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Changing patten of the urban land use mapping using geospatial technology of Hansi city of Haryana

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Abstract

The objective of the study is to find out the landuse pattern of Hansi city in Hisar, Haryana using Geo-informatics. It includes the comparative study of two different methods to find out the landuse pattern using the on-screen digitization and image classification techniques. For Digitization technique Google earth images and guide map has used of Hansi city and land sat 8 30 m spatial resolution has used for classification technique the study. The study has found that landuse categories build-up (815.50 hect.), agriculture area (521.17 hect.) Fellow land (121.20 hect.), and water bodies (7.77 hect.). Comparative analysis of Land use in Digitization and classification method consequently identified that applying the on-screen Digitization technique highest accuracy landuse feature extraction.

Keywords: geo-informatics, urban land, comparative study

Introduction

Land surface has always an area for geographers and other scholar's interest in spatial analysis. This surface has been recording changes throughout the geological time but with recent rapid urban expansion this change occurring at much faster rate. This is more particular in urban landscape. This change needs to be detect, mapping and measuring at frequent intervals so that we can have real time information on it. This information will not only be helpful for understanding the dynamic of the changes. But it is equally essential for the further planning and management of natural resources. Mapping urban sprawl help to identify area where environment and natural resources are critically threatened and suggest likely further directions and pattern of sprawling growth.

During last some decades, India has witnessed rapid and uncontrolled urban expansion due to process in the industries, trade and Population increase. Uncontrolled expansion of cites experiences several environmental problems in urban area. The most changes occurring in pre-urban interface, such as transformation of the agriculture land, conversion of wet land, unorganized of the of new residential area and mistreated solid waste nevertheless affected the sustainability of the natural resources, well-being and quality of life. Thus there is a great importance of urban and land use planning.

Remote sensing in combination with geographic information system (GIS) has a great potential to provide synoptic and up to date information on changes in extent, distribution and the condition of urban land cover. High resolution satellite imagery provides spectral features as well as spatial information (shape, texture and context) is clearly evident. Anderson *et al (*1971,76) [1] attempted to develop a classification system for land use with remote sensing techniques that will satisfy the needs of majority users and certain guidelines of criteria for evaluation first were established. Panigrahi *et al* (2004) [2].

Unsupervised classification is based on the exploitation of the inherent tendency of different classes to form separate spectral clusters in the feature space. Unsupervised classification uses algorithms that search for natural groupings of the spectral properties of the pixels. The computer selects the class means and covariance matrix to be used in the classification. Once the data is classified into clusters each clusters is then associated with a physical category (B.L. Deekshatulu and George Joseph, 1991) [3]. The object-oriented classification method has proved effective for separating vegetation types defined by life form, area, or shape without using additional remote-sensing data sources with different resolutions or any ancillary data such as digital elevation models (Li and Shao, 2013) [4]. Considering the consistent relationship between the crop nutrients, wheat yield and the wheat spectral parameters, satellite remote sensing shows promise as a tool for assessing the variation in soil properties and yield in arable fields. The results suggest that management zone delineation using RS (Remote Sensing) data was reliable and feasible (Xiaoyu *et al*., 2009) [5]. Recent satellite sensors (e.g., Resourcesat-1, Cartosat-2, IKONOS-II, and RISAT-2), along with improved image processing techniques integrated with terrain and other spatial data using a geographic information system, are enabling mapping at large scale (Singh *et al*., 2010) [6]. The study analysis the spatial landuse pattern in Hansi City of Haryana in association with two different techniques on screen digitization classification techniques. Spatial analysis of the land use urban during 2018 of the Hansi city in Hisar district (Haryana) was carried out. Google earth imagery was used to monitor the land use urban in the study area adopting WGS 84 datum and UTM Projection system.

Historical background of study area

Hansi is the amongst the ancient town of the India which has noticed two different types of ups and down of the natural and culture change. It was located as the historical trading roots (today NH10) connecting the middle Asia and

also situated on the two-confluence point of the two holy rivers Che tang. Therefore, the town was famous and known for its social and economic development in the region as well as the Middle East. It was observed under the threats by the Looter, thefts, attackers etc. To look the city safe, it was bounded by walls.

Rajkumar one of the children of Nagpal, established empire of Delhi. Identified due two strategic, social and economic importance of the town, and established a weapon (Talwar) factory and the fort is known as Ashford. In 1038 AD, the town was attracted by Mohamad Gazania but saved by Rajput's Subsequently, the city was observed by various attacks during Muslim periods. In 1797, Jorge Thomas made the city a capital of Haryana. During this time, various development activists were done. In 1802, East India Company attacked and controlled the city and also established here a cant. During the British time, the city saw various ups and down. It was connected by Railway line, establishment of the commercial market and Municipal Board etc. After independence, the city also passed through rehabilitation process among Hindu and Muslim After independence in 1947 and after the formation of Haryana in 1966, Hansi town was neglected in developmental activities. But recently, the

Objective of the study

To evaluate the origin and growth pattern of land use land cover and measuring urban sprawl in Hansi city between the periods of 2015.

Material and methodology.

The present study represents the land use of Hansi city. The methodology implemented to extraction the features on screen digitization of land use feature features on a zooming scale of 1:5000 of Google Earth images in QGIS. MS Office 2007 has been used for statistical diagrams and analysis

Data use

Onscreen digitization of land use

Data set received were stacked into layer, transformed into projected coordinate system, finally subset and processed in QGIS, both the raster imagery and municipal boundary as vector data of the study area were merged to extract the land use and create a database and develop a vector map of Land use map of Hansi City. However, the extraction method was followed by digitization on the scale of 1: 5000 were used to visually estimate land feature. The basic type of urban classes includes Settlements, Fellow land, and agriculture and water areas. Methodology used in this study is represented in Figure 2. town was observed with the development and the resident of Hansi town and surrounding villages are demanding to denote the Hansi as a separate district with Hansi town as its headquarters. Therefore, it was a matter of great academic interest to study such a historical town.

Classification method

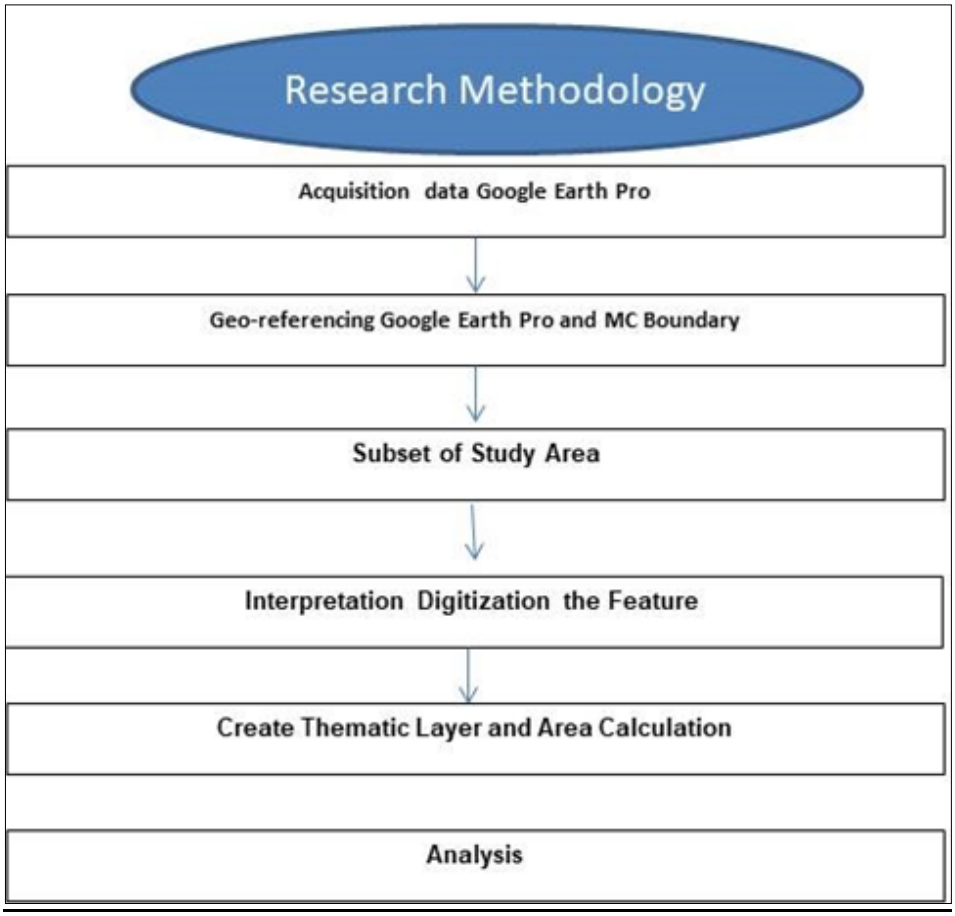

Fig 1: Flow chart for methodology

Cloud-free multi-temporal Landsat satellite data sets of the study area Landsat archives as L1 data products. Digital image analysis was carry out in QGIS software, Best cloud-free Landsat were selected for analysis and study area extracted. Landsat operates in 8 multispectral bands. These multispectral regions can bring more information that can

differentiate in land use. In SWIR region, better crop discrimination using band 5 (1.55µ-1.75µ) in comparison to TM band 7(2.08 µ -2.34µ) was observed. The unsupervised classification for single date data was carried out.
The image was classified into five classes' namely Built-up, agriculture fellow land Water and fort area also calculated and identified the different land use classes.

Result and Discussion
Study investigates urban land use pattern in Hansi city, by centring on Five categories of Landuse and land cover: Fallow Land, Agricultural Land, Built-up, and water bodies. Remote sensing and earth observation methods coupled with GIS techniques were successfully used to identify the spatial-pattern of urban landuse using Landsat 8 data it has major land use among various classes such as build-up (815.50 hect.), agriculture area (521.17 hect.) Fellow land (121.20 hect.), and water bodies (7.77 hect.)

Comparison of Different Methods for Urban Landuse Mapping
The extraction of Landuse feature involves image classification techniques and on-screen Digitization. Figure 3 (a) depicts that 81.205 hect build-up area has been extracted through digitization while figure (b) represents 815.50 ha (41.51%) by Classification method and Table 2 represents the comparative analysis of Land use in Digitization and classification method. Consequently, it is identified that applying the on-screen Digitization technique highest accuracy landuse feature extraction.

Table 1: Statistics of land use/land cover (LU/ LC) of Hansi City.

		Digitation Method	**Classification Method**
S.No.	Category	Area(hect)	Area(hect)
1	Settlements	815.50	750.24
2	Agriculture	521.17	441.09
3	Fellow land	121.20	270.36
4	Fort	15.61	11.12
5	Water Body	7.77	8.44
6	Total Area	1481.25	1481.25

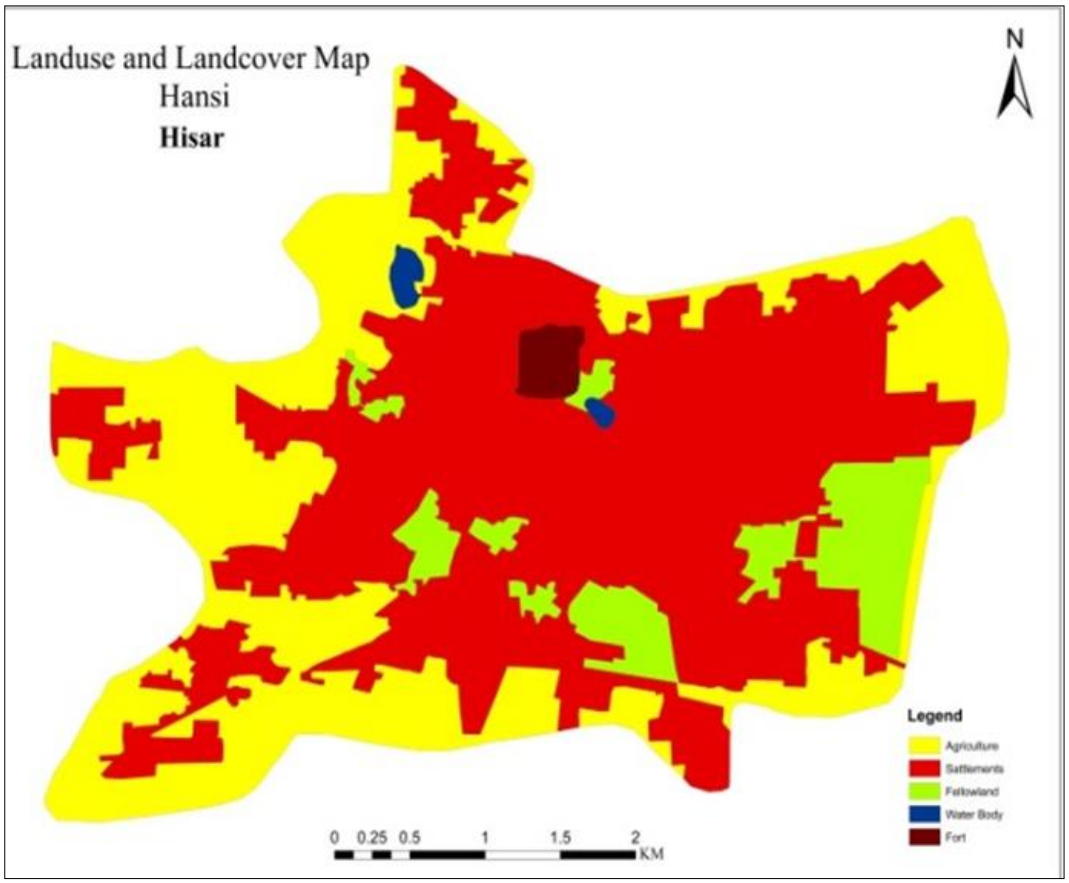

Fig 2: Estimated Area of Different Land use in Hansi City using the Digitization Classified Method

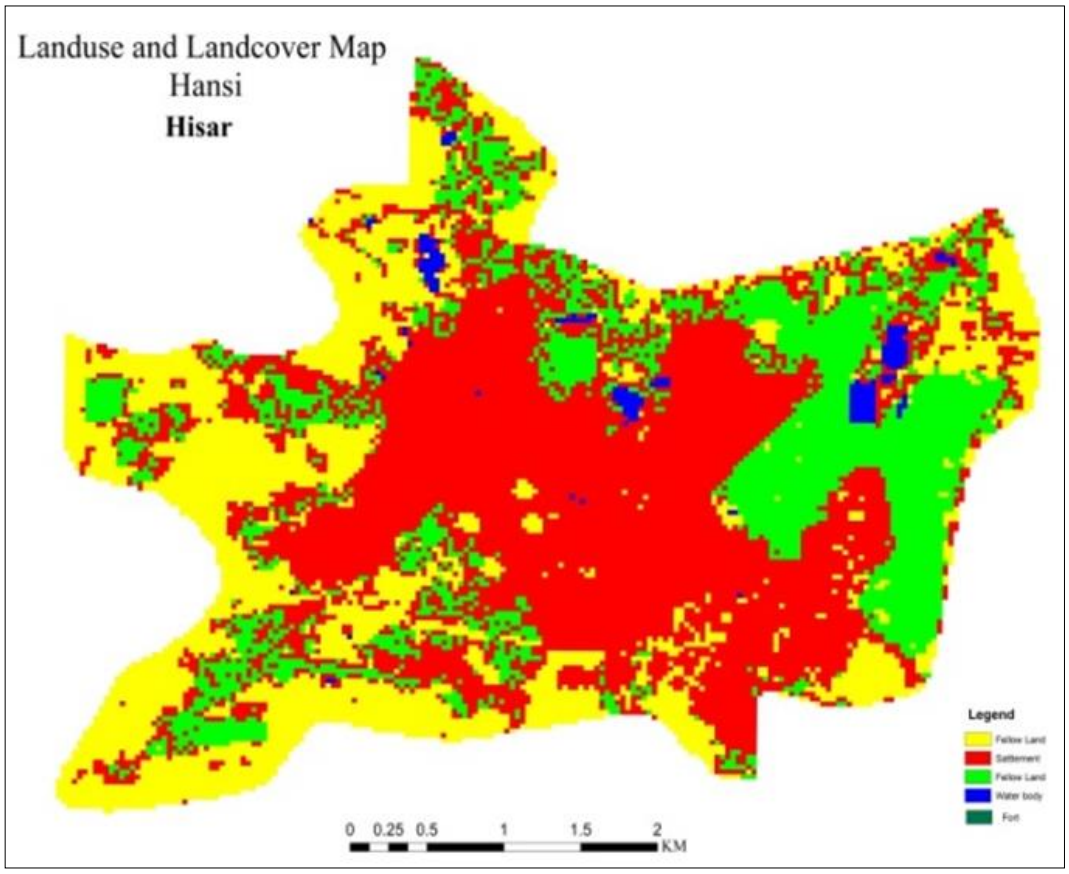

Fig 3: Extraction of Land use in Hansi Municipal Boundary using Classification technique

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