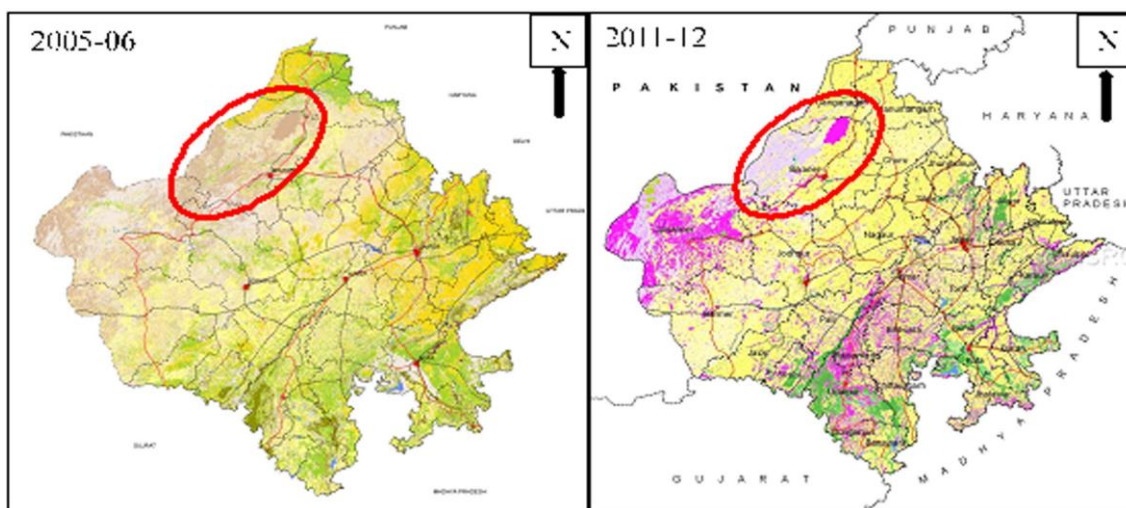


Figure-2a: Comparison of LULC pattern of Bikaner Part of Thar Desert (inside the red ellipse) of 2005-06 and 2011-12 showing prominent reduction in grass cover and spreading of wastelands<sup>5</sup>.

Classes	Classes
<b>Built Up</b>	<b>Grass / Grazing</b>
Urban	Grass/Grazing
Rural	
Mining	<b>Barren / Waste Lands</b>
	Salt Affected Land
<b>Agricultural Land</b>	Gullied/Ravinous Land
Crop Land	Scrub Land
Agricultural Plantation	Sandy Area
Fallow Land	Barren Rocky
Current Shifting Cultivation	Rann
	<b>Wetlands / Water bodies</b>
<b>Forest</b>	Water bodies
Evergreen/ Semi Evergreen	Rivers/Streams/Canals
Deciduous	Inland Wetland
Forest Plantation	Coastal Wetland
Scrub Forest	
Swamp/ Mangroves	<b>Snow and Glaciers</b>
	Snow/Glaciers

Figure-2b: Colour code chart of LULC pattern, reflecting reduction in grass cover and spreading of wastelands in Figure-2a<sup>5</sup>.

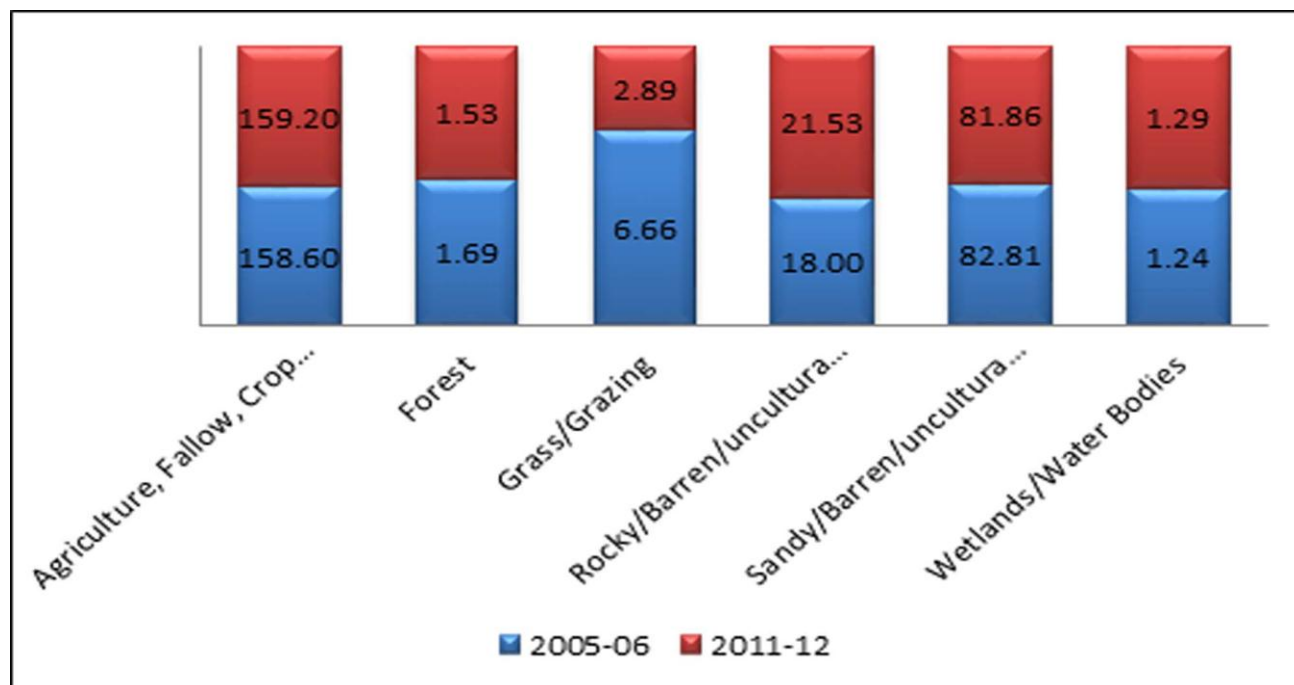


Figure-3: Actual decrease in area (ha) reflecting reduction in grass cover and spreading of wastelands in Figure-2a<sup>2</sup>.

### Conclusion

The present study quantifies the Land Use Land Cover changes that have taken place over a period of 7 years in the Thar Desert area of Bikaner District, India. Land use Land Cover analysis was done by comparing and evaluating images of two specific time period by using Bhuvan. Such studies are important to understand the change of environment and the impact of natural resources like land and waterbodies. Though the uniqueness of this study is being the first time study of LULC by using Remote Sensing and GIS (specially Bhuvan) in Thar desert area of Bikaner. Till date the only study of this kind was restricted to the IGNP (Indira Gandhi Nahar Pariyojna) canal area of Thar desert and not to the total district. Bhuvan is Geo-portal of ISRO (Indian Space Research Organization) and acts as gateway to explore earth in multi-sensor, multi-platform, multi-temporal geospatial domain. The highly potential Bhuvan thus can be used in many such studies producing hitherto unexplored changes of geomorphology, oceanology as well as climatic analysis. The purpose of this study was the same, to highlight the possibilities of future endeavours.

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