

## A Study of Urban Land use : Panipat City (2017)

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**Abstract** Analysis of land use/land cover is very important for city planning if it is up to date. The study tries to find out the information of land use in urban planning through satellite data. It also attempts to identify the mapping of spatial information using GeoEye image within supervised classification modified from National Urban Information System (NUIS) 2008. Quartile method has been used for the classification of ward wise population density in study area. The study demonstrates the role of geospatial technology at micro level for city planning. Key words: Urban Planning, Geospatial Technology, and High Resolution. Key-Words : Urban Morphology, Geospatial Technology .

**Introduction:** Urban morphology means the study of the pattern and structure of a city. It is very old discipline which began in the first half of the twentieth century. It provides comprehension to the transformation, form and processes of creation along with character of human settlements and spatial structure by an analysis of the constituent parts which form the settlement and of historical development.(Conzen 1960; Whitehand 1986). Urban morphology is a vital tool that determines the transformation. Morphology of cities is decided by process of the city development. so, settlements are studied with temporal change ,which describe how the city get its site for evolution and develop. All the findings are evaluated according to these criteria by using GIS, Satellite imagery and ground survey. Functional and spatial structure of a city is affected by its historical roots. (Larkham 2002 ). Morphological examines the relationships between the different components of the city one by one. Scholars emphasize relationships in their studies according to their interests (Moudon 1992). Urban morphology comprises three distinct complexes of ‘plan elements’ as buildings, plots and their aggregation in street and streets and their arrangement. Within an urban area, different combinations of these plan components form unitary areas which termed as ‘plan-units’ (Conzen 1960 ;). Moudon (1997) categories the main elements of morphological analysis as streets, buildings, monuments gardens and parks. These elements have been constantly used and undergo transformations through time. In her study Moudon (1997) mentions the following analysis is based on these principles (1) buildings and open space (2) buildings in the reference of streets (3) historical development to understand the replacement and transformation of the city(Moudon 1997).

The street grid is very important as it is used for civic activities, social contacts and vehicular movement. It is as a social structure and physical structure of the living environment (South worth and Owens 1993). Southworth categories the various typical street patterns of urban residential area United States that affect the character and quality of the community environment into five different types; 1. Lollipops-on a stick 2. fragmented parallel, 3. loops. 4. gridiron 3. warped parallel. Nowadays Urban morphology becomes an important and common research method to analysis of the social structure and physical structures of cities by quantitative methods and techniques. Land use refers to the varied

uses and man's activities that are carried on land cover and over land refers to rock, natural vegetation, artificial cover, water bodies, soil, and others noticed on land (NRSA, 1989). Land use/land cover changes are big issues of global change. In the mapping of land use/land cover the satellite remote sensing data is quite useful. (Anilet al., 2011). By GIS techniques Quantification of such changes is possible even though the resultant spatial datasets are of various resolutions (Sharma et al., 2001). These studies help to understand the change in human activities in time and space. Land Cover, means the assemblage of a biotic components and biotic components on the earth's surface. Land use change is the modification of land. (Verburg, et al, 2000). Land is an important natural resource; It refers to the way in which land has been used by human's residence and for their economic activities. (Mynar babu et al., 2014). In fact an urban settlement is apparently a physical entity and the morphology it acquires is a result of a long process of growth .In a more restricted sense, the terms of "morphology, refers to the internal structure of various land uses in urban areas ... In a specific period of time, the structure of a town passes through various development stages and is the consequence of the processes it undergone. In general, the morphology of a town is quite different from that of a biological organism, to the extent of its individuality with the function. But the process of formation of a town and the development of an organic form are almost alike and pass through three stages: - 1. Histogenesis 2. Patternogenesis 3. Morphogenesis – (Wolpert 1967) In the process of town formation histogenesis refers to the origin of historical nucleus of the town and it forms some definite means of intercommunication between individual human agglomerations. During this stage, the nucleus development of a town takes place. Settlement starts concentrating around a religious site, fort, Lake Etc. Centripetal force is active in this process. The pattern formation or patternogenesis may be regarded to the phase of development of various nuclei of human settlements and their interactions within, ultimately providing a pattern of skeleton to the town. More precisely, the development of roads and structure can be put in to his heading. Thus the sectoral development of town takes place and centrifugal force to some extent, is active. The state of Morphogenesis can be perceived in the morphological character to be closely associated with the functional character of present day city.

According to Dickinson (1951), It is a description of their nature, their relative disposition and their social interdependence that constitute a geographical analysis of an urban area. The morphology of Indian cities with respect to existing layout of streets, the arrangement and characteristics of buildings and associated pattern of land use. Discussing about the above views , R.L.Singh (1964) pointed out that the same should be pursued not only with a view to identify new categories and pattern or developing new classification but also for the light they through on historical sequence and functional relationship. According to Singh (1970), the term morphology includes the various internal forms and structural pattern and characteristics of a spatial unit. In brief, urban morphology is the distribution of different functions in a city.

## **Study Area**

Panipat is located at 29° 39' North Latitude and 76° 97' East Longitude. This city is located in Khader plane with 219 elevations from sea level. Panipat is situated on 90 km north of Delhi; the Eastern Boundary is marked by Yamuna River and Jind in West direction, Karnal in the north direction and Sonapat in the south. The city is located in the plain which provide fertile land for agriculture and provide plane surface that is suitable for road and Railway network which is the necessary for industrial development of the city. The slop of this area is towards south west and southern side from north east. Earlier Yamuna River was passing from here now which has been changed its path. Alluvial soil, ordinary clay; sand and silt are commonly found here. Under ground water level is comparatively high than Sonipat. Quaternary to recent age, old and new alluvium deposits covered this whole area completely that is consisting of sand and clay. This area has unconsolidated sands and Consolidated sands. In plains soils are well drained, from clay loam to Sandy loam. In relic channels or depressions soils are clay to loam. There is no wild life and forest area in Panipat.

### Objectives:

To identify the land use/land cover information of Study area.

- To analysis the morphology of the study area.
- To determine the expansion of the city with categories.

### Data Source and Methodology

The study is based on both, primary and secondary data. The source of secondary based on landset 8, Path147, Row 40, Acquired date is 13th April 2017. It has been used for the preparation of different thematic layer of map. High resolution satellite image is best appropriate for mapping of urban land use/land cover information and city planning.. Municipal Corporation map of Panipat city 2011 and primary census abstract of 2011 has been used.

### Land-Use:

Information of land-use and land cover is an important factor informing policies which are related to demographics, environmental issues and economies at local national and regional levels. The relation between man and land determines all the productive and economies activities. Land is not only a resource but also resources base in itself. Land use and land cover changes are affected by man involvement and natural variables such as population growth and demanding area, agriculture demand and trade, economic development urban growth, Technology and science and other factors (research on land use change and agriculture, international institute for applied system analysis, 2007)

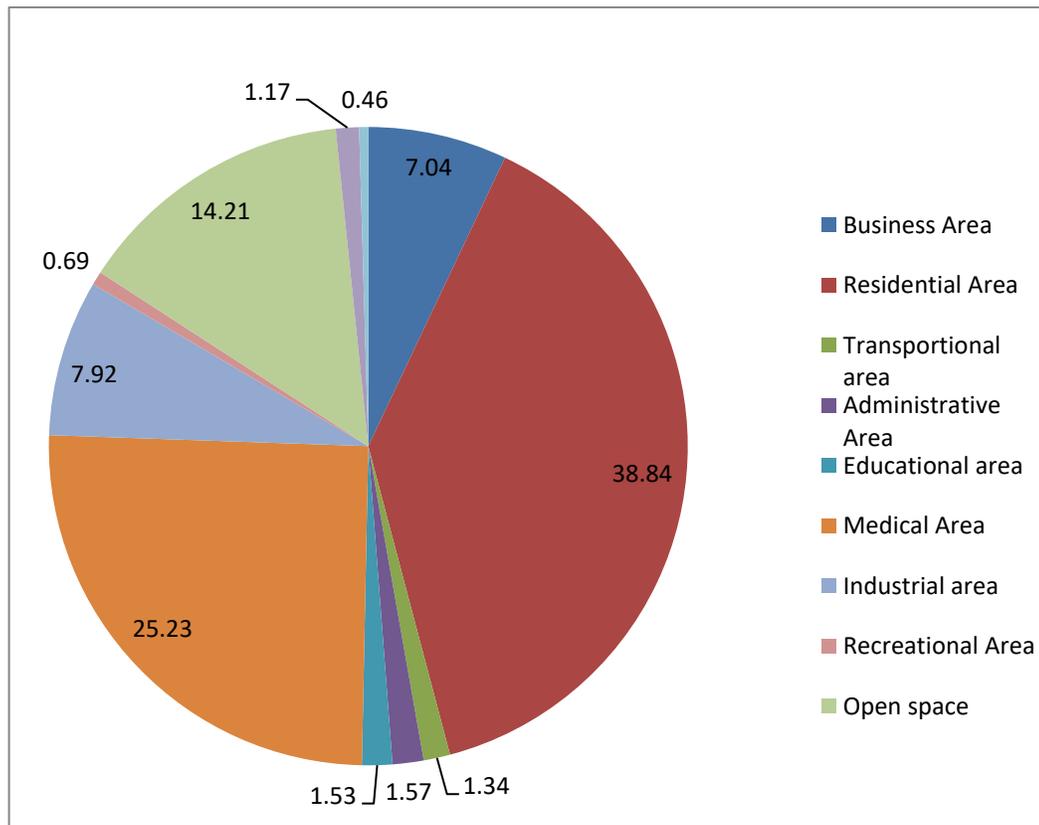
**Table no.4.1 Land use of Panipat**

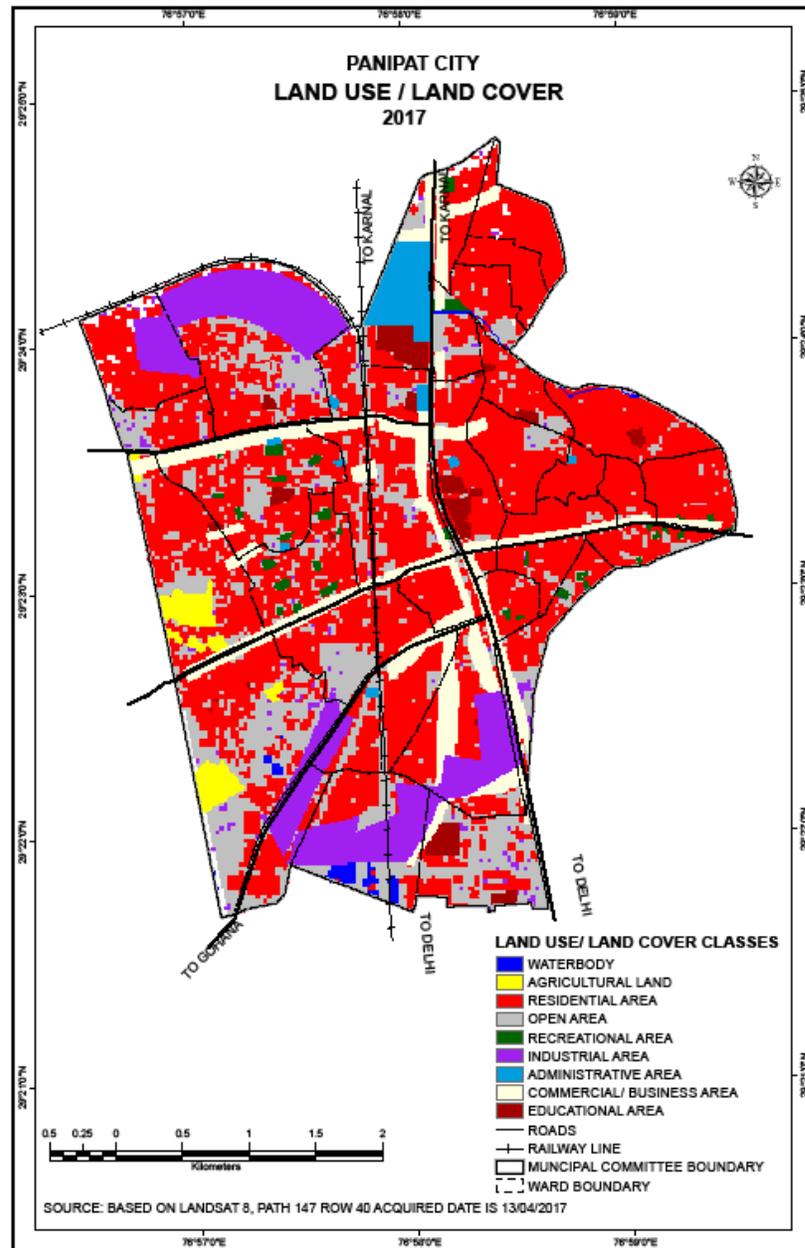
| Land use \Land cover class | Area In sq.km. of Panipat | Area In Percentage |
|----------------------------|---------------------------|--------------------|
| Business Area              | 1.52                      | 7.04               |
| Residential Area           | 8.39                      | 38.84              |
| Transportional area        | 0.29                      | 1.34               |
| Administrative Area        | 0.34                      | 1.57               |
| Educational area           | 0.33                      | 1.53               |

|                   |       |       |
|-------------------|-------|-------|
| Medical Area      | 5.45  | 25.23 |
| Industrial area   | 1.71  | 7.92  |
| Recreational Area | 0.15  | 0.69  |
| Open space        | 3.07  | 14.21 |
| Agricultural area | 0.25  | 1.17  |
| Water bodies      | 0.10  | 0.46  |
| Total Area        | 21.60 | 100   |

Source: satellite landsat8 path147 Row

Total area of Panipat city is 21.6 sq km and sonipat city is 40.75 sq km in which different land uses categorized as Business Area, Residential Area, Transportational area Administrative Area, Educational Area, Medical Area, Industrial Area , Recreational area, Open Area, Agriculture Land and Water Body. In following the description of total land cover area is given above.





### 1. Business area:-

**Business Area of Panipat:-** Total area of Business area of Panipat city is 1.52 sq.km.. This is only 7.04 % out of total city area. The business and commercial areas have shifted from origin place to the city. The commercial activities of the city are mainly along to the roads. The commercial Land use of city has been divided into following parts.

**(i) Central Business Districts (CBD) (ii) Main Business Centre (iii) Outer business Centre (iv) Neighboring Business Street (v) Scattered shops .**

**(i) Central Business Districts (CBD):-** This is the most inner zone or core of the city, defined by the name of C.B.D. This is a zone, where sky scraper buildings are found in huge number. This is the focus of commercial, social and civic life and of transportation. These are most frequented by the people of the city and the surrounding areas for various purpose. It is an area of retail trade, business; with its departmental stores, smart shops, offices buildings, clubs, bank, hotels, theatres and organisation headquarter. It is spread between Bus stand to railway station road. There are mostly shops famous for handlooms.

**(ii) Main Business centers: -** Main business Street developed along the side corners of the roads or other transport streets. Business area always develops on the road which connects the main business buildings have developed on the main business street along with G.T. road and railway line. Other markets are developed on Assand Panipat Road, Gohana Road, Khanna Road and sanoli road, Jattal Road.

**(iii) Outer Business Centers: -** With the expansion of the cities the business activities have been developed in those areas of the city, which are distantly located from the central business area. In different parts of the town small business centers develop for the convenience and to fulfill the needs for surrounding areas. Such types of centers develop with the development of the city, when C.B.D falls a far away from those areas. In these business centers those kinds of activities and shops develop which are present in CBD, such as clothes shops, shoes and general stores etc. the people living in the outer areas have to cover a long distance and have to face certain problems like traffic congestion, no proper parking facilities in the CBD area and wastage of time, crowdie at morpheme and high cost of goods in CBD area and so many others. All these inconveniences have encouraged the development of outlying business centers automobiles showrooms are exists in the outer part of the city. Sector 18 sec 13 and sec 17 and sec 6 market are some pockets of business which are scattered in the outer northern part of the city.

**(iv) Neighboring Business Centers: -** Some small business area established along the roads connecting the CBD with nearby villages and towns, such types of shops are also developed in new residential colonies. These small business shops develop of the adjoining areas. Some scattered shops can be seen at residential area of Panipat city. It is spread between outer area of city namely Kundli, Rai and Delhi these areas are neighboring business centers for the Panipat city. In these areas many malls, cloths and handlooms shops are there which the neighboring business center area.

**(v) Scattered Shops:-** Scattered shops are primary link of the commercial series. These shops are scattered in residential areas which is main characteristic of these shops. This kind of shops fulfils the demand of the people of surrounding houses. Small quantity of all daily need of things are available in these shops. Secondly these scattered shops are that people can take things on credit form here. In short these scattered shops are active because of Local demand, credit facility and because of individual's behavior. These small scattered shops bring their things from the main business centre of that area and serve their surroundings .Throughout the country businessmen visit here. They collect textile and

handloom items to be sold in retail and whole sale by their own business centers. The city has a lot of textile and handloom oriented industries. They sell their products to local as well as tourists. In the Panipat city there are separate markets for each.

main markets in Panipat city: Big Bazaar sector 25, NFL shopping complex Ins ar Bazaar, Shoppng center sector 12 Maharja aggarsain towel market, Handloom textile market Insar Bazar Road, Palika Bazaar, New Grain Market Vilas Nagar, Choura bazaar old Housing Board colony and Jawahar Cloth Market

Because of handlooms and textile industries durries, Bed covers Bath Mats Curtains Floorings, Made Ups, and carpets and furnishing fabrics there are some exportable things Most of these markets in Panipat are located in its key areas. They are mostly the old markets that were established with the development merchandise along with culture of Panipat reflected through them. The shops some of which are quite age old and chowks render a nostalgic feel to these shopping places. Many of these markets also have small eateries offering local flavors to the shoppers along with big restaurants.

**2. Residential Area:** - Residential areas play most important both quantitatively and qualitatively in the morphology and sustenance of the city. They provide shelter and living accommodation to its inhabitants who are the earners, designers and builders of the city. These areas draw more attention of all-concerned with the welfare of the city, because they share more than 47% of the total developed area of the Indian cities, and happen to be the largest component of the urban space.

The uncontrolled changes of use in residential areas have resulted in confused and chaotic atmosphere. All the functions are badly intermingled with each other forming a complex type of pattern. The causes for such complexes and intermingled developments of residential zones can by very well associated with the nature of the emergence of the Indian cities. Once grown in a definite complex pattern, the cities, undoubtedly with their exotic impulses, could not remove to any considerable extent the above said characteristics.

The ancient cities, which owe their origin and growth to different factors, are still characterized by the same intermixture of various functions. The natural setting or the site of a place, generates centripetal forces, functioning as a negative or positive force determining both the original layout as well as the later expansion of the settelrment. Riverside, confluence of rivers, river meanders, spurs, bridge-points, forts road junction, temples, tanks and market place have attracted the residential areas and other functions. It appears that there was no check in the process of intermixture of functions in the cities. Mostly upper floors as well as the rear side of the houses we're occupied for residential purposes while the lower and front sides along the roads were given to the business and commercial uses. It may be emphasized that the residential sites were originally influenced by the religious nuclei, defensive sites and by the proximity of employment centers.

Distribution Pattern of Residential Areas:

In the ancient towns and cities it is very easy to demarcate the types of residential areas. People of high economic status selected better sites on higher ground" particularly the high river banks and more defensive and economically or otherwise suitable places. Poor people were forced to reside in the neglected lowered tracts suffering from malarial and other unhygienic conditions.

At present the architectural beauty of the high class residential areas of the ancient cities is mostly shadowed by the maximum density of the houses and the narrow zigzag lanes and streets. The middle class surroundings lagged behind much more in sanitary conditions. The segregated low class residential groups characterised their thatched and tiled roofed houses, which were very dirty and most irregular.

**Medieval Period:-** Brought in the Muslim culture in India. Muslims were from the very beginning sensitive to the age old historical truth that Hinduism, both as religion and culture, has enjoyed the capacity to absorb other cultures. This sensitivity on the part of the Muslims kept them aloof, rather fearfully and even later they settled in separate mohallas or wards. This brought a prominent change and expansion in city's residential structure. Conversion of temples into mosques and Hindu locality into Muslim brought some changes in the city morphology.

**Modern Period:-** We find that both centripetal and centrifugal forces were active, sometimes one being more vigorous than the other, but both being always present in the dynamics of urban habitat, Civil lines, railway colonies, etc. developed for residential purposes away from the indigenous part of the city. Side by side in the old existing city centripetal forces continued their influences. Time and distance were the factors influencing the residential development of urban centres and their outlying areas. Developing of residential areas in the 'open suburban zone, a rather modern trend, took place insignificantly in this period mainly due to the advent of highways.

**Post- independence Period:-** After Independence the centrifugal forces had been very much active to decentralise the high class localities from the hub of city. Probably the most impressive phenomenon associated with urban residential land use in recent decades has been the growth of suburbs. It has been the fashion of the wealthy people to have their residences in the suburban area, in open surround. Middle class is trying to build residential neighborhoods in the peripheral areas of the city. In the big and rapidly growing cities, however, where the transport facilities are well developed, the distant residential colonies are coming up. Some new colonies have developed in all the centers often by swallowing the best agricultural lands. Further, the densely built residential areas of the upper class in the inner zones are accommodating the low income groups, because they are available on cheaper rates. The factory workers and professional members of low income groups are further having their planned labour colonies.

In this period in all the cities the residential areas are growing fast along the main highways and station roads in a ribbon pattern owing to the easy transport facilities. The comfortable planned house types based on western pattern are the main architectural outcome in our cities.

In this way in all the planned residential portions of Indian cities we find a new look and there are as yet no dilapidated houses. Variety in architectural style and design is notably slight, as most of the houses are government owned and built. The differences exist only in the various classes of government houses varying in the size and the ground plan and premises, number of houses and other elaborations.

The time changing patterns of building structure and trends of economic growth have been the most

influencing factors in shaping out the morphological characteristics of the residential areas of Indian cities. The aggregation and segregation trend of the residential areas and economic and political status of the people have been responsible for the evolution and growth of different types of residential areas. The tendency of people to reside in the area occupied by the persons of their own group, based on whether caste, community, religion, occupation or other interests have resulted in the segregation of different cultural groups in different parts of the city.

Panipat residential area is 8.39 sq. km out of total area. This is the 38.84 % of the total city areas. The residential area always cover a big part of the city, it is mainly use in settlement, housing buildings. Panipat is the city “Weavers” so the handlooms industries are develop here. Growth of the city and migration for employment are the main reason for the highly populated area. Most of the land is used for household industries and households. Older part of the city growth was haphazardly and unplanned form. So the residential area is also spread haphazardly, where the basic facilities are available but defecting in modern facilities. Along the drain No.8 lower class residential area is found. Sector 2, 6, 7, 13,17 and Yamuna enclave are newly planned residential planned area. In the Western area of the city unauthorized colonies were developed with unplanned infrastructure found at regular distances.. Total residential area of sonipat city is 15.30sq.km.. This is 37.59% out of total city area and having a big proportion of total area. Residential area of any city can explain through household density.

**Table no.4.2 HOUSEHOLD DENSITY PANIPAT**

| Ward No. | Household density /sq.km. (Panipat) |
|----------|-------------------------------------|
| 1        | 7750                                |
| 2        | 6778                                |
| 3        | 1723                                |
| 4        | 4075                                |
| 5        | 3406                                |
| 6        | 3451                                |
| 7        | 6603                                |
| 8        | 8780                                |
| 9        | 5678                                |
| 10       | 8575                                |
| 11       | 7330                                |
| 12       | 7443                                |
| 13       | 5990                                |
| 14       | 4845                                |
| 15       | 12895                               |
| 16       | 4525                                |
| 17       | 5273                                |

|    |      |
|----|------|
| 18 | 3792 |
| 19 | 7093 |
| 20 | 1455 |
| 21 | 5043 |
| 22 | 3570 |
| 23 | 6554 |
| 24 | 4215 |
| 25 | 2470 |
| 26 | 1753 |
| 27 | 3572 |
| 28 | 1892 |
| 29 | 609  |
| 30 | 4760 |
| 31 | 1528 |

(Source: computed by Census of India and Municipal Committee Reports)

### **Panipat Household Density**

Total area of Panipat city is less than Sonipat city. Total household of panipat is more than Sonipat city which is 60905 and 57740 respectively. This represents that density of population and density of household of Panipat is higher than Sonipat city. Sonipat city household density is 1354 household per sq kilometer whereas; Panipat city household density is 3498 household per sq kilometer. Lowest household density is found of ward no 29 as 609 whereas highest household density is of ward no 15 as 12895 houses per sq kilometer.

#### **(i) Low Household Density**

In this category only seven wards are found which are as ward no. 29, 20, 31, 26, 28 and 25. When we analyses Panipat city map we can easily find that small and interlocked wards are located in eastern direction and big and clear-cut boundary wards are in western direction. Old industrial belt is in south west part of the city. Newly industrial belt is in north west direction of the city. Distribution of open area and agricultural area also justify the household density. Ward no 26 and 25 are the part of older planned area of the city as Model town and 8 Marle colony. Ward no 31 is newly added village named Nangal Kehri is a part of Panipat city. Ward no 20 has more proportion of newly industrial zone and commercial area than residential area.

#### **(ii) Moderate household density**

There are two belts are found with Moderate household density. First belt is going along the railway track and Grand Trunk Road With ward no 4, 5, 6, 18, 17, 13, 14 and 24. this represents the extension of the city which follow the road and railway pattern. Railway track and Grand Trunk Road plays an important role in development of panipa city .C B D of the city also follow transport network. Panipat Assand road, Panipat Gohana road ,Jattal road ,Sanoli road also play a centrifugal force role for city development. Other belt with moderate density is existing in outskirts of the city. These wards are 22, 27, 30 and 21 which forms this belt .Ward no 30 is along Gohana road and Sugar mill. Ward no 22 is

in outer southern part of the city. Ward no 27 is spared between Assand and Jattal road It is surrounded by Model town .Ward no 21 have more percentage of commercial and open area than residential area

### (iii) High Household Density

Ward no 7,8,10,11,12 and 15 are located in the eastern boundary of the city which is decided by drain no 8.Low class residential area is found along the drain .Ward no 1and 2 are also have high density of household . Ward no 3 is an industrial area and residential area is not available here. Ward no 25 and 26are planned part of the city ,so land prices are very high The labour and workers are living in ward no 2 and 1 due to low price of land and rent people choose these area for residence. Maximum density is in ward no 15 It is a part of oldest city streets are narrow area of per house is very low.

### 3) Transportation area:-

The roads and streets, which expedite the flow of different types of traffic in all sections of city, are of utmost importance in the land use study.(Kamala Kant Dube1976). In American cities it is the largest use of urban land ranging between 25 to30 percent.(Bartholomew,H.,and Wood, J.1955) but in the Indian cities and so in these two cities the land utilized for this purpose is not significant. Transportation lines serves as the arteries of the urban organism, which provide links amongst its various parts, inter urban links and regional contact. It is but natural then for the street to cover a substantial part of the urban area, with a minimum of 20% to 25%in the densely build up central districts.(Dickenson,R.E.1951). Here, we may consider them from the point of nature, width and area. Both cities have good connectivity by road network and Rail system. Grand Trunk road, other state and district roads and Delhi Kalka Railway line provide these facilities to the cities. In Panipat area under transportation is 0.16sq km with 0.39%. In this category only area of bus stand, railway station, and transport nagar and trunk union area is included.

The haphazard development of roads, without any preconceived plan, has been the prime factor for the development of unsatisfactory street system in the city. Hence in the old developed area, the streets are very narrow with a large number of zigzag lanes and winding by lanes. Sometimes their widths are less than five meters where several bottlenecks are created due to the traffic congestion, often resulting in fatal accidents. But in the newly developed residential areas of the HUDA sector the rectangular Street network have generally been followed with a few exceptions. These areas have wider roads ;their width ranges between 10 to20 meters.

**4. Administrative area:-** Administrative area of Panipat :- Total area of administrative body of Panipat city is 0.34 sq. km. This is only 1.57 % out of total city area. Grand Trunk Road from South to North direction . Main administrative area is lying in North of the city in a polygon shape . Where we can see its area is very small but when we see the building of administrative area they are multistoried building and most of offices are located here in mini secretariat building as D. C office, A.D, C office. DC camp and DC house are near Hali lake. The joint director General of foreign trade office is at Ram Lal Chowk , Model town. HUDA office is situated at out of municipal committee boundary at sector – 18, HUDA Tehsial Camp is in the eastern direction of mini secretariat. Quarters of Government is in the North direction of mini secretariat along the G.T Road. There are 7 Police stations and chowkies are in scattered city. Police line is situated out of the city limits.

**5. Educational Area:** Educational Area City forms a theatre where various cultural elements play their important role in shaping the social life of the urban organism. In order to fulfill the social and cultural needs almost all the urban centers have developed educational zones with distinct morphological structure, and their distribution pattern has caused differentiation of its various parts as well. These have played an important role in determining the mode of city life.

Most of the educational institutions, except some of the Universities and big colleges, were previously located in the old parts of cities. However, towards the end of 1930's and- especially after Independence some educational zones in large open spaces often detached from the old centers, were evolved. In all the Indian cities the higher secondary schools have occupied the area adjacent to the densely inhabited localities because of keen 'competitions among them and lack of transport facilities in the outskirts. Thus, most of the colleges lie mostly in the inner 'and middle zones of the city proper. Degree colleges specialised technical and training centers and universities being the large institutions draw students from different corners of the state and the country. They also require *extensive* and cheap land for hostels, college buildings, playgrounds and libraries etc., in the locations easily approachable from every part of the city and the umland, Universities are generally found in the outskirts of the cities, and primary and nursery schools occur predominantly in residential areas, though sometimes they are situated in localities of mixed uses.

**Morphology of Educational Areas:** - Educational zones are morphologically different from those of others. The increasing need for the provision of educational facilities of different standards and types has led to the intensification of educational zones. The: universities and big institutions with their defined campuses, the colleges and higher secondary schools of composite pattern and the nursery and primary schools and small training centres accommodated in private or other public buildings in the densely populated zones of the city are the three main classes of educational areas. The universities, L.I.T.S, etc, form their own distinctive appearance. The buildings that house the universities and colleges are generally large and imposing and the ground that surrounds the buildings is often extensive giving a parklike facility to the city inhabitants, In most of these areas, planned roads with defined land use of colleges, hostels and residential structures etc are impressive.

**Panipat:-** Total area under the educational area is 0.33sqkm. This is the only 1.53 %out of the total city area. The educational area mainly included educational institutes, schools and colleges. There are mainly 64 schools and 3 (P.G) Colleges in the Panipat city. Their names are respectively- Aarya P.G College, S.D College, and I.B College. These colleges are along the G.T Road nearby bus stand of the city. Some other colleges like education, engineering, Polytechnic and management colleges are found in the outer area of the city. In early time .mostly educational institutes of Panipat were located in the mid eastern part along the Grand Trunk Road.SD education institute and Arya College are existing inward no18, 17 and 10. Now a day's educational area is extending in northern and southern outer part of the city .Here the cost of land is low and far away from over crowdedness, lack of air pollution and noise pollution. There is a great difference which I found that educational area is more lies in east of railway track and there is very small area exists in the west of railway track.

**6. Medical Area:** Unfortunately Indian cities do not have adequate medical services, yet every city whether old or new, big or small, has developed some sort of a medical zone. These medical zones comprise the hospital buildings, the residences of the doctors and other employees within the walls of a large compound. The older medical establishments are situated in the congested parts of the cities whereas the newer ones develop in the open areas preferably in the new extensions with better plans, the old hospital zones are now quite congested and their healthy atmosphere is almost deteriorating rapidly while the newly developed medical zones with their large extensive compounds, beautiful sets of buildings as well as different departments of respective medical services, added by parks, open spaces and wide roads present better and healthy atmosphere. It has been noticed that the increased tendency of the country to open medical colleges in most of the cities has enhanced the capacity and functioning potentiality of the medical zones.

The medical zone of Indian cities generally comprises of a hospital, a clinic or a dispensary, with the establishment of many medical shops surrounding it. With growing urban functions, independent clinics and dispensaries of private doctors come up often in the same zone. However, the recent planned extensions of the cities do show the emergence of a clinic or dispensary attended by a private medical practitioner with rather complete absence of medical shops surrounding it. Usually the medicines are sold by the doctor himself in such localities.

The recent trend of enhancing medical services in the cities are opening a new chapter by establishing specialised services such as sanatoriums, eye hospitals, maternity centers, etc. in the open surroundings away from the city proper. These medical service areas, though small, are sufficient to attract the growth and expansion of the city by attracting business and residential establishments and other activities related to medical services.

The second category of medical establishments consists of the private dispensaries, clinics and nursing houses, etc. Such establishments are generally located in the residential buildings in the form of shops along the roadside. The clinics and the dispensaries generally possess one apartment in which some place is occupied for storing the medicine in racks and admirals and some for the inspection of patient. The maternity and nursing homes comprise of two or three big rooms in which the beds are provided for the patients. The doctors also reside in the same building or premises.

Panipat:-Total area of medical bodies in Panipat city is 5.45sqkm. This is 25.23 percent out of the total city area. This category included all the medical ships, Hospitals and medical institutes. There are 65 hospitals in the Pnaipat city namely Ravindera Hospital, Chhabra Hospital, G.C Gupta Hospital and civil hospital are here. Mainly medical zone is divided into two parts first is surrounding the civil hospital and second is with the Jattal and Sanoli Road. Medical area is also follow the residential and educational area .Most of hospitals in these cities are along the transport network.

### **7. Industrial Area: -**

Industries play a significant role in the city economy. In fact most of prosperous cities today are industrial. Large Indian cities with their large markets and technical skills act as powerful magnets attracting industries both of producer and consumer goods. In fact light and consumer goods industries

are quartered in outer areas away from the residential areas, so that these industries may not have the adverse affect on the health of city people. According to Kussum Lata Taneja (1971) in our country, the percentage of industrial area in some of the cities is 14.5 in Mumbai, 10.5 in jaipur , 9.2 in Kolkata , and 1.8 in Delhi . The study of industrial structure of Indian cities has significant importance in Their over-all appraisal. While the business arras tend to be centralised in the CBD" in 'the inner side, modern industries have started emerging in the outer portions of the city and thus' help not only to the balanced development of land use but also the population and other urban activities. Industries play a significant role in the city economy, as they provide the basic export channels for earning money. In fact, most of the prosperous cities, today are industrial. Large Indian cities with their large markets and technical skills act as powerful magnets attracting industries, both of producers and consumers goods. Market oriented consumer goods industries and those using the latest technology and materials have been growing very, rapidly in our cities. In fact in view of the general industrial, growth of the country, large cities are over industrialised and have had a disproportionately larger share in the growth of modern industries because of their location pulls. Existing cities have been offering to industrial concerns the required personnel, capital and markets of growing concerns. They have attracted and continued to attract more than required number of rural labourers from the environs which bring to 'the city problems of accommodation and unemployment etc.

Most of the large scale industries are quartered in separate zones and sometimes appear to be alien to the existing townscape. Small scale and household industries- are also important in defining and building the land use patterns. Typical industrial cities produce and display their own skeleton essentially different from those of functionally other type of cities. Morphology of industrial cities and typical industrial areas associated with other, functions.

**First Phase (1857-1914 A.D.):** In the first phase the expansion of railways connecting most of the large Indian cities created conditions conducive for industrial growth. The pace of industrial growth of Indian cities has been accelerated since 1900. Various new factories sprang up and old ones revived and expanded. Thus, a revolution was brought to bear its imprint in the morphology of our cities when a new trend of industrial location ensued. Industries were located towards the railway lines and roads, which became more powerful and speedy traffic arteries' for the movements of goods and people. Some examples may be given for analysing their phases of industrial' development in some cities.

**Second Phase (1911:-1947 A. D.):** Acceleration in the city expansion took place in the pre-Independence period; characterizing the" industrial expansion 'in the inter-war period. The chief events .mainly responsible for these developments were, firstly, during the first World War period (1914-1918 AD) the demand of manufacturing articles was very high "as a result of which the mill owners earned a good profit: secondly the well developed rail transport facilitated the movements of both the raw-materials and manufacturing goods Further, the advent of electricity ill' the early decades or the 20th century helped in the growth of the industries like textiles, glass works, potteries, leather works (tanning), fruit preservation and cold storage, welding metal and Industries chemical works. Since many of these are with bulky- materials, they require large structures of a coke oven, a heavy chemical

work specific types, such furnace, or a thermal electric plant, requiring large space preferably uniformly fiat land and above all need to keep them away from the residential areas. The complicated appearance of the already developed industrial areas remained almost the same in nature but the new industrial units that came into existence with the demand in the Second World War, consumed many of the residential and other accommodative units and converted them into industrial areas.

**Third Phase 1947 and onwards):** After Independence, the national Government 'has tried to build our industries on planned pattern. Among their programrnes, the most promising one is that of Industrial Estates which are designed to establish planned industrial communities of small and medium size in which a pull of modern services needed by small individual entrepreneurs is provided. While taking decisions' in regard to the location, of industries, planned decentralization has been kept in mind. With the result many new towns have sprung up. This recent trend of industrial location has involved unexpected extension of corporation limits and with the result significant change in the industrial landscape of the Indian cities during this period is marked. The industrial growth and expansion also brought about in its wake significant extension of other urban land uses such as residential, business and industrial, etc.

The classification of industries by structure is more difficult than the classification by products or processes. We get numerous examples of the latter type of classification while the former is rarely found'. 'To describe the morphology of industrial areas, it-is essential to classify them on structure: frame considering their functional pattern, production type and time of establishment. It is also true that certain primary types of industries have such distinctive form elements that they can ordinarily be recognised at a glance. The basis of the physical structure of the factory, i.e., the ground space, building 'type, number of storey, building material, date of establishment, location to rail, water and road and other transport facilities needed by the plant etc. may give a better and composite picture of the. morphology of industrial areas. But due to the lack of reliable data and essential information it has not been possible to consider all of the elements referred to. The study in the present context is based upon location of industries in the city frame, transport facilities, nature of consumed material and products, and the time factor. The time factor, here, is limited only up to modern period. An appreciable large span or time in ancient and medieval period of India did not bring out any marked industrial area in the city. Only small scale industries such as weaving, spinning, smithy etc. were localised in the small pockets of the city with practically no zonal distinction. The formation of the industrial zones, however, ushered into the morphology of Indian cities after' British occupation or after the phase of industrial revolution in the country. As such quite a long range of time right from the ancient days till the British occupation can be distinguished as the period of household or cottage industries. Later, after the British occupation till the recent days the industrial development can be spitted into various phases with different morphological structures.

On the basis of the above mentioned facts industrial areas of Indian cities can be classified iii the following groups:

- (I) Ancient small scale manufacturing areas-in the inner and middle zones of the city
- (II) Older (after British occupation) large scale' manufacturing area in the inner and middle zones of

the city.

(III) Pre-independence outlying industrial areas and units both large and small.

(IV) Newly developed outlying organized Industrial Districts or Industrial Estates. Industries in

Panipat:- In during recent years Panipat has been encountering considerable development. In Panipat city the total industrial area is 1.71sqkm. This is 7.92% out of the total city area. It has large scale, small scale and middle scale industries. Panipat is famous for handlooms. It is also known for battles fought. It provides incompatible products to offer to the customers. The city has something for each one either a businessman or a shopper. Panipat has the best range of textile and handloom. Panipat has approximately 1200 small industries that produce domestic items and offshore markets. Most of its items are for exports though they can be bought directly from the weaving centers that are located quite densely throughout Panipat.

**(i) Earlier southern Western Industrial area (ii) North West industrial area (iii) South East Industrial area (iv) Scattered Industries (v) Outer expansion**

**(i) Earlier southern Western Industrial area:-** Panipat Cooperative Sugar Mill Ltd and National Fertilizer Limited, two big industries were established in the early stage of development. These are main industry of city which gives identification to Panipat city.

**(ii) North West industrial area** This area is surrounded by Railway track, model town, ward no 1 and 2. This area is allotted by Haryana State Industrial Infrastructural Development Cooperation. Himgirri Textile, Shiva Textile, Golden Jacquard Industries, Laborate Pharmaceuticals India Ltd, Rug Textile and Venayak creations are the main industries of this area.

**(iii ) South East Industrial area:-** HUDA sec -25 is an industrial zone. Hetalon of India ,Jay pee loomtex ,K F L loomtax, Chetna Textile ,Super Packaging industries ,Deep Texo Fab, SK Woolen mills and K B electric power Ltd are main industries of this area.

**(iv) Scattered Industries** There are many small scale and household industries as khaddi udhyog and diy industry.

**(v) Outer expansion** There are mainly two large scale industries which are named as panipat thermal plant and panipaot Oil Refinery existing in outer part of the city . Some other industries are also part of outer extension of panipat city as Bhandari handloom industry, Rajeev Handlooms. **8. Recreational**

**area:** - Recreational area is defined as area is form of grounds, parks, green spaces, and open areas. In an urban setting the area of recreation can be range from small parks to highly sustain environments, playgrounds to community gardens or centers. Recreational area may include town-owned, district – owned, state-owned and nationally – owned p are roperties which accessible by public. Definition that is commonly used is: “an activity or pastime voluntarily undertaken, primarily for pleasure and satisfaction, during leisure time” (Pigram 1983). . Recreation provides an opportunity in vacations to spend leisure time to the people. But it is different than a person stay one night away from his home. Recreation is type of leisure that is intoner people daily schedule. Recreation can be in home and out of home. Both focus to provide entertainment to the consumers. But recreation actually refers out of home leisure. Recreation depends upon the time, travel facility and recreational spots present in the area. Government provides multiple recreational areas like parks that has:

- a) Social utility
- b) Economic value
- c) Health vitality

The presence of water, sewage and safety facilities at the recreational spots make them really useful. The Recreational area/areas are one of the many parameters of economic development of an area. The better the facility the better would be the health and environment of people would better and they would work better.

a) Social utility

- Parks reflects the quality of life in a society.
- It provides place for social gathering.
- Access to park and recreation opportunities reduce the criminal tendency.

b) Economic value

Park improves the value of the land and houses nearby. The private property values increase of such land is near to parks.

- Recreation and quality parks are cited as one main attraction in business cite relocation decision
- Recreation and parks programs added to revenue directly from tickets bought by people.
- Hawkers and other small shops get their income by visitors of recreation spots.

c) Health vitality

- People go to park and get health and stay fit.
- Parks and such recreation spot services contribute to the health of adults, youth, seniors and children.
- Parks give an opportunity to prevention and control on disease, promoting and improving physically active and can improve community and individual health.
- Research shows parks and open space improve the water quality, prevent flooding, protect underground water, produce habitat for wildlife and provide a place for families and children to connect with nature and recreate outdoors together. Panipat have more than 40 recreational spots. Total area under recreational area of Panipat is 0.15sqkm. This is the only 0.69% of the total city areas. The recreational area included all the parks, community centers and cinema halls. Recreational area is mostly found in planned area of city like as. There are two cinemas namely Surya cinema in the city. Model Town has maximum parks of the city.

### **9. Open Area**

In Panipat Total area under open space is 3.07sqkm. , this is the 14.21% of the total city area. It includes that area which is manly scattered on the outer boundary of the city. In the southern direction of the city the open are found near the industrial area. Most of the open area is found in the western direction of the city along with the Gohana Road. Third belt of open area is exist near the northern industrial belt. Maximum patches of open land is existing in ward no 28, 24, 22, 31 and 3. In ward no.28 it is the part of Sugar Mill Colony. Houses are scattered in this area. This is a part of older industrial zone of the city. In ward no.24 there are also small pockets of open area which is plotted land of 8 Marla Colony. Ward no.22 and 31 have open area between

Railway track and Grand Trunk Road. This is existing in N F L Town. This area is the open area of Government ITI Panipat, Regional Vocation Training Institute For Women, area nearby New Grain Mundi. This is also a part of green belt surrounding industries. Ward no.3 is an industrial area. There is a big open area pocket which is Hali Lake which is now become dry. There are some green belts and some unconstructed industrial plots. There are some gardens and banquets for parties and marriages they are along refinery road. Some area lies in ward no 10 and 17 , which are some historical building and part of religious places as Devi Mata temple and Hanuman Temple .Ibrahim Lodi tomb and circus ground are in ward no.9. There are some patches of open area in the city with residential area.

#### **10. Agricultural area: -**

This category included that land is typically land devoted to agriculture , the systematic and controlled use of another form of life particularly , rearing of live stock and production of crops to produce food for humans . In land actually under annually replanted crops in any given area, is instead said to constitute “Shown land or cropped land, land able to be use for farming is called “cultivable land, The surface of the earth has been altered considerably over the past 50 years by humans especially through urbanization, deforestation, and agriculture. While conversion of available lands to agriculture and rates of deforestation vary across the world, the number of people residing in cities has been consistently increasing.

Total agricultural land area of Panipat city is 0.25sqkm. This is 1.17% out of total city area. There are small patches in West direction of the city. One patch is found in ward no 28 , which is in between Refinery road and Panipat co - operative\_sugar mills limited . The other agricultural land is scattered in ward no 27. These are along the Refinery road and surrounded by Virat nagar, Krishana Nagar and Jattal road. There are two small patches of agricultural land along the Assandh Panipat Road in ward no 27.

#### **11. Water Body: -**

The ecosystem processes and ecological communities are affected by the shape, size and connectivity of Water bodies. Here a question arises that how it can be affected land cover change and land use and the answer is not known. Alteration of water bodies various activities including like burial, reshaping, constriction and drainage It may select for influence and characteristics of morphometric the water bodies are affected by means along with the factors behind it. Term urban development has been used by different scholars as per their requirement. Some scholars focus on the concepts like; city planning and architecture, spatial and physical development cultural and social process behind them. Other scholars start with social factors like gentrification or inequality to explain development and discuss the social consequences. Water bodies play a vital role in urban area development. It may be source of water for landscaping, irrigation, supply, eco-tourism and fishing that add values to social benefits. Water bodies can also help to reduce and prevent heat island effects. It also improves the microclimate of cities. In account the inland water resources of the country are categories canals and rivers, tanks, reservoirs beels and ponds etc. This means that the water bodies can take different shapes, forms, sizes because of local physiographic factors. The main type is fresh water that helps in the sustenance of

different fauna and flora. Apart from aquatic life form creatures like animals birds etc. that are also dependent on water bodies. The availability of fresh water is important for the survival of the ecosystems as well as for the survival of the human. Cities which located in alluvial river plains the surface water bodies can occupy huge areas. It also serves environmental and ecological consequences that arise. They are given less importance in the planning and development processes. In highly populated urban areas water crises is a severe problem.

Total area of water bodies in Panipat city is only 0.010sqkm. This is 0.46 percent out of total city area. This category included all water bodies' like- lake, pond and water tank natural and manmade sewerage and river etc. The main water body is brain No- 8, that crosses all over the city from north and follows towards East direction of the city. It also determines the eastern boundary of the city. Other water bodies are located in outer area of the city. This is mainly waste water of National Fertilizer Limited and Sugar Mill. There is also a water treatment Plant in southern direction of the city. Panipat has only two water bodies which is in the older industrial zones. National Fertilizer Limited and Sugar mill effluent stagnant water in this water bodies. Third water body is also not a natural water body. It is water storage of water open tank of Public Health Department.

#### REFERRNCES:

1. **Conzen, M.R.G. (1960).** Alnwick, Northumberland:" A Study in Town-plan Analysis, Transactions and Papers" Institute of British Geographers, Vol No.27: p122.
2. **Whitehand, J. (1986).** " Taking Stock of Urban Geography", Area, Vol.18, p p.147-151.
3. **Larkham, P.J. (2002).** " Misusing 'Morphology'", Urban Morphology, Vol.6, No.2. pp. 95-96.
4. **Levy, A. (1999).**" Urban Morphology and the Problem of the Modern Urban Fabric: Some Questions for Research", Urban Morphology, Vol.3:pp. 79- 85.
5. **Moudon, A.V. (1992).** "A Catholic Approach to Organizing What Urban Designers Should Know", Journal of Planning Literature, Vol.6, No.4: pp. 331-349.
6. **Moudon, A.V. (1997).** "Urban Morphology as an Emerging Interdisciplinary Field", Urban Morphology, Vol.1, No.1:pp. 3-10.
7. **Carmona, M. (2001).** "Sustainable Urban Design-A Possible Agenda,Planning for a Sustainable Future": 165.
8. **Southworth, M., and P.M. Owens (1993).** " The Evolving Metropolis: Studies of Community, Neighborhood, and Street Form at the Urban Edge", Journal of the American Planning Association, Vol.59, No3:pp. 271-287.
9. **Southworth, M., and E. Ben-Joseph (2003).** "Streets and the Shaping of Towns and Cities", Island Press, Washington D.C.
10. **Hillier, B., and J. Hanson (1984).** "The Social Logic of Space", Cambridge University Press Cambridge.
11. **Ningrui Du, HenkOttens and Richard Sliuzas (2008)** –" Spatial Impact of Urban Expansion on Surface Water Bodies- A Case Study of Wuhan, China", Journal of Landscape and Urban Planning 94 (2010)pp. 175–185.



12. **Harris, C.D., (1968).** “The Pressure of Residential-Industrial Land use, Man’s Role in Changing the Face of the Earth” , Vol. 58, pp. 881-895.
13. **Hart, J.F.,(1976).** “Urban encroachment on rural areas”, The Geographical Review, Vol. 66, No.
14. **Dickinson,R.E.:(1951);**”The West European City”Routledge and Kegan Paul Limited; London;p225
15. **Singh,R.L.:(1964);**”Bangalore: An Urban Survey; The National Geographical Society of India;Varanasi”;pp. 65-79
16. **Taneja,K.L.:(1971),** “Morphology of Indian Cities”, National Geographical Society of India;Varanasi;pp.100-105.
17. **Dickinson,R.E.:(1951);** “The West European City” Routledge and Kegan Paul Limited; London;p-429
18. **Dube,K.K.:(1976);** “Use and Misuse of Land in the KAVAL Towns”, National Geographical Society of India;Varanasi;pp.93.
19. **Bartholomew, H., and Wood, J.,**“Land uses in American Cities”, Cambridge, 1955, p. 63.