*International Research Journal of Environment Sciences*_____ ISSN 2319–1414
Vol. **4(5),** 42-46, May **(2015)** *Int. Res. J. Environment Sci.*

Change detection of Wastelands of Jhajjar District, Haryana using Geo Informatics

Arya V.S.[1], Arya S.[2*], Sandeep kumar[1] and Hooda R.S.[1]
[1]SG, Haryana Space Applications Centre, HARSAC, Hisar, Haryana, INDIA
[2]D.E.S. (AF) KVK, Fatehabad, CCS HAU Hisar, Haryana, INDIA

Available online at: www.isca.in, www.isca.me
Received 26th December 2014, revised 5th February 2015, accepted 12th April 2015

Abstract

The challenge to provide food security to our country's increasing population is a big task. The stretches of land lying waste, in Haryana it is necessity to use that land for farming purpose. We can convert these wasteland into agricultural land by using some practical efforts.. It has been rightly pointed out that these lands are not "waste" lands but "wasted" lands. To convert the wastelands to cultivable land, it is necessary to estimate and monitor the area under wastelands. The digital data for the years 2005-06 and 2008-09 of three seasons i.e. Kharif, Rabi and Zaid of IRS-IC/ID LISS-III was used. Change analysis matrix shows that the wasteland was 109.38 sq. km. in 2005-06 which decreased to 107.24 in 2008-09. It was found that degraded grazing land in the district is 57.99 sq.km. followed by open scrub other classes like stabilized sand dunes, waterlogged, mining area etc. were also observed.

Keywords: Geo informatics, change detection, Wastelands, LISS-III, IRS-1C/1D.

Introduction

To reclaim the wastelands into cultivable land, it is necessary to have their spatial extent at the state and district level. Keeping this in view, National Wasteland Development board (NWDB) was constituted with the objective of bringing five million hectares of land every year under fuel wood and fodder plantations.

Three seasons i.e. Kharif, Rabi and Zaid for the year 2008-09 of IRS-IC/ID LISS-III digital data was used for analysis in the district adopting standard projection system. The change detection matrix was generated by using vector layer of 2005-06 Manual, NRSA 2007[1]. The aim of this study was to monitor the wasteland changes by using the vector layer of 2005-06. To update the vector layer of 2005-06, the satellite data of latest available i.e. 2008-09 was used for analysis and vector layer was imposed on the latest interpreted data of 2008-09 to prepare the category wise spatial change matrix.

The study indicates that Haryana state has a total area of 2145.92 sq.km. under wasteland which constitutes 4.85 % of the total geographical area of the state Arya et.al. 2014[2]. If these wastelands will be under cultivation and other purposes like afforestation and horticulture can help in development of the socio-economic status of the people and increase the overall economic growth of the state.

Study Area: The Jhajjar district is located between 29°21' 30" to 29°51'30" N latitudes and 76°16'30" to 76° 58' 45" E longitudes Hooda et. al. 2003-06[3]. It covers a total area of 1834 sq. kms. it is bounded on the north by the Rohtak district, on the west by the Bhiwani district, on the south by Rewari and Gurgaon districts and on the east by the State of Delhi. The location of the district in the state is shown in figure-1. Alluvial plain of Yamuna river is a part of this district. The slope of the district is from west to east, water flow is towards Yamuna. There are two major physiographic units i.e. Bangar and Khadar in the area. Banger area is spreading in the western part which is upland plain inclined towards south and south-west. This area is eastward extension of the upland plain of Kaithal district Statistical Abstract, 2010[4]. It is irrigated by tube wells and canals and is a prosperous agricultural area. The Khadar is a flood plain of the river Yamuna and is suitable for sugarcane and rice cultivation. It is very near to Yamuna River.

Information on wastelands was derived from multi-temporal data either by digital analysis or visual interpretation. Visual interpretation was carried out displaying the digital data on the color monitor and wasteland categories were delineated through on screen interpretation. Software's ARC/MAP. 9.2, ERDAS IMAGINE 9.3, Microsoft Office 2007 were used for this study UNIP/ISRIC 1991[5]. Digital data was loaded and geo-referenced with the help of ground control points by using image processing software. Details of methodology of wastelands change analysis is described in the flow chart (figure-2). The methodology involved on-screen interpretation of multi season IRS-IC/ID LISS-III digital data from NRSC (National Remote Sensing Centre) of Rabi, Kharif and Zaid crops for the year 2008-09 for interpretation of various wastelands categories. Ground truth data collected from various places was used to finalize the map.

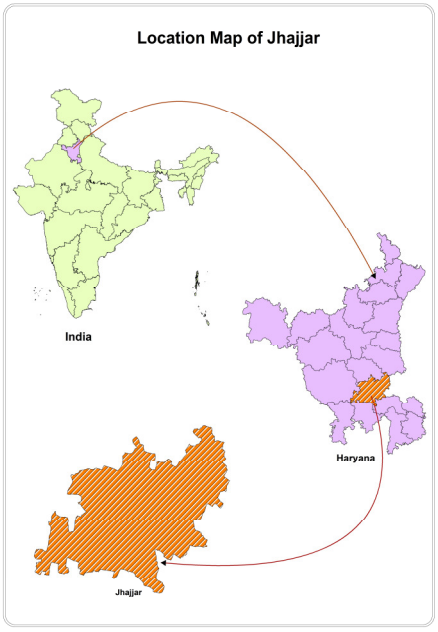

Figure-1
Location Map of the Study Area

Material and Methods

The Vector data of wastelands generated during 2005-06 was used to generate change detection, methodology flow chart is shown in figure-2. Survey of India topographical maps were used for identifying villages' locations, major transport network, cultural features and annotation of major towns and cities Manual, NRSA 2010[6].

Results and Discussion

Description of Wastelands: Wasteland mapping of the Hisar district was completed with multi season satellite data for the year 2008-09. The total area under various wasteland categories is 107.24 sq. km. which contributes 5.85 % of the total geographical area of the district. The area of these wastelands is given in Table-1; the graphical and pictorial representations are shown in figure-3. The brief description of these wasteland categories is as follows:

Scrub Land: It is scattered in all over the district where water availability is very less. These are degraded and undulating land having scrub and small trees. The prominent patch is observed near Matanhel village in western side, Mohan Bari and bahu village in the south-west, Amboli village in the south, Zahidpur and Ismailpur vilage in the east, and Jhajjar City in the central part. Some patches are also observed in the north of the district. The total area under open class is 25.47 sq.km. which covers 1.39 % of total geographical area which was 19.89 sq. km. during 2005-06. Area under this category is increased by 5.58 sq.km

Waterlogged and Marshy land (Permanent/Seasonal): These are the area where water is existing on the soil surface it can be for one season or can be for three seasons. Water logging is due to seepage of canal along the banks or low lying area where rainy water accumulates. Seasonal and Permanent waterlogged areas were identified in the district. The areas which were waterlogged only in kharif season were classified as seasonal waterlogged areas whereas, if water logging was observed in all the three seasons, those areas were put under permanent waterlogged areas. Permanent waterlogged is mainly observed at the western part of the district. Prominent patches are observed near Matanhel and Palra villages. The area under permanent waterlogged category was 4.36 sq.km. i.e. 0.24 % during 2005-06 of the total geographical area of the district and is decreased by 1.14 sq.km in 2008-09. The area under seasonal waterlogged was 11.22 sq.km. i.e. 0.61% during 2005-06 and is decreased by 5.3 sq.km in 2008-09.

Salt Affected Land (Moderate and strong): The land where excess soluble salt (saline) or high exchangeable sodium is present in excess that land is called salt affected land. It badly affects the growth of the plant. The land become salt affected due to seepage of canals and low lying area where underground water is on surface for long time. This category mainly lies in the north and eastern part of the district and near to Beri Khas village. The area under moderately salt affected class was 1.29 sq. Km. which covers 0.07 % of the total geographical area during 2005-06. Area under this category is increased by 5.54 sq.km in 2008-09. The area under strongly salt affected class was 1.92 sq. Km. which covers 0.10 % of the total geographical area during 2005-06, which is 1.72 sq. km. in 2008-09.

Degraded Pasture/ Grazing Land: These are panchayat lands which are surrounding the village. These are neglected and degraded land having natural plantations mostly used for animal grazing, without proper soil conservation and drainage measures. These are covered by scrubs, bushes or with scattered trees. The prominent patches are observed near Kheri, Jasaur and Kulasi villages in the north, Beri Khas and Majra in the north-east, Matanhel and Bahu villages n the south-east, Shamaspur Majra and Amboli village in the south and Badli villages in the west of the district. Area under this category was 55.98 sq.km. i.e. 3.05% of total geographical area of the district in 2005-06. Area under this category is increased by 2.01 sq.km in 2008-09.

Degraded Land under Plantation Crops: These are the lands under plantation crop but devoid of tree cover and mainly filled with bushes and shrubs. The canopy cover is less than 20 per cent. It is distributed all over the district but the prominent patches are found near Chhudani village in the north, Zahidpur in the south-east, Mohan Bari village in the south-west and some patches in the north-east of the district. The area under this category during 2005-06 was 3.67 sq.km. which covers 0.20

% of total geographical area in the district. Area under this category is decreased by 1.55 sq.km in 2008-09.

Sands: Semi Stabilized to Stabilized (15-40m): Majority of the area is sandy that depends on rainfall and in some parts sprinkler system is also used for irrigation purposes. The interdunal sandy area is found in this district but it is very small area and most of the interdunal area is under cultivation. Prominent patch is observed near Matanhel village in the western part of the district. The area under this category during 2005-06 was 6.53 sq.km, area in the district, which is 0.36 % of the total geographical area. Area under this category is decreased by 6.07 sq.km in 2008-09.

Mining Wastelands: Mine dumps also includes the area of brick kiln in which surface sand of that area is lifted app. 2 to 3 feet for making of bricks. This land can be brought under cultivation after regular inputs in few years. The area under this category during 2005-06 was 4.52 sq.km. which covers 0.25% of the total geographic area of the district. Area under this category is increased by 1.01 sq.km.

Conclusion

The data reveals that the total wastelands area in 2008-09 of the district is about 107.24 sq.km, which accounts for 5.85% of the total geographical area, which was 5.95% during 2005-06. Total wasteland area decrease by 2.14 sq.km. which is 0.11 % of the total geographical area. To decrease population pressure on natural resources it is necessary to increase agricultural area. Therefore, it is need of time to classify and retrieve these wastelands in the state. Degraded Pasture/ Grazing Lands are the panchayat lands which are surrounding the village. This is the major category of wasteland in the district consisting of 57.99 sq.km. i.e. 3.16 % of total geographical area of the district.

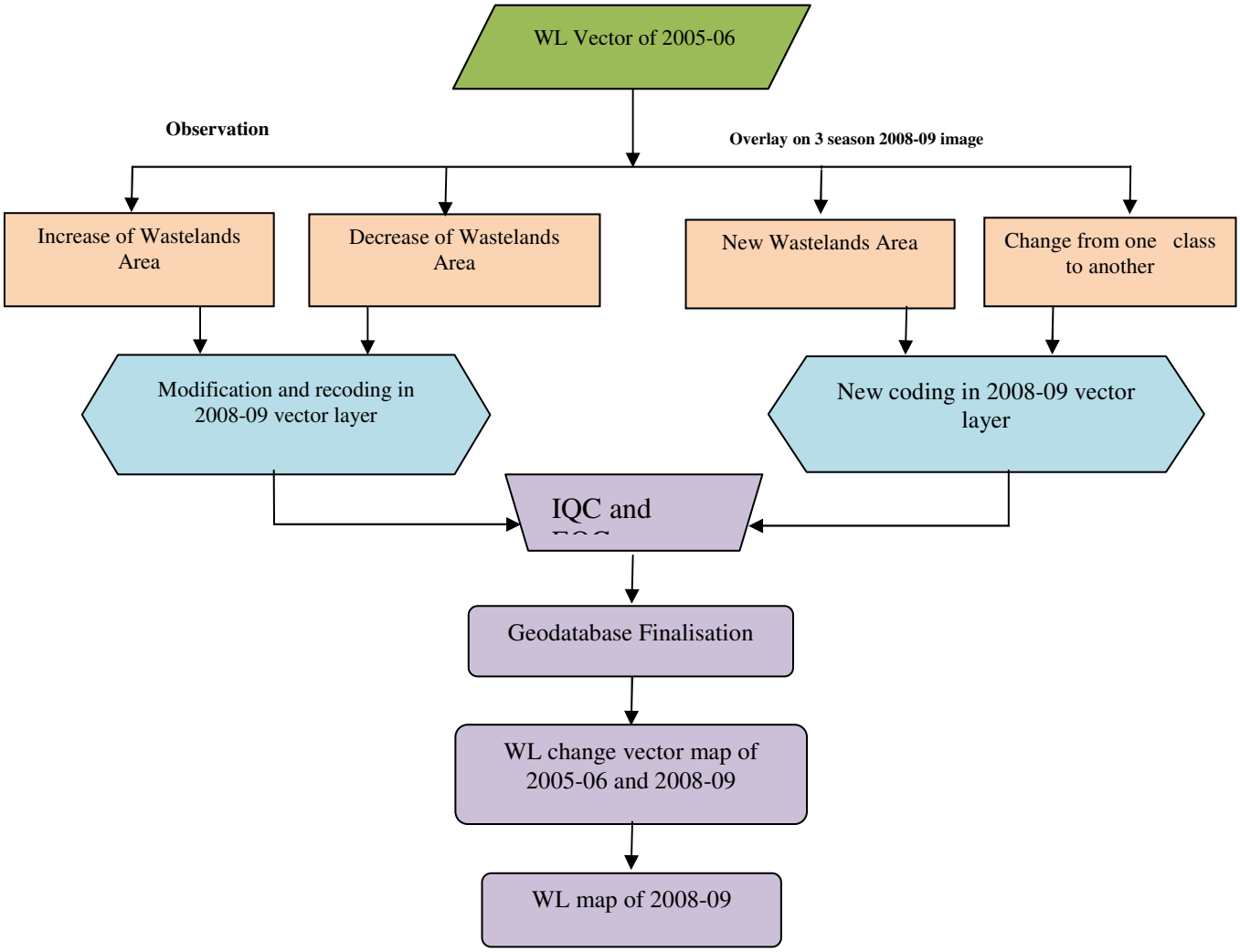

Figure-2
Methodology flow chart

Table-1
Wastelands under different Categories and change detection

SI	Wasteland Categories	2008-09	%	2005-06	%	Change	% diff.
1	Land with Open scrub	25.47	1.39	19.89	1.08	5.58	0.31
2	Water logged and Marshy land permanent	3.22	0.18	4.36	0.24	-1.14	-0.06
3	Water logged and Marshy land seasonal	5.92	0.32	11.22	0.61	-5.3	-0.29
4	Land affected with salinity/alkalinity-Moderate	6.83	0.37	1.29	0.07	5.54	0.03
5	Land affected with salinity/alkalinity-Strong	1.72	0.09	1.92	0.10	-0.2	-0.01
6	Degraded pasture/grazing land	57.99	3.16	55.98	3.05	2.01	0.11
7	Degraded land under plantation crops	2.12	0.12	3.67	0.20	-1.55	-0.08
8	Sands–Semi stablised- stablished Moderate High 15-40 m	0.46	0.03	6.53	0.36	-6.07	-0.33
	Mining Wastelands	3.51	0.19	4.52	0.25	-1.01	-0.06
	Total	**107.24**	**5.85**	**109.38**	**5.96**	**-2.14**	**-0.11**

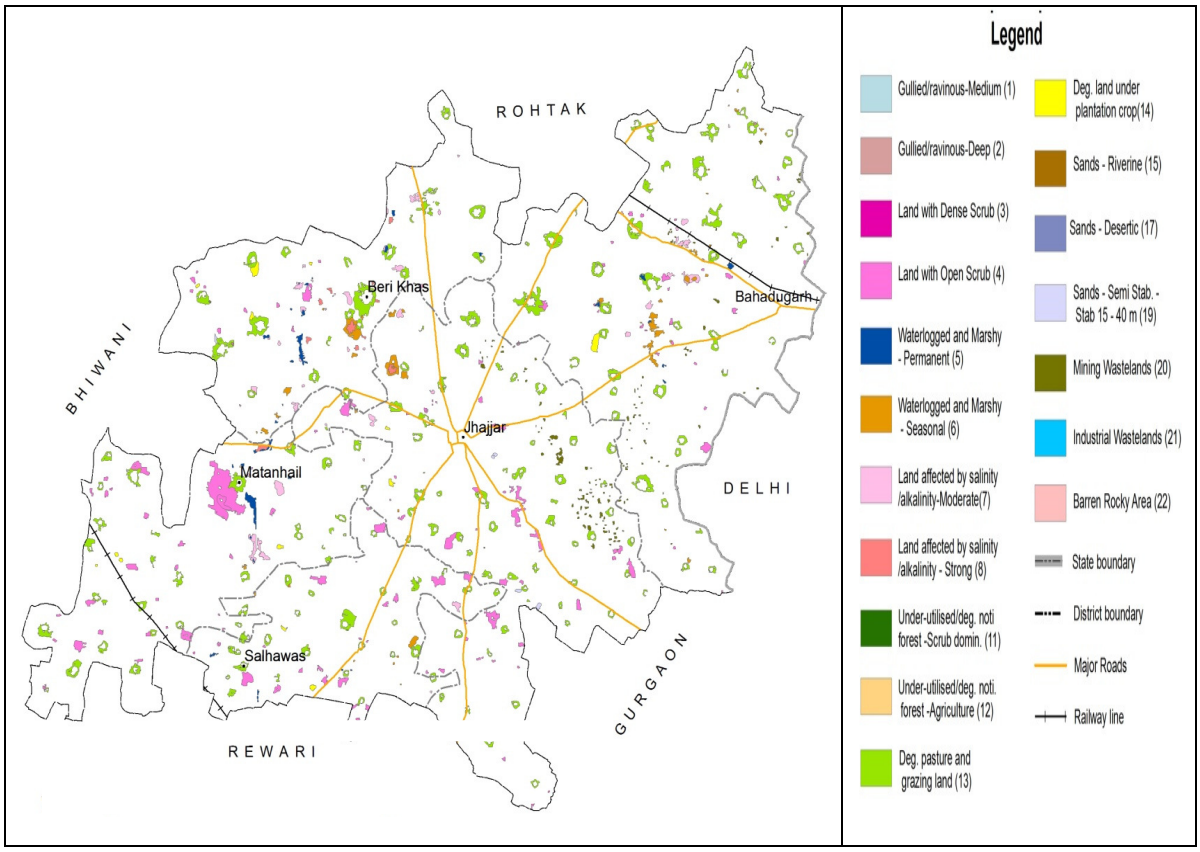

Figure-3
Wasteland Map under different Categories of Jhajjar

References

1. Manual, National Wastelands Monitoring using Multi-temporal satellite data, National Remote Sensing Agency, Dept. of Space, Govt. of India, 98 **(2007)**

2. Arya V.S., Kumar Sandeep, Kumar Anil, Singh Hardev, Arya Sandeep and Hooda R.S., Wasteland change analysisi in Northern Haryana's six districts using-temporal satellite data in GIS environment, *International journal of advanced scientific and technical research,* **4(2),** 1-9 **(2014)**

3. Hooda R.S; Arya V.S, Arya Sandeep, Khatri S.S, Sharma Prem Parkash, Singh Vijay; Sharma Heena and Singh Hardev, Updated Wastelands Atlas of Haryana. Haryana Space Applications centre (HARSAC), Dept. of Science and Technology, Govt. of Haryana, **(2006)**

4. UNEP/IRSIC Global Assessment of Soil Degradation (GLASOD), Nairobi, **(1991)**

5. Statistical Abstract of Haryana, Economic and statistical advisor, planning department Government of Haryana, **(2008)**

6. Ministry of Rural Development and National Remote Sensing Agency (NRSA), Wastelands Atlas of India, National Remote Sensing Centre, Dept. of Space, Govt. of India, Hyderabad, **(2010)**