

Land Procurement Management of Kurukshetra and Thanesar City by Geo-Informatics Technology

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Abstract: Land Procurement Management assess that Urban Sprawl is the Major obstacle in urban development. The growth pattern of Haryana's towns is going out of control and the construction land has kept expanding blindly. While doing any type of analysis, we are trying to understand the problem; one has to find and analysis urban social pattern that reflects the social characteristics of urban setting. Land Procurement Management includes status of Kurukshetra and Thanesar Town in different periods 1970, 2010 and 2021. The objective of the study is to assess the Urban Sprawl of the City and to check that on which pattern the growth of the city is increasing and it also shows how Remote Sensing and Geographical Information System technology support Land Procurement Management. The Study follows the Method of Digital Interpretation and finds out the pattern of yearly growth in every town of Haryana. The study finds out Urban Sprawl of the towns from 1970 to till now and future perspectives also. The study is analyzing how much area of Kurukshetra and Thanesar towns is increasing and encroaching agriculture land and it also find out the growth pattern of the two respective towns which is increasing and its impact for future Proposed Master Plan. The study shows a rapid change in the town's growth which is alarming for the Proposed Plans. Haryana is going to overtake the other states of India in terms of Urbanization.

Keywords: Geo-Informatics, Remote Sensing & GIS, Pattern Assessment, Urban Sprawl

1. Introduction

Land Procurement Management

Land Procurement Management of urban areas and cities require adequate and up-to-date information. For this Urban and regional planners require continuous acquisition of land to formulate government policies and programmers. Compilation and monitoring among towns of Haryana state are one of the most common use of remotely sensed data by Geo-informatics technology. Land procurement include a lot of management in which we formulate city level plan, sub-city level plan, comprehensive traffic & transportation plans, circulation network plan, traffic management schemes. In the procurement of land one have to face a lot of problems of related to land acquisition, acquired area, legal & litigation problems. Among all these Land acquisition is one of the biggest hurdles in project implementation. The Haryana Govt. Recently introduced an innovative scheme to overcome delays commonly associated with the process of acquiring land.

Master Plan

The Development Plan or Master Plan of the city must be reviewed every 5 to 10 years to take care of the population pressure and provide better quality of life in the city and its environs (Indore Development Plan-2011(Draft))

Urbanization

Urbanization has become a global phenomenon. Urbanization is an index of transformation from traditional rural area to modern one. Urbanization takes place either in radial direction around a well established city or linearly along the highways. This dispersed development along highways, or surrounding the city and in rural countryside is often referred as urban sprawl. In recent years, human activities have been recognized as a major force shaping the Biosphere. This is particularly true in city areas where agricultural land is disappearing each year, converting to urban or related uses.

Furthermore, because of the lack of appropriate land use planning and the measures for sustainable development, unchecked urban growth has been creating severe environmental consequences.

In the process of developing a township in an urban area, the following steps are taken:

- Land acquisition.
- Preparation of developing plan.
- Site development.
- Allotment.

Urbanization Scenario in India

The level of urbanization in India, in comparison to the world scenario, appears much lower urbanization phenomenon is no exception to India: in fact Indian cities are one of the fastest growing in terms of population and in geographical area among most of the cities outside India. The migration of people from villages to towns and cities continues unabated. The rapid urban growth has resulted in increasing the share of India's urban population from 159 million (23%) in 1981 to 217 million (26%) in 1991, the 286 million (28%) in 2001 and 300 million (30%) in 2006. Thus, post independence, while the population of India has grown three times, the urban population has grown five times. The urban population in the country is expected to rise India's population is likely to reach around 1.50 billion (50%) by 2030.

Urbanization Scenario in Haryana

The Haryana Urban Development Authority (HUDA) a statutory body of Haryana Government was constituted under the Haryana Urban Development Authority Act-1977. Its aim was to achieve expenditures, development of Urban Estates. The main functions of HUDA are:

- a) To acquire, develop dispose of land for residential, industrial and commercial purposes.

- b) To make available land to various bodies for providing houses top economically weaker sections.
- c) To undertake construction projects.

Problem of Urbanization

Problem of urbanization is manifestation of lopsided urbanization, faulty urban planning, and urbanization with poor economic base and without having functional categories. Urban areas, especially in India, are unable to keep pace with the increasingly growing demands of the basic amenities and services, where urban areas have experienced an unprecedented rate of growth over the last 30 years. While the urban areas continue to contribute to country's economy and employment, they suffer problems from: Housing, Slums, Transport, Water supply and sanitation, Water pollution and air pollution, inadequate provision for social infrastructure. Most of these cities using capital intensive technologies can not generate employment for these distress rural poor. So there is transfer of rural poverty to urban poverty, Poverty induced migration occurs due to rural push, Urbanization is degenerating social and economic inequalities which warrant social conflicts, crimes and anti-social activities, Inadequate green cover and living environment that is highly unsustainable thus leading to poor quality of life, Lack of open space, Haphazard and unplanned urban growth.

Geo-Informatics

Geo-Informatics is a science which develops and uses infrastructure to address the problems of geo-sciences & related branches of engineering. Geo-informatics combines geospatial analysis and modeling for development of geospatial databases, information system design, human computer interaction and both wired & wireless networking technologies.

Application of Geo-informatics in Urban Planning

Urban Planning by Geo-Informatics deeply rely on technological and scientific discipline for sensing, modeling, representing, visualizing, monitoring, processing, and communicating in all fields of Urban Planning that are Straightly related to Geo-informatics. The main focus of the study is to stress on present status and scope of future planning & management of Towns of Haryana state with the help of available Satellite Data consists of Quick bird (panchromatic), SOI Toposheet & Master Plans of 2021.

Role of Remote Sensing and GIS

- Remote sensing & GIS are now providing new tools for advanced management. The collection for remotely sensed data facilities the synoptic analysis of earth system function, patterning, and change at local, regional and global scale over time.
- GIS is a sophisticated system for acquisition, storage analysis and display of geographic data.GIS is a systematic procedure for map generation whereas map files itself in the traditional database. The data base manipulation techniques, which include various analytical function and data processing function which can be performed on spatial

data.GIS also used to merge graphic & non-graphic information.

2. Objective

- State Urban sprawl assessment.
- Land Procurement pattern assessment.
- Land Procurement impact assessment.
- How technology support land acquisition system.

3. Study Area

Haryana is situated between $27^{\circ}39'$ to $30^{\circ}56'$ N latitude and $74^{\circ}27'$ to $77^{\circ}36'$ E longitude. It covers area of about 44212 square kilometres. The state is divided into four divisions for administrative purpose - Ambala, Rohtak, Gurgaon and Hisar. The study area of this project includes 76 towns of Haryana.

4. Methodology

For the study the following major steps were adopted.

- Collection of Proposed Master Plan of towns from department of Town & Country Planning, Haryana.
- Mosaicing of satellite data in ERDAS 9.1 software.
- Scanning and Geo-referencing of the Master Plans with Satellite data.
- The datum and projection system of Toposheet & Satellite data QB were taken as WGS 84 and UTM respectively.
- Visual interpretation and On Screen Digitization of towns from toposheets as well as on satellite data was done in ArcGIS 9.2.
- Changes in the pattern of respective city were identified.
- Final maps were prepared.
- Final report writing was done after completion of the study.

A. Data Used

- a) Cartosat-1 and Resourcesat P-6 LISS III satellite Images.
- b) Quick-Bird (QB) Satellite high resolution data.
- c) Proposed Master Plan collected from DTPO

State Urban Sprawl Assessment

Land Procurement Management includes status of Kurukshetra and Thanesar city in different three periods (From-Toposheet, Quick-Bird Satellite Data and Proposed Master Plan). Its objective is to assess the Urban Sprawl of the City and to check that on which pattern the growth of the city is increasing.

Kurukshetra & Thanesar City

Kurukshetra and Thanesar have its own historical importance. Kurukshetra is a holy place known as "Dharamshetra" and Thanesar derives its name from the word "Sthaneshwar", which means "Place of God". The land of Kurukshetra was situated between two rivers the Sarasvati and the Drishadvati.

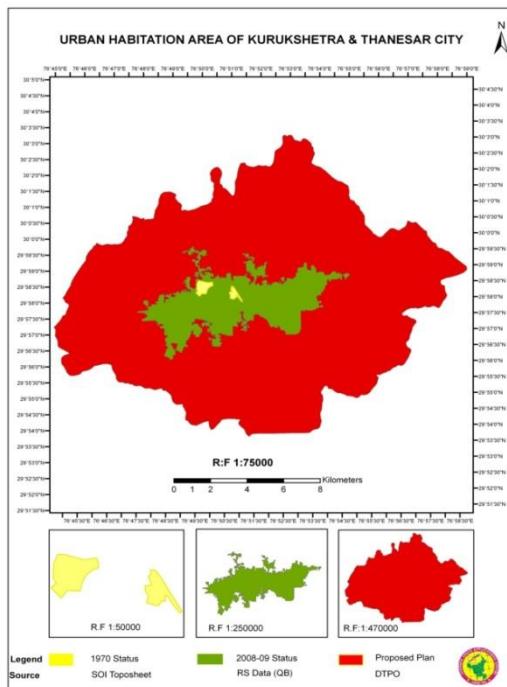
According to the Puranas, Kurukshetra is named after King Koru, the ancestor of Kauravas and Pandavas, as depicted in epic Mahabharata. The importance of the place is attributed

to the fact that the Kurukshetra War of the Mahabharata was fought on this land and the Bhagavad Gita was preached on this land during the war when Lord Krishna found Arjuna in a terrible dilemma.

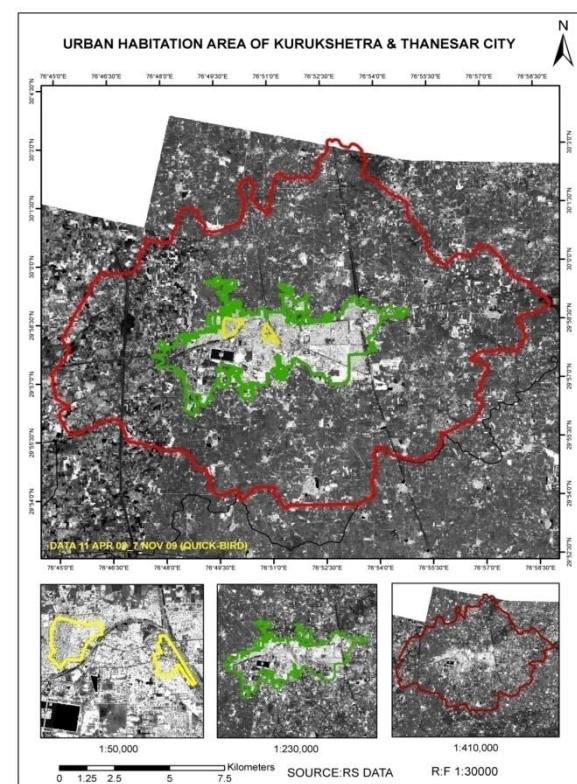
The Sthaneshwar Mahadev Temple, whose presiding deity is Lord Shiva, is believed to be the oldest temple in the vicinity. Local hearsay identifies the legendary "Kurukshetra" with a nearby place known as Thanesar. A few kilometers from Kurukshetra is the village known as Amin, where there are remnants of a fort which is believed to be Abhimanyu's fort. In the past decades of Kurukshetra and Thanesar city, the Vamana Purana tells how King Kuru came to settle on this land. He chose this land at the banks of Sarasvati River for embedding spirituality with 8 virtues: austerity, truth, forgiveness kindness, purity, charity, yagna and brahmacharya.

Land Procurement Management Study includes status of Kurukshetra and Thanesar city in different three periods (From-Toposheet, Quick-Bird Satellite Data and Proposed Master Plan). Its objective is to assess the Urban Sprawl of the City and to check that on which pattern the growth of the city is increasing and it also tells us how Remote Sensing and Geographical Information System technology support Land Procurement Management. In the study Land Procurement Management of the city include SOI Toposheet, High Resolution Satellite Data & Proposed Master Plan of 2021.

The Study follows the Method of Digital Interpretation for area extraction after that, boundary of the city is demarcated on Toposheet and Quick-Bird Satellite Data. Proposed Master Plan Firstly, scanned and then Geo-referenced with Satellite data (QB).After this, change in the pattern of the city area is identified. And then the final map is prepared.



Urban habitation area of Kurukshetra & Thanesar city



Urban habitation area of Kurukshetra & Thanesar city

Urban Habitation Area of Kurukshetra & Thanesar City in Sq.Kms & Percentage

Kurukshetra & Thanesar	Toposheet (1970)		Quick-Bird (2010)	Proposed Plan (2021)
	Kurukshetra	Thanesar		
Area in Sq.kms Sq.Kms	0.502	0.247	28.05	226.734
Area in % STGA	0.03	0.015	1.68	13.617

As the above descriptions shows that the urban growth of Kurukshetra and Thanesar City is increasing 0.502 Sq Km. 0.247 Sq km in 1970 and 28.05 Sq. 226.734 Sq km in 2010,2021 with growth rate of 0.03%, 0.015%, 1.68%, 13.617% respectively. This increment highlights the forthcoming over-crowded picture of the Kurukshetra and Thanesar City which results to analyze the proposed plan again and find out the superlative solutions for these impending situations.

After all analysis, it can be said that Kurukshetra and Thanesar city is increasing in a systematic manner from 1970 to 2010 but in future it will increase more rapidly than the previous growth. The above Toposheet description of SOI and DTPO states the path for the proposed plan for year 2021. On the other hand, Geospatial technology reveals the growth rate of the city is faster than what we assume. With the help HRS data i.e. QB facilitates the real picture of the current city growth for the sustainability of the urban centers with healthy urban environment to sustain the people as well as the existence of city itself.

5. Result and Discussion

The study of Land Procurement Management for the year 1970, 2010 and 2021 shows a rapid change in the town's growth of Kurukshetra and Thanesar city which is alarming for the Proposed Plans. The pattern at which towns are growing will cause a lot of misbalance and problems in the coming years.

A. Urban expause of Kurukshetra and Thanesar city in the year 1970

The Study shows that Kurukshetra and Thanesar city in the year 1970 were very small which covers 0.502 and 0.247 Sq.kms area respectively and this area is 0.03 and 0.015 percent of State total geographic area.

B. Urban expause of Kurukshetra and Thanesar city in the year 2010

The present scenario of the arial expause of the Kurukshetra and Thanesar city shows large increment in the area of the city. Most of the Towns are now covering more than 1% area of total geographical area. Currently Kurukshetra and Thanesar city is one of the largest town of Haryana that covers 28.05 Sq.kms of area which is 1.68% of STGA. The towns those covers more than 50 Sq.kms area are Ambala, Hisar, Gurgaon, Manesar, Faridabad, Panipat Kurukshetra, Thanesar and Karnal. It was observed that most of the headquarters towns are expanding were composed to others as it works as a magnetic power for all the opportunity & infrastructure facilitate for people. Towns of Haryana are scattered all over geographical area and expending towards one another. Kurukshetra and Thanesar have expanded increased so much that their area has merged in one another and there is no clear discrimination now between the two towns. While Analyzing status of Haryana's towns in different three times, Kurukshetra and Thanesar city has been found as one of the largest town in 1970, 2010 and 2021.

C. Urban expause of Haryana towns in the year 2021

The study included future prospects of the towns to indicate what is expected to be the situations of towns in the near future (2021) according to Proposed Master Plan by DTPO. Towns those have more than 200Sq.kms area are Ambala, Kurukshetra, Thanesar, Hisar, Rohtak, Kharkhoda, Sonipat. The analysis shows that the Proposed Master Plans will be not able to serve requirement of expansion in the urban management is going to emerge as a big problem for the urban planners. Kurukshetra and Thanesar city from 1970 to 2010 have already increased 36 times and now there is a situation that there is no separate boundary of these two towns. Kurukshetra and Thanesar city have already merged with each other.

D. Temporal Change Analysis

Land Procurement Management includes status of Kurukshetra and Thanesar city at three different times. From 1970 to till now, Kurukshetra and Thanesar city have increased at such a rapid speed, which is alarming for the Proposed Plans. These towns are covering a significant area of total geographical area of Kurukshetra district. Almost all

towns have increase nearly thrice compared to 1970. These towns are covering geographical area and encroaching the agricultural land. The study analyze the Urban Sprawl of Kurukshetra and Thanesar city from 1970 to till now and future perspectives also.

It may be concluded from the above analysis that Haryana, one of the most developing states in India is rapidly going towards Urbanization and in Future a very rapid change is expected in its urban growth pattern. Haryana is going to overtake the other states of India in terms of Urbanization. The towns which will expand at a higher rate compared at previous speed are Kurukshetra, Thanesar, Dharuhera, Nuh, Samalkha, Panchkula, HailyMandi and Taraouri. Kurukshetra and Thanesar city will increase more than 36 times as compared to 1970. Thus in future i.e. by the year 2021 they are going to occupy a very large % of total geographical area of the state. If such a fast urban development is allowed to continue, the entire Haryana will be urbanized in the next 99 years.

6. Recommendations

Haryana State is highly influenced by the fast growth of Haryana Towns geographical area. The Growth of Haryana's Towns in Sq.Kms from 1970 to 2010 has increased 4 Times that is period of four decades. But Temporal Urban Pattern Assessment study includes Proposed Plan also that is of 2021, upcoming one decade. The area of Haryana's Town is increasing 5 times than the previous growth. The pattern of growth in the size of towns is increasing at an alarming rate which is beyond the expected limit.

No doubt, Urbanization is a developing phenomena for any country but it can't be denied that excess of everything is harmful. This study of different three times of Haryana shows the high increment of town's area due to the massive increase of population, shifting activities from primary to other sectors, along with the advancement of people's lifestyle. The prepared index of town's by town and country planning is going out of range in near future. On the basis of the previous study from 1970 to 2021, Land Procurement Management study also made future predictions till 2051.

If we follow the pattern of town's growth from 1970 to 2010 and after 2010 to 2021 then in coming 17 years the all Haryana's towns will cover entire Haryana's geographical area. It can be predicted that entire Haryana will be urbanized in the year 2038. Based on this study here are some been recommendations that government should follow:

- A. No irrigated multi-cropped land shall be acquired by the Government.
- B. Where any person other than a specified person is purchasing land equal to or more than one hundred acres, in rural areas and fifty acres in urban areas; through private negotiations he shall file an application with the District Collector notifying him of:
 - a) Intent to purchase;
 - b) Purpose for which such purchase is being made;
 - c) Particulars of lands to be purchased

- C. That land in any area is required or likely to be required for any public purpose; a notification to that effect along with details of the land to be acquired in rural and urban areas shall be published in the Official Gazette, in two daily newspapers and on the website of the appropriate Government in public domain.
- D. To enter upon and survey and take levels of any land in such locality.
- E. To dig or bore into the sub-soil.
- F. That no person shall enter into any building or upon any enclosed court or Garden attached to a dwelling-house without previously giving such occupier at least seven days' notice in writing of his intention to do so.
- G. In case of any damage caused, or any case of dispute, the officer shall at once refer the dispute to the decision of the Collector or other chief revenue officer of the district, and such decision shall be final.
- H. Any person interested in any land which has been notified as being required or likely to be required for a public purpose, may within sixty days from the date of the publication of the preliminary notification.

Where land proposed to be acquired is equal to or more than one hundred acres, the Appropriate Government shall constitute a Committee under the chairmanship of the Collector to be called the Rehabilitation and Resettlement Committee, to monitor and Review the progress of implementation of the Rehabilitation and Resettlement scheme and to carry out post-implementation social audits in consultation with the village Panchayat in rural areas and municipality in urban areas. Whenever multi-crop irrigated land is acquired, an equivalent area of culturable wasteland shall be developed for agricultural purposes. The acquisition of the land in aggregate for all projects in a district in which net sown area is less than fifty per cent of total geographical area in that district, shall in no case exceed ten percent of the total net sown area of that district.

7. Limitations

- Land Procurement Management study includes only Kurukshetra and Thanesar's town area, villages and other categories are not included in this. That why the study gives us informationonly about Town.
- Land Procurement Management covers only existing habitation of the town area; new habitations are not included in it.
- The results and the Conclusions those are find out in this study are based only on the observations by the Satellite data.

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