CHAPTER – 1

INTRODUCTION

➢ Statement of Problem,
➢ Review of Literature
➢ Objective of Study
➢ Database and Research Methodology
CHAPTER 1

INTRODUCTION

Human being is best creature of the nature. From the long history of civilization human being is in incessant efforts to facilitate his life. Firstly from roaming here and there; he confined himself in caves, from caves to villages and from villages to towns. After food and cloth the third basic need is shelter. In the earlier phase of civilization, the agglomeration of people into villages were just for the shake of security but as the time passed, the facilities or services provided by the urban centers became much more important factor.

The urban population all over the world is increasing. Urban lifestyles and consumption patterns have far-reaching and long-term effects not only on its immediate boundaries but also on the entire region in which it is situated. Cities and towns in most of the countries all around the world have been gaining wide attention because of a large number of people/households migrating to cities and its consequent effects. In 1800, only 50 million people lived in urban areas worldwide; while till 1975, this was increased to 1.5 billion, and in the year 2000, this was near about three billion; more than the entire population of the world in 1960 (Megacities, 2000).

The urban population of India has also rapidly increased after independence. In 1961 about 79 million persons lived in urban areas of the country, by 2001, their number had gone up to over 285 million, an increase of over 350 percent in the last four decades, which will increase to over 400 million by the year 2011 and 533 million by the year 2021. In 1991, there were 23 metropolitan cities, which have increased to 35 in 2001. The population growth rate was faster than infrastructural development. As a result, most of the urban settlements are characterized by shortfalls in housing and water supply, inadequate sewerage, traffic congestion, pollution, poverty and social unrest making governance a difficult task and causing urban environment degraded.
Normal growth of population along with migration figures in urban area makes the growth rate quite higher as compared to whole of region may be a nation or state. Changing demography also makes locational as well as functional changes in the cities. Thus cities have dynamic character where its appearance or image got changed rapidly. Urban planning and designing is also a regular process meant for accommodating the expected growth in urban centres without halting the urban system. In most of Indian cities, the urban growth could not be managed by planning agencies resulting into unplanned formations and urban slums. Increasing pressure of population has also disturbed the environment of urban areas to a great extent.

The Urban Planning should comprise of all basic amenities and infrastructural planning because these in conjunction with each other determine the living conditions for its inhabitants. In an urban or city planning, environmental aspects are of major concern. Condition of water supply services, transportation, drainage/sewerage systems, garbage collection and disposal, livelihood necessities like air, water quality, status of greenery etc. plays a major and important role in making a city environmentally planned. These factors should also be given due attention in researches related to development of any urban area.

The materialistic needs and ignorance of natural ecological cycles have deteriorated the environment of urban as well as rural area. The inventions of undegradable things have also induced many problems. As far as the ecological and environmental aspects are concerned the urban areas are vulnerable to pollution, over congestion, low standard dwelling place, low or absence of greenery, water problems, air pollution (smoke, smells etc.) and so on. Merely physical planning (good built-up structures) does not ensure good living standard in a city. It is the environmental planning which should bring in with its entire components i.e. natural, built-up, socio-economic environment of a city because all these in-to make sure the sustainable development of an urban area.

It is only in the last two decades that a better understanding of the effects of changing environments and ecosystems has been developed. Mostly environmental problems that we currently face can be directly or indirectly traced back to the
lifestyles that we are inheriting and leading as human beings. The lifestyles have created many types of diseases like hypertension, obesity, diabetes, and other psychological imperfections etc. that have a little existence in history and also rarely found in rural environment. These types of diseases are so common in urban area that some times these are called ‘urban diseases’. Moreover, due to the same lifestyles or being more materialistic and ignorant of natural phenomena, the urban environments have not remained livable at some parts. Therefore, the planning process which is usually concerned with good structures and wide roads should also have sustainable planning exercise in which equal attentions have been paid to environmental aspects.

The sustainable urban environmental planning process (The environmental planning of an urban area) can be defined as the management of all available urban resources in a best suited way so that the maximum needs of urban people can be satisfied without compromising the needs of the generations to come. Now-a-days the concept of ‘Ecocities’ is arising in urban studies. ‘Ecocities means a city that decreases environmental burden/stress, improves living conditions and helps in achieving sustainable development through a comprehensive urban improvement system involving planning and management of land and its resources and implementation of environmental improvement measures’ (CPCB Project Report-Ecocities, 2003). The Ecocities include area-wide improvement and providing of infrastructure and services.

The environmental sustainability issues have now come to more micro level and reached to a building. To make a region environment friendly, the least units i.e. buildings therein should be focused primarily. Today, in the age of modern urban development where big malls, commercial buildings are designed in core congested urban areas, the individual buildings are given due attentions for air movements, greenery, sun light etc. Green buildings, designed to use the resources efficiently and create minimum impact to the surroundings, are an integral part of Eco cities. The green building concept is gaining popularity in India and a number of buildings are being awarded the prestigious LEED Ratings. The energy requirements are reduced by planning plenty of green spaces and designing buildings for natural ventilation. A
special emphasis is being paid on the usage of renewable sources of energy such as solar or bio gas from sewage (www.lavasafuturecities.com).

1.1 STATEMENT OF PROBLEM

Urban structure and forms of Indian cities are mostly evolved through the ancient urban core and since then these are sprawling into the rural fringe and agricultural areas. Urban population is continuously increasing day by day due to immigration of people from rural to urban areas. It is essential to have updated information on urban growth patterns and its impact on both the living and non-living environments. It is observed that the current trends of spatial urban growth patterns (especially in north Indian plain areas) are haphazard along the rural urban fringe area. In fact this growth is an invasion or an encroachment over surroundings rural/agricultural area.

The thing which separates the urban areas from rural is the availability of vital facilities or amenities in them. Accessibility and management of these amenities are of prime concern for their proper functioning. In the development planning of a city many aspects are important such as water supply & its quality, medical facility, air quality & pollution, transportation system, waste disposal system, sewerage system, location and linkage from all part of the city to main market or CBD etc. All these factors remain changing with the growth of town.

The present study is focused on an important city Hisar of Haryana state in India. Haryana came into existence as a state on 1st Nov. 1966. This was also the onset of Green Revolution. This revolution has a great role in the development of Haryana, which enhanced the agricultural production and the economic potential of its inhabitants. The urbanization in Haryana increased at a faster rate due to industrialisation from this time. As usual it was due to two main reasons, first was migration of people from rural to urban areas for better employment opportunities, secondly due to raise in the living standard of people. Today about 29 % population of Haryana is living in urban areas and it is increasing day by day.
Hisar, which means in Urdu language 'The fort' was the boundary of Delhi in 14th century. Initially, it was a fort but at present Hisar city covers an area of 45.42 km² (within municipal limits). Rapid increase in the population has led to expansion of city and it has crossed the municipal limits. The main growth of the city is towards southern and eastern side (southward NH-10) because only on these sides area is available for further development. On other sides Govt. offices and institutions have owned the land like HAU in west side, Govt. farms & GJU in north side and Cantonment in the east side of the city.

Hisar from the establishment of Haryana became an important city due to a centre of politics in western part of the state. The increasing population pressure in the city has led to establishment of unplanned highly congested localities in the central eastern and central parts of city like Mahavir colony, Mohalla Dogran, 12 quarter etc. These types of colonies are situated in other part of the city also like Azad nagar, Rishi nagar, Camps, Ghora-farm area. There is neither good road network nor other vital facilities like hospitals, proper water supply etc available in these colonies.

The surrounded area (mainly northwest & south side) of the city is occasionally waterlogged due to heavy rain or any other reason. The northwest part where Sector-14, Grain market, Auto-market and many Govt. farms, Dabra Village lies is a low-lying area of the city. These areas are vulnerable to floods and water logging and needs some defensive measures to handle such situations.

Traffic congestion in the city at present is a severe problem. The main problem is due to a single main market place (CBD), which is located at northwest part of city and includes the Grain Market and Bus Stand also. A heavy in-flow of traffic from all sides towards this area is a problem of traffic-jam. Traffic and Industries are increasing the air pollution in the city. At present it is found at low level but situation can be worse in near future which needs some instant steps to be taken.

Being an important town of western Haryana, the growth of Hisar is comparatively higher as compared to other town in the region. Because of two world level universities and other research centres, the city has international interactions.
The city is also expected to be a million city till 2021 as assessed by town and country planning department, Hisar. Owing to all these reasons the environment of Hisar urban area may degrade with future growth and changing landuse. Therefore, the present setups of town and master plan 2021 are required to be analysed in this respect. The studies regarding the environmental planning and management of cities have not been given due attention in Haryana since its establishment. The present study is an effort to examine such parameters so that these can be helpful for sustainable environmental planning of Hisar city. It is also a step forward to fill the gap of not incorporating the environmental aspects in designing and planning of cities in the state and nation. It will also help in preparing plans so that life in cities may not difficult and disturb due to future growth of population.

1.2 REVIEW OF LITERATURE

By reviewing the literature it reveals that a lot of efforts have been made by researchers in the related field of urban planning but in the field of present study the researches are not so frequent. The methodology adopted and conclusions drawn by the available researches help in determining the methodology for new researches. The themes related to the present study are Land use planning, land suitability planning; Use of RS/GIS in urban studies, studies in Urban (resource) information system, environmental planning and management etc. Urban planning has been given due importance in all the times because of its multipurpose activity. Some of the important studies and reference books on related literature in this context are discussed hereunder.

J. Ratcliffe (1972) in the book ‘An Introduction to Town and Country Planning’ has extensively described various techniques related to planning in an urban area. Starting with nature and development of Town Planning the various components, aspects, methods and controls have been intensively elaborated in this book. In addition to it this book also deals with the legal aspects of TCP as these are of great concern in urban planning. The other aspect like Rural planning (mainly at fringe of the city), Conversation measures, Resource planning, the inner city
development has been covered thoroughly. Light has been also been thrown on some relevant techniques in urban planning like Garden city concept and their development, Public participation in urban planning which have an immense role in urban planning.

Jean Paul Donney et. el (2001) in the book ‘Remote Sensing and Urban Analysis’ describe various technique and methods related to Urban studies with the help of Remote Sensing as a major tool for analysis. In-depth explanation has been given in this book on how high resolution panchromatic imagery can be fused with coarse resolution MSS image which can provide high resolution MSS for urban analysis. The other aspects that have been touched are Urban pattern recognition, Recognizing Settlement Structure using Mathematical morphology and Image texture, Application of various algorithms like Maximum Likelihood classification & other in Urban Remote Sensing, Image Segmentation for Change detection, Urban Agglomeration delineation using Remote Sensing data etc. the book presents a profound analysis also on social aspects of Urban study using Remote Sensing.

Urban geography written by Suresh C. Bansal (2000) provide detail understanding about the subject. It deals with all the basic concepts in urban geography viz. its nature and scope, methods and techniques, morphology, urban hierarchy, planning etc. at last various examples of Indian metropolitan cities in special reference like Urban Agglomeration of Calcutta, Mumbai etc. Delhi Master Plan have also been discussed in detail.

N. Raghu Babu and Ashwani Kumar (www.gisdevelopment.net) in their research project entitled “Environmental Management Plan for Kanpur urban area” made an effort for environmental planning of Kanpur city. The main objectives of the study were

- To map the environmental profile for identifying environmental hot spots,
- Environmental management plan for rehabilitation and mitigation measures;
- To recommend guidelines for environmental compatible landuse planning.

To achieve these objectives various parameters were selected and their spatial extent with attributes were analysed in GIS. Some of these were as landuse maps,
Existing industrial location map, Environmental resource map, Housing quality, water quality, solid waste collection and disposal map and Environmental hot spots etc.

Air quality and pollution status were identified on 1 sq. km. grid of city. Other parameters were analysed spatially (unit-wise). The recommendations were made mainly for air quality, landuse, traffic and transportation management, industrial emission control, green areas development, liquid waste management, water quality, sewerage network and solid waste management etc.

*Ground water information booklet* prepared by S. Sing and S. Gupta (2007), Central Ground Water Board, Chandigarh presents detailed analysis of ground water conditions in Hisar district. The booklet compiles all the relevant information such as hydrology, ground water resources, quality, status of development and geophysical studies at district level. It also gives a brief account of geomorphology and soil type of the district. The information complied in the booklet relied upon observation from 31 groundwater monitoring well of CGWB distributed throughout the district.

Sanjay S. Jadon (2007) in his research entitled ‘Basic concepts of urban design – a research review’ pointed out the pioneer researches and key ideas laid down by the researchers. In this article view of Lynch about the image of cities that people perceive is focused duly. People perceive a city in different ways and each city has a public image which is the overlap of many individual images. Imageability in a city may be said to be more a perceptual concept than a physical or visual entity. It is the interpretation of various layers of a city’s images - its form, profile and experiences over a period of time. Imageability refers to the probability that an environment will evoke a strong image from observers. Imageability is probably the single most important factor in the identity of a place.

Generally, the approaches in architecture and urban design have been more speculative than based on a scientific approach. Kevin Lynch (1960) pioneered a scientific approach to urban design studying and analysed the components of urban design parameters and human evaluation. He put forth the image of the city as a concept which can be perceived, evaluated and changed. His seminal work lay in
identifying basic elements of an image of a city and in introducing a technique of image analysis as the basis of a plan for a future visual form of the city. His work was based on American cities. In his words, the image analysis may differ with other cultures or other races. Later work in architectural research, landscape architecture, environmental psychology has dealt with specific studies in perception studies and cognitive maps in America and Central America (Potter, 1984). Ulrich Neisser (1967) in laying the ground of cognitive psychology defined iconic memory as the visual sensory memory.

Again it is opined by Sanjay S Jadon (2007), that in the Indian context primary research studies on the concept of urban space design have been marginal. Traditional urban spaces have been studied in the documentation studies under various heritage areas of Ahmedabad, Jaipur, Mumbai, Jaiselmer, etc. under the aegis of INTACH, etc. Eminent professionals have discussed the images of urban India. Concepts of urban space, serial vision and skyline within the walled city of Delhi were explored by himself (1992). Dongre (1992) has explored image perception within a small Indian town as a database towards planning process. Shirodkar V.A. (2005) has analysed transformations of specific streetscapes of Goa over a historical period of time. All general studies and researches have emphasized that Indian spaces have certain intrinsic characteristics such as mixed land-use, multi-functional use of urban elements, and community as identifying factors.

Hari Shrinivas (www.gdrc.org) in his study 'Networking of Urban environments' describes the problems associated with urban environment. In this research the emphasis was upon the share of information regarding environmental issues in city among the government and public. Community participation is strongly recommended. In this research the three aspects of urban environment is discussed which were Built-up, Natural, Socio-economic environment. Natural environment are resources, processes and effects related to flora and fauna, human beings, minerals, water, land, air, etc. Built environments are resources, processes and effects related to buildings, housing, roads, railways, electricity, water supply, gas etc. The socio-economic environment includes resources, processes and effects related to human
activities, education, health, arts and culture, economic and business activities, heritage - urban lifestyles in general. Common people of city can be involved in process of environmental management by making them aware of such issues and their consequences.

Again Hari Shrinivas (www.gdrc.org) in his study 'An integrated urban water strategy' told about the water problem in various form like inadequate availability, contamination, improper management and wastage etc. are common in many urban areas. Various statistics is mentioned in this paper related to water crises. Mainly six principles were given here which are responsible for aggravation of these crises. In last strategy to tackle these problems is given which incorporates many suggestions like water audit (provides a comprehensive appraisal of natural and urban water resource base), demand management & water pricing, integrated urban water resource management, urban watersheds, awareness and information disclosure, and recharging & monitoring of water etc.

In a project 'GIS-MIS-GPS for Solid Waste Management' Senthil Sanmugan (www.gisdevelopment.net) prepared a Solid Waste Management system (SWM) for a typical urban environment in case of Banglore city. The various aspects covered in this paper are the background, need, methodology the development process of the three different system GIS-MIS (Management Information System) & GPS and their integration. This project was a mission ‘Swacha Banglore SB’ under Banglore Agenda Task Force (BATF) constituted by state government of Karnataka. The aim of this project was to restructure the entire system of garbage collection, disposal and monitoring using all three systems viz. GIS, MIS, GPS. GPS is used in this project to identify shortest possible route that transport vehicle should follow and to locate various garbage collection & disposal site.

Jan Nijman in his research ‘A study of space in Mumbai’s slums’ (www.gisdevelopment.net) throws light on urban slums and their formation and social structures. He opined that the urban slum in the less developed world has an overwhelming significance of place for its dwellers: it determines who they are, what they do, where they go, and whom they know. Unlike most Western cities where the
different realms of life (residential, work, religious, public, etc.) are spatially segregated, here they are all functionally and spatially integrated. A close examination of slum spaces in Dharavi, Mumbai, reveals such overlapping spatial patterns and raises some fundamental questions. Is there a proper definition of the slum? How should we conceive of the slum community and its spatial features? How useful or problematic are Western concepts of residential segregation, ghettos and enclaves? Slums not only provide shelter to a large urban labour force but also a milieu that is conducive to intense social organization and economic production.

D.P. Tiwari (2003) in his paper regarding ‘RS/GIS for efficient Urban Planning’ discussed urbanisation process in India. Through his study he demonstrated how urban planning could be done using RS/GIS technique. This technology can play a key role in these types of studies. The role of local bodies in urban planning is mentioned with their 18 fold functions as described by 74th constitutional Amendment Act (CAA74). Parameters to be considered during planning or study the planning are also mentioned in his study. Some of them are:

- Determination of area required for urbanisation on the basis of population projection of the city and its growth centers.
- Calculation of land requirements for urban developments based on the carrying capacity of the region and Analysing urban landuse suitability
- Urban environmental sensitivity analysis based upon both physical as well as air quality parameter.
- Determination of Composite Functionality Index (CFI) to setup various amenities such as educational, medical, recreational etc.

Alberto Vanolo while conducting the research ‘The border between core and periphery: Geographical representation of world system’ describes that geographical metaphors such as centre-periphery or First-Second-Third World are widely used to describe the world economic system. This paper discusses the role of metaphors in geographical representations and proposes some guidelines for the analysis and classification. This methodology is then applied to a sample of well known textual metaphors used to describe the world economic scenario, including ideas of a First-Second-Third World, North-South, core-periphery, Global Triad, global network, flat and fluid world.
Infrastructural setup of Sirsa district is analysed by Dr. Harpal Singh (1994). In this an integrated plan is worked out with its physical, human and economic resource base. Location specific deficient areas in services as well as in economical development are identified. Spatial gaps in infrastructural facilities are also identified and a plan scheme is proposed with a strategy to put such area on first priority.

A.K.Jain, Dr. R.S.Hooda, Dr. Jagan Nath, Dr. M.L.Manchanda (1990) in the research project ‘Mapping & monitoring of Urban Landuse of Hisar Town-Haryana, using Remote Sensing technique’ aerial photographs for the year 1965, 75, landsat TM(FCC) 1986 data were used. The different landuse categories like residential industrial, commercial, recreational, vacant land etc. have been identified. The original shape of the city was nucleated, but it is sprawling as star shape along Delhi & Rajgarh roads. Due to presence of Haryana Agriculture University, Equines Breeding Farm & Govt. Livestock Farm (GLF) the growth on these sides have been checked. While giving suggestion for planning of city it had been suggested to use vacant land to use for built up area instead of surrounding agricultural area.

While studying the development plans of Tirupati town Shirley Ballaney & Bindu Nair (2003) in their study ‘Application of Satellite Images and GIS in the Preparation of Development Plans: Case Study: Master Plan for Tirupati Urban Development Authority (TUDA) Region and Zonal Development Plan for Tirupati Town’ discussed the method for planning process. This study was conducted in three steps. First, dealt with the preparation of base map for TUDA region and Tirupati town. Satellite data can play a better role in preparing the base maps. The main advantage of satellite data for base maps is that it can be updated whenever required. The area was divided into two parts i.e. TUDA region and Tirupati town. TUDA region is comprised by 87 settlements while Tirupati town comprises of Tirupati municipal limits and Tirupati non-municipal area. The main sources for base map were satellite images with high resolution, aerial photographs and SOI Topo-sheets.

Secondly landuse mapping was done with the help of image acquired on high resolution. Physical surveys were used earlier for this respect when Remote sensing technique was not available. These surveys are usually done only when very large
scale information is required or point information is required. Image with high resolution or aerial photographs at large scale can fulfill the normal requirements.

In third step the planning decisions were made. For this purpose different thematic layers were formed and overlaid to analyse them. The main proposals framed on the basis of this analysis were:

   i) Landuse zoning,
   ii) Density zones, and
   iii) Delineation of heritage precincts and purposed heritage walks.

Further, various analysis for future development or urbanisable zone, evolving road network, environmental concerns and conservation were carried out.

Trevor Jacobie, Dr. K.A. RajuTata and S.D. Landge (2003) in their study for ‘Structure plan for newly merged villages in Pimpri-Chinchwad’ discussed the connectivity and integration of these villages with rest of region using spatial information. The key features of these areas those were discussed in this study are:

- Ensure proper utilisation of land interest of resident of the area.
- Provision of an efficient traffic and transportation network.
- Sustainable provision for civic amenities for residents.
- Preserving areas and building of historic, religious, cultural significance.
- Improving existing living condition, physical quality of life and guide future development.

Following the methodology of unit wise analysis of some aspects of facilities, status of the infra structure at present and requirement for future is identified.

In studying ‘Identification of Levels of Availability of Facilities: Case Study of Dehra Dun City’ Suman Sao (2002) describes the available facilities or amenities in the city under study. The main objective of the study were:

- To identify the service area of different facilities.
- To make an intra urban disparity analysis of selected facilities and services
- To identify the areas for future expansion and location of selected urban facilities.
The detailed 'sources' analysis of the city was made to find out the service deficient area. The basic methodology of the study was to prepare the buffers of limited distances depending upon the type and location of the concerned services. For all the services two buffer zones were formed and respective percentage of people which comes under service is calculated. At last suggestion were mentioned indicating the areas of less availability of quality and quantity of services.

P. Jothimani (1997) in study of 'Operational Urban Sprawl Monitoring using Satellite Remote Sensing: Excerpts from the Studies of Ahmedabad, Vadodara and Surat, India' studied the Urban sprawl. The main objectives of this study were to delineate the major urban landuse classes, mapping and analysis of trends of urban spread and its emerging urban structure. In this study various landuse have been interpreted and delineated on the basis of visual interpretation technique of satellite data. Major attention was given to delineate the border level of landuse zones within the old city area. Main emphasis was to examine the structure of the city not merely the landuse. Regional settlement landuse maps like dense build up, sparse build up, build up mixed with habitation, industrial zones, recreational areas, open/vacant spaces and the emerging settlement clusters were drawn. The case study was done for three cities: Ahmedabad, Vadodara and Surat.

The air quality of urban area usually prone to deterioration due to many pollution generating activities like traffic, industries, waste and power plant etc. The air quality of Hisar city has been examined by C.P. Kaushik et al (2006) in their research entitled 'Assessment of ambient air quality in urban centres of Haryana (India) in relation to different anthropogenic activities and health risks'. The units represented by sample sites were residential, industrial and commercial. The pollution found to be at sever level on sensitive sites. The research also reveals that pollutants decreases considerably by adopting preventive measures in vehicles. The growth of population, industry and number of vehicles and improper implementation of stringent emission standards make the problem of air pollution still worse. The WHO/UNEP report (1992) reveals air pollution problems in metropolitan cities of India as they are heading the list of the most polluted cities of the world.
Study jointly carried out by the University of Glasgow and University of St Andrews (www.naturalnews.com) regarding importance of greenery in cities, found that living near parks and forests provides an overall health boost, an impact which is independent of social class. The use of fields and parks for walks and other physical activities helps to regulate blood pressure as well as alleviate the harmful effects of stress. Using mortality data of 366,348 people in England from 2001 to 2005 and looking at the link between exposure to greenery and different causes of death, researchers found that

- The health gap between the richest and poorest groups of people was the smallest in areas with the most green spaces – it was only about half of the gap of the areas with the least greenery.

- Significantly, even small green spaces in living environments made a difference to people's risk of fatal diseases.

Another study (www.naturalnews.com) which was conducted at the Columbia University and published in the Journal of Epidemiology and Community Health found that

- For every additional 343 trees in every square kilometer, asthma rates decreased by 25% among children aged 4 and 5 in New York

- Children who are exposed to few microbes in early life are at an increased risk of asthma because their immune systems do not get the practice they need at fighting infection. Therefore, if a tree-lined street encourages outside play, it might help reduce the risk of asthma by maximizing the odds that children will be exposed to microbes.

- Trees are also a source of pollen, which may potentially exacerbate asthma symptoms in vulnerable children.

Wei-Hsin Ho & Ge-Wen Lee (2000) in their 'Study on Land use management using GIS' discuss the key points that to be considered during urban study especially relating physical aspects. In this study a system has been prepared by integration GIS software (PC Arc/Info) with highly developed Visual Basic language. Physical
constraints in urban development and land use management can be identified through this system when related with attribute information. Thematic layer produced here can be useful in base map for the further different purposes and processing. The main advantages of this study were:

a) The graphical interface allows the user to easily evaluate the type of land use.
b) To understand easily and proper required data for land use.
c) In this case study the slope analysis of the area has been made and related with earthquakes that came in the recent past. These areas then termed as slope diseased areas.

V.N. Patkar (2002) in his paper ‘Direction for GIS in Urban Planning’ describes the role of GIS in urban planning. GIS for urban planner not only provides the spatial analysis but it also helps in object-oriented analysis. All types of urban problem analysis like sewerage, road network, water supply services, land suitability analysis etc. can be done through GIS. Need of temporal analysis of landuse/zoning, planning of infrastructure, management, sprawl analysis and planning has been suggested in this study. Some problems, which GIS professionals face, & how to tackle them is also mentioned.

The future development plan for 2021 prepared by town and country planning department Hisar, presents their final draft plan describing various proposed landuse groups around the present extent of city. The plan also projects the city with a million population till 2021. It also details about the units carved out by various line department in Hisar city. Although, it provides future landuse zones but it haven’t any justification for its spatial planning.

G.K. Tripathi (2002) describes in his research ‘Web-GIS based urban planning and information system for municipal corporations - A distributed and real-time system for public utility and town planning’ how GIS integrated with web can be useful to urban planners, geographers and common people. A planned city or town with full of amenities soon becomes a source of agglomeration. Location of best sites for various purposes can be accessed through this technique.
Alireza Gjaragozlou (2003) presented an urban development model by studying the northwest area of Tehran. In this paper ‘Presenting urban development model by using environmental models & GIS & RS, North-West of Tehran’ various aspects of urban environment e.g. Parks and green area patterns, residential pattern, industrial patterns, recreational feature patterns etc were evaluated during a certain period. After detailed analysis of such parameters, an urban development model has been suggested. Using models for determination of ecological capabilities and method of determination for ecological and social capacities as well as environmental condition of the city and in last applying ‘standards’ in making urban development model for planning, urban development and management model has been given. For this research RS/GIS technique was used to analyse the spatial pattern of various parameters, temporal change and suitable area for various activities. By using RS/GIS approach, the monitoring of change in urban environment becomes easier, accurate and economic.

In a research ‘Suitable living condition within cities’ by Rami Badawi, Feng Xue Zhi and Zhang You Shuili the vegetation cover map of a city was compared with the national environmental model city system in China. This was a case study of Nanjing city, capital of Jiang Su province. This study was to focus on the spectral properties of urban material and their representation and mapping. In last various recommendations were given as standards that should be present in an ideal city. The study seems to be very helpful for greenery mapping and finding locations for creating green space.

1.3 OBJECTIVE OF STUDY

The studies in Urban Morphology and planning are common in the literature of Urban Geography. In India there are few planned towns. Most of the cities are historically developed and with their rapid growth of population, land use in such cities face many problems like air/water pollution, lack of residential houses, slums and traffic congestion etc. Owing to increasing pressure of population on land, people are rushing towards cities and towns for better employment opportunities and other
facilities such as education, health and other basic amenities. Consequently many
problems have been risen in the Indian cities. In this light, the study of growth of the
urban population and capacity of city resources to bear and sustain this pressure is of
great concern to the geographers and town planners.

The present study is an attempt to analyse the environmental aspects of Hisar
City. The study is aim to highlight the changes occurred in the form, structure, land
use and overall environmental conditions such as greenery, heat island effect, rain
water potentialities, ground water analysis, pollutions etc. in the city. Such studies
may prove useful in analysing the development and planning of the city and its
problems and prospects. The analysis of future (master) plan is also required for
proper management of resources and best functioning of each of urban unit. Hence,
the main objectives of the present study can be summarized as under:

- To study the Morphology and landuse of Hisar City and changes therein
during 1985 - 2005;
- To analyse and evaluate the urban environment of the study area;
- To examine the role of Govt. agencies in planning and development of Hisar.
- To suggest strategic alterations, if so required, in future plans for sustainable
  planning and management of Hisar city.

1.4 DATABASE AND RESEARCH METHODOLOGY

"...planning is an elaborate exercise; it takes into account the individual
resource as well as the interconnectivity prevailing. The development analysis
includes a trend analysis of the city development process as well as identification of
problems and priorities for planning, based on the data collected through surveys or
other technologies/sources" (Phansalkar,M., 2002).
Present study is an attempt to analyse the Urban Environmental aspects for the sustainable planning of Hisar city. It is also an attempt to illustrate the immense use of Remote Sensing & GIS technology for such types of studies.

Data pertaining to this research are not readily available. This kind of researches require specific type of information at micro level i.e. at city level which is not a common practice in a country like India to collect data at such level. Hence, various departments/offices were approached which seemed to be containing required information. On this line, various departments of District Hisar like Town & Country Planning department, National Informatics Center, PWD Public Health and B&R, Haryana Urban Development Authorities (HUDA), Office of Municipal Committee, Ground Water cell, Dept. of Environmental Sciences at GJU, Dept. of Agricultural Meteorology at HAU and many more were explored. Published information at state and district level such as Statistical abstract of Haryana and Hisar, Census of India publication, Survey of India topo-sheets, Gazetteer of District Hisar alongwith material available on different sites on web were also pursued. Alongwith all these sources for secondary data, the remote sensing data (IRS LISS-III (23.5 m resolution), LISS-IV (5.8 m resolution), PAN (5.8 m resolution), Cartosat I (2.5m), and Cartosat merged with LISS-IV) available at HARSAC, Hisar have been used to prepare spatial information such as landuse, road network, morphological classifications etc. State of the art techniques of Remote Sensing and GIS have been used lavishly wherever required, to carry out this research.

REMOTE SENSING technique and data are used to study and monitor spatial phenomena. A broad base map of the city and city region, indicating physical features can be prepared quickly with the help of satellite imageries. Using the ground truth and interpretation key, the remote sensing data are analysed, interpreted and mapped related to existing features i.e. land use, broad settlement structure, resource analysis etc. can be generated. Remote sensing data can be effectively integrated with the conventional data for analysis, planning and decision making. Because of synoptic view and repetitive coverage, the remotely sensed data helps in wide range analysis for urban areas. This technique is immensely useful for different type of applications with the advent of computers. In the early phase when resolution of satellite products was very coarse, its use in urban area was very limited. But
with the availability of high resolution imageries and highly sophisticated computer systems, this technique has been extensively used in all of fields related to urban studies.

**GEOGRAPHICAL INFORMATION SYSTEM (GIS)** is a computer-based system, capable of input, storage, manipulation, and analysis of data useful for planning & decision-making. It is a powerful tool, which helps planners to view different possibilities and their outcome so that an optimal strategy may be chosen for planning and development. GIS is basically a map processing technique. GIS is a useful tool, particularly because of its capacity to support both spatial and non-spatial attributes. It can also be useful for handling data from diverse sources and forming links and interconnections between them.

Cartographic and Statistical techniques are also used to undertake the study. Remote Sensing data are used to generate Land use/ Land cover maps of Hisar city to analyse urban land use change from the time when the city became the Class I city i.e. 1985 to till now i.e. 2005. Further, the terrain characteristics or topography, surface and ground water etc. are also mapped and overlayed with ward boundaries. Finally, the spatial data linked with attribute data for thematic mapping. The statistical techniques are also used in the final analysis and cartographic methods have been applied in the finalization of maps. The software packages mentioned hereunder have been used for analysis and generation of various thematic maps.

- ArcGIS 9 and ArcInfo,
- ERDAS Imagine,
- SuperGIS 2

Supervised or Unsupervised classification and on screen digitization has been done for land use/ land cover maps. Initially the morphology of the city and general land use were studied to find out the changes and growth. Landuse for 1986 as published in reports (HARSAC, 1990) was imported in GIS. The higher resolution images available at website of Google Earth were used for land use delineation of the year 2005. Entire mapping was done on 1:10000 or larger scale. New growing area, planned and unplanned regions in the city have been mapped. Population projection is carried out with census data.
Morphology of city has been prepared with digitization. Ground water quality analysis is carried out by collecting sample from various parts of city and spatially analysed in GIS to find out safe water zones in the city. Likewise other environmental parameters such as greenery analysis, air pollution status etc. are also analysed.

In this way, the urban environmental profile of the city has been prepared. In the light of all the analysis, the master plan of Hisar for 2021 prepared by town and country planning department has also been analysed and necessary suggestion were made for better environmental conditions in future.