Section A-Research Paper
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Assessment of Wasteland using Remote Sensing and GIS

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Abstract

This paper highlights the satellite remote sensing techniques for monitoring and mapping of Wasteland of Ambala district of Haryana. In the present study, the multi-temporal satellite images of LISS-III sensor for the year of 2018 were used to delineate wasteland classes using on screen digitization technique. Base map has been prepared with the using Survey of India topographical sheets on 1:50000 scale. With the help of on screen visual image interpretation techniques various wasteland categories on satellite image were observed. The Ambala district has dominate riverine sand, scrub land, degraded pasture/grazing land, waterlogged land and mining categories of wasteland. The wasteland covers 4.32% of total geographical area of the district. The land with open scrubs (2.31%); pasture/grazing land (0.32%) around villages; land under mining is (0.03%) has mapped in the district. Some portion of water logging (0.19%) is also found in the district. The geospatial database on wastelands is expected to be valuable for the execution of various developmental programmes.

Key Words: GIS, Remote Sensing and Wastelands

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1. Introduction

Wasteland is another name for low-quality or declined land from an agricultural perspective. Wastelands are generally considered from production point of view whether it is grass, agriculture or forest (N.C. Jana, 2009). The National Wasteland Development Board (NWDB) has defined wasteland as "Degraded land that, with moderate effort, might be covered in vegetation, is now underutilised, and is deteriorating due to improper water and soil management, environmental factors, or both. Wastelands can be caused by natural or imposed limitations, such as those imposed by geography, environment, the chemical and physical characteristics of the soil, or management or financial restraints." (Arya,V. S, 2006) The degradation of land, a significant environmental problem in the modern era, is a result of the overexploitation and improper management of natural resources. Satellite data gives unbiased information about the objects. There receptivity, multi-spectral, synoptic coverage, near real time and its relative economy over other methods of study made the techniques better for mapping

wastelands. The IRS satellites with improved spatial and spectral resolution made it possible to more effectively map and monitor degraded regions (Rao et al. 1980). NRSA has used satellite mapping for preparing a spatial database on wasteland for entire country in two phases which completed in 2000 and 2005 respectively on a 1:50000 scale at the district level. According to first phase the total wasteland in the country have been estimated 63.8 million hectares. As per the NRSA Atlas 2005 the estimated waste land cover 55.26 million hectares in the country (NRSA Atlas 2005). The population pressure on land to supply commodities such as food, energy, and fibre for a nation that is always expanding. Any attempt to reclaim wastelands is essential and worthwhile from the waypoint of economic development through increase in agriculture production by reclaiming the uncultivated wasteland. The objective of this study is to assessment the wastelands in the Ambala district, Haryana using RS/GIS technologies.

2. Study area

The Ambala district is situated between 30 °07′ to 30° 34′ North latitude and 76°20′ to 77°10′ East longitude. The total area of the district is 388949 acres. The district is bounded by Panchkula in north, Yamunanagar in east-south, Kurukshetra in south, Punjab in north and north-west. The location of the study area has shown in Fig.1. The district is covered by seven toposheets prepared by Survey of India.

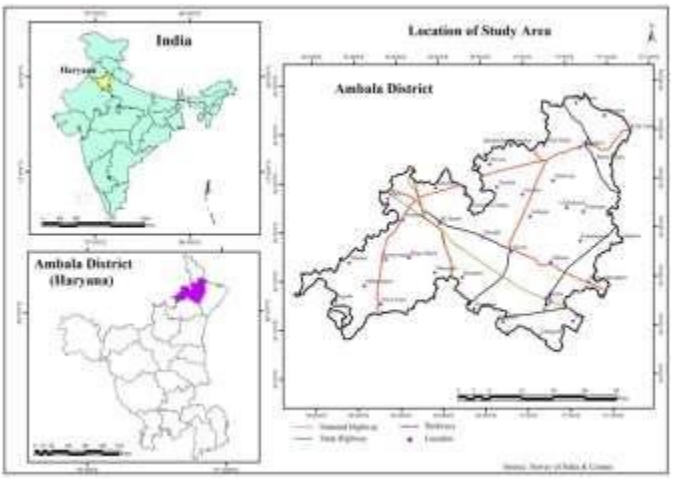

Fig.1: Location of study area

3. Materials and Method

The study has comprised with on the primary as well as the secondary data which have been collected from different sources. Indian Remote Sensing Satellite LISS- III digital data of Oct. 2018 has been used which is downloaded from BHUVAN. Other information was gathered as well, such as the most recent reports, articles, and maps for reference. Surveys of India and topographical maps were also utilised to pinpoint the locations of villages, important transportation hubs, cultural landmarks, and annotate significant towns and cities. The base map was created using Survey of India topographical sheets at a scale of 1:50000. With the help of on screen visual image interpretation techniques various wasteland

categories on satellite image were observed based on the image characteristics like shape, size, tone, texture, pattern, location and association etc. wastelands categories were delineated by following a standard legend prepared by NRSC. To gather the field characteristics of wasteland regions and relate them to the appropriate image qualities, field inspections were conducted. The Survey of India's topographical sheets were used to initially identify and precisely locate the sample sites that would be validated in the field. The names of the settlement areas and the main roadways were also prepared on a separate layer using GIS environment. The wasteland data were put in GIS and prepare the database for analysis and mapping of the wasteland.

4. Results and discussions

Visual interpretation based on image attributes and existing information of the research area was used to identify wasteland areas (Figure 2). The wasteland in the district covers 4.32% of total geographical area of the district. The main wasteland category is land with open scrub (2.31%). The other main categories are pasture/grazing land (0.32%) around villages; land under mining is (0.03%). Small portion of land is also under water logging (0.19%). Area under various types of wastelands in the district is provided in the table 1 and distribution of various wasteland categories shown in Fig 3. The various land use classes which is found in the district during 2018 discussed below.

4.1 Riverine Sand: This categories lies on east and northern part of the district near Markanda and Begna Nadi. It constitutes 5681.54 acres which is 1.46% of total geographical area in the district.

4.2 Scrub Land: These are the uncultivated wasteland and are scattered in the whole district. The scrub land is situated mainly around Nalaha and some lands are present generally on the periphery of the village settlements. This category covers the 8976.03 acres and 2.31% of the total geographical area of the district.

4.3 Degraded pasture/ grazing land: It constitutes 1257.91 acres which is 0.32% of total geographical area in the district. These are primarily dispersed on local panchayat properties connected to nearby villages. Due to poor land management (lack of adequate soil conversion and drainage techniques), pasture and grazing area with natural planting have deteriorated. These overgrazed areas have scattered trees, bushes, and shrubs.

4.4 Waterlogged: Waterlogged areas are present in the low lying area, flood plains and local depressions. These regions have high ground water levels, particularly during monsoon and post-monsoon seasons. These portions are now wasteland due to inadequate drainage, shallow groundwater levels, and poor soil quality. This category covers the 758.44 acres constituting 0.19% of the total geographical area of the district.

4.5 Mining Areas: The major part of the mining dumps occurs in the southern part of the district. This class is mainly consists of brick kiln area. It covers an area of 125.56 acres which is 0.03% of total geographical area in the district.

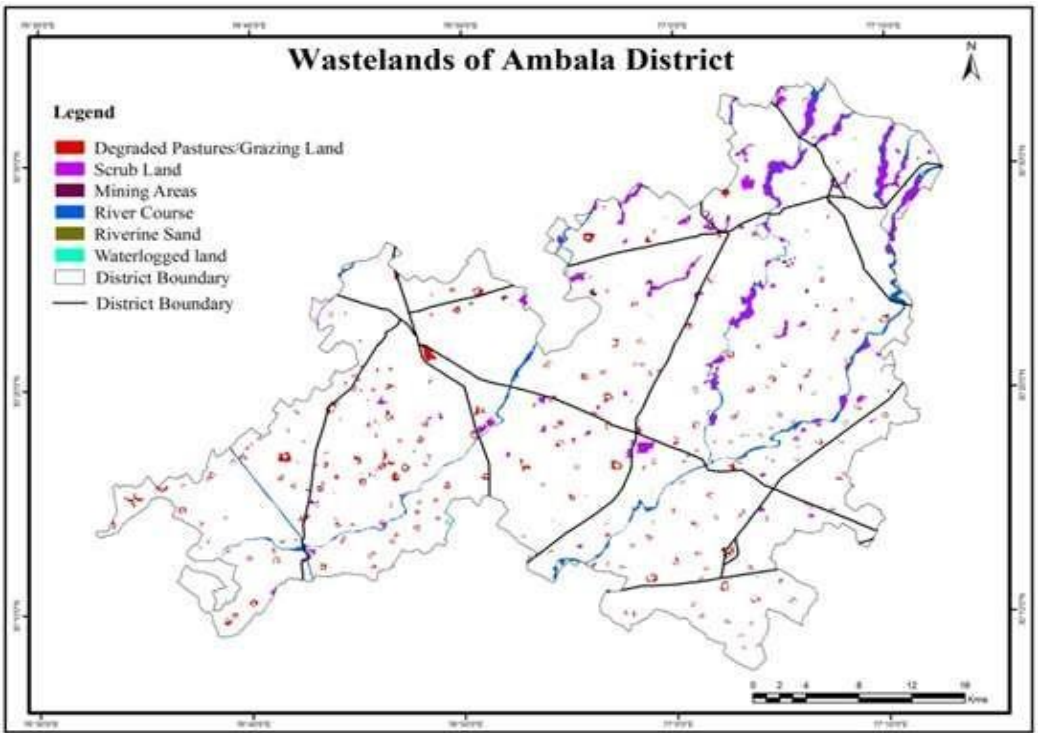

Fig.2: Wasteland categories of Ambala District

Table 1: Area under different wasteland categories of Ambala District

Sr.No.	Category	Area (Acres.)	% age of Total geographical area
1	Riverine Sand	5681.54	1.46
2	Scrub Land	8976.03	2.31
3	Degraded pasture/grazing land	1257.91	0.32
4	Waterlogged	758.44	0.19
5	Mining Area	125.56	0.03
	Grand Total	**16799.48**	**4.32**

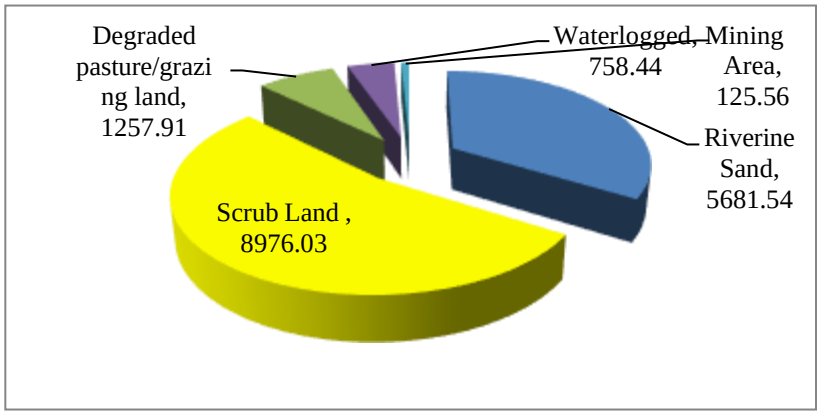

Fig.3: Wasteland area distribution in Acres of Ambala District

5. Conclusion:

In the present study there is urgent need for food and nutritional security on one hand and there is strong demand for urbanization and industrial development on the other, which requires a large amount of land resource. As result increase tendency of land conversion is being observed that has given rise to growing socio-political conflicts in different part of India. Wastelands must be placed on a LISS-III basis because they play a significant role in land-use planning and development and allow for the collection of any relevant information regarding individual parcels of property. Additionally, it has been discovered that satellite data is helpful in reaching high mapping accuracy in the demarcation of wasteland classes. According to the characteristics of the wasteland, management techniques such levelling gullies or ravines, gully plugging, contour bunding, and contour trenching can be used. Thus, by using this sophisticated technique, wastelands can be managed and turned into agricultural land. For various reclamation strategies and other uses for district level planning, the spatial data obtained on wastelands at 1:50,000 scales can be used.

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