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Wastelands Analysis and Mapping of Bhiwani District, Haryana

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ABSTRACT

This study aimed at monitoring, mapping, and assessing the wasteland in the Bhiwani district of Haryana using Geo-informatics techniques. The district suffers severely due to land degradation and desertification problems, especially in its central and western parts. Base map prepared on 1:50,000 scale using Survey of India topographical sheets of the study area. Information including roads, canals and locations of villages were traced on the base maps. On screen digitization classification approach, wasteland categories were identified and demarcated using IRS LISS-III imageries of 2008 for the study area. The study area has been defined various land use land cover categories, which were salt affected land, sandy area, Waterlogged area, Scrub land and barren hills. Very limited area is salt affected in Bhiwani district along the canal due to seepage of canal water. Most of the sandy area is a result of Aeolian process in the district. Normally, they are wind blown sands formed in different shapes and spread through out the district. The barren hills of varying altitude are included under barren rocky category. The most predominant category of wastelands in Bhiwani district is sandy area which is not taken up for cultivation so far due to some constraints such as location, environment, chemical and physical properties of the soil or financial or management constraints.

Keywords: GIS, Land degradation, Remote sensing, Satellite image

I. INTRODUCTION

Increasing pressure of population has created an excessive demand for food, fodder, fuel and fiber. This has necessitated adoption of scientific measures for increasing land productivity and bringing more areas under cultivation/forests. At the same time land degradation due to desertification, soil salinity, waterlogging, floods/droughts, excessive soil erosion and unscientific agricultural practices has resulted in the creation of vast stretches of wastelands. About 16 per cent of the country's geographical area is under wastelands (Jaga et al., 1993). Wasteland means degraded land which can be brought under vegetative cover with reasonable efforts, and which is currently under-utilized, or land which is deteriorating due to lack of appropriate water and soil management or on account of natural causes (Saha et al., 1990). Information on geographical location, aerial extent and spatial distribution of wastelands is essential for their effective management and sustainable development (Gautam and Narayan, 1988). To monitoring, mapping, and assessing the wasteland in the Bhiwani district of Haryana using Geo-informatics techniques.

II. STUDY AREA:

The district Bhiwani lies between latitudes 28°19' to 29°5' N and longitude 75°28' to 76°28' E. It is bounded in the north by the Hisar district, in the east by the Rohtak district, in the south by the Mahendergarh district of

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Haryana and the Jhunjhunu district of Rajasthan and in the west by the Churu district and a part of the Jhunjhunu district of Rajasthan with an area of 4639 sq. km. There are about 444 villages and 6 towns in the rural-urban frame of the district. The towns are Bawani khera, Bhiwani, Tosham, Siwani, Loharu and Charkhi Dadri (Fig.2.1).

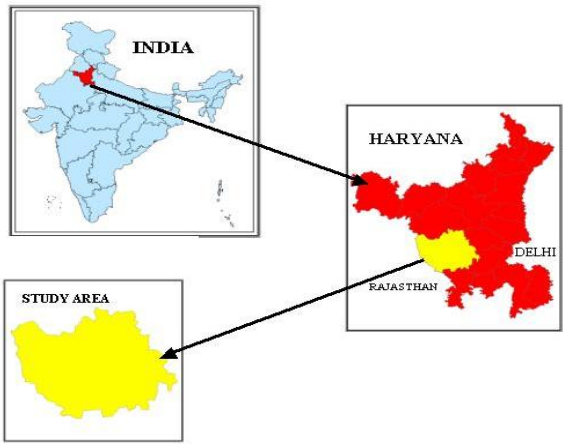

Fig. 2.1: Location of study area

III. MATRIALS AND METHOD:

To study the spatial dynamics of wastelands, and to evaluate the utility of high resolution satellite data for wasteland mapping, the IRS P6 satellite data and topographical maps were used (Table 1 and 2). The present study is based on the remote sensing spatial data as well as the non-spatial data available from the various sources. Multidate IRS- P6 (Resourcesat-I) LISS-III (Oct. 2008 and Feb. 2009) satellite images has been used for the preparation of wasteland map of the study area. The secondary data collected from census handbook, District Gazetteer and Statistical Abstract of Haryana (2008). In the present study the wastelands categorisation in the said city is envisaged based on screen visual interpretation technique using Arc GIS 9.3 software along with ground truth analysis. The dynamic nature of wasteland categories warrants the uses of multi-season satellite data for their accurate delineation. This facilitated the on-screen visual interpretation for delineation of wasteland classes and was carried out on IRS-P6 LISS-III imagery of 2008-09 provided the spatial extent, distribution and dynamics of wastelands.

IV. RESULT AND DISCUSSION:

The multi-temporal satellite images of IRS P6 LISS-III were used to map and analysis of wasteland for the year of 2008-09. Various waste land categories has been mapped and classify based on screen digitization techniques (Table 4.1 and Fig. 4.1). The various wasteland categories has discussed below.

4.1 Waterlogged Area (seasonal and permanent):

waterlogging dynamics, the water logged areas have been categorized into seasonal water and permanent water logged areas. An area, which remains waterlogged throughout the entire year, is termed as permanent waterlogged area, and remaining of the waterlogged area, which generally dried up before the end of Rabi cropping season ending by mid April, is termed as seasonal waterlogged area. Seasonally waterlogged areas appear very clear in different shades of blue and cyan in standard false colour composite (FCC) image generated

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from space borne multispectral data, and acquired during the months November and December (Dwivedi et al., 1999). The area under Waterlogged (Permanent) is 79.47 ha and Waterlogged (Seasonal) 900.89 ha which is about 5 percent of total waste lands of the district.

4.2 Moderately Salt Affected:

Very limited area is salt affected in Bhiwani district along the canal due to seepage of canal water. The total area under salt affected is 46.67 ha of the total waste land of the district.

4.3 Land with open Scrub:-

Those lands normally occupy (relatively) higher topography like uplands or high grounds with scrub/shrub vegetation are classified under this category. In case of Bhiwani district, sand dunes and sandy areas and local depression areas (Johar lands) with bushy vegetation are included and mapped under this category. This land occupy 7227.38 ha area of the distract.

4.4 Sandy Area (Desertic):

Areas having stabilized or partially stabilized sand dunes and other sandy area have been classified under this category which is covered 567.23 ha of the district. Most of the sandy area is a result of Aeolian process in the district. Normally, they are wind blown sands formed in different shapes and spread through out the district.

4.5 Degraded Pastures/Grazing Land:

These are spread 9857.95 ha area mainly on village panchayat lands associated with village surroundings. The pasture and grazing land with natural plantation have become degraded due to neglected land management. The area covered 48.46 percentage of the district.

4.6 Barren –Rocky:

The barren hills of varying altitude are included under this category. This category covered 1606.45 ha which is 7.90 per cent of the study area.

4.7 Mining dumps:-

Area various storage dump of industrial raw material or slag/effluents or waste material or quarried/mixed garbage of earth's surface are included in mining dump. Which is occupied about 55.06 ha area of the district.

Table 1: Wasteland statistics generated from LISS-III (2008-09)

Total Geographical Area	Wasteland Categories	Area in Ha	Area in Per cent	Area in Percentage of TGA
463900 hecture	Barren Rocky	1606.45	7.90	0.35
	Degraded Pastures/Grazing Land	9857.95	48.46	2.13
	Mining dumps	55.06	0.27	0.01
	Moderately Salt Affected	46.67	0.23	0.01
	Sandy Area	567.23	2.79	0.12
	Land With Open Scrub	7227.38	35.53	1.56
	Waterlogged (Permanent)	79.47	0.39	0.02
	Waterlogged (Seasonal)	900.89	4.43	0.19
	Total wasteland area	**20341.1**	**100.00**	**4.38**

Source: Derived from satellite images of study area Oct-2008 and Feb. 2009

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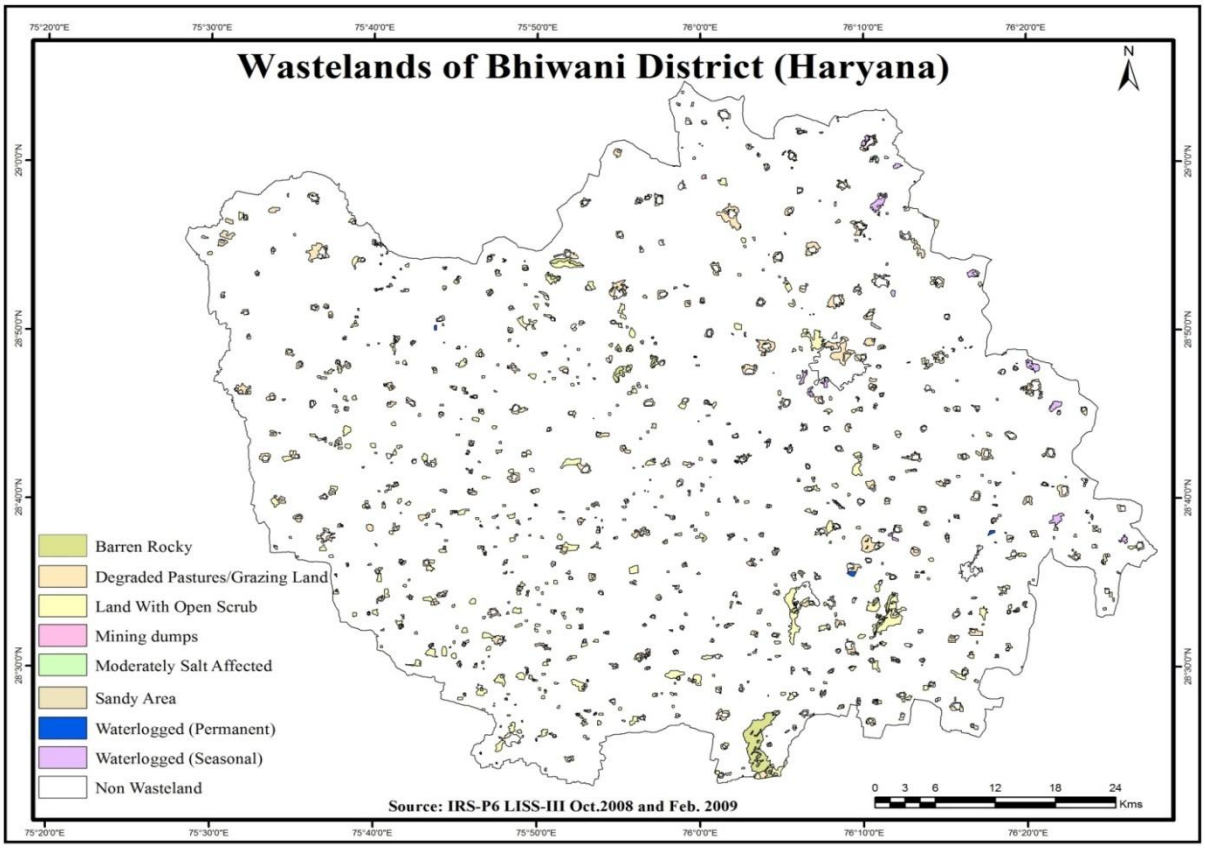
Figure 2: Wasteland of Bhiwani District, Haryana (2008-09)



V. CONCLUSION

This study amply demonstrates the use of remote sensing and GIS to analyze the wastelands in the study area. This study aimed at monitoring, mapping, and assessing the wasteland in the Bhiwani district of Haryana using Geo-informatics techniques. The district suffers severely due to land degradation and desertification problems, especially in its central and western parts. For the development of wastelands, different activities have been suggested for different types of wasteland depending on the spatial distribution in the study area.

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