CHAPTER - IV
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MORPHOLOGY AND LAND USE

INTRODUCTION:

An increasing number of contemporary geographers are focusing their attention on the study of urban areas. The object under the lens of the urban geographers is the analysis of the activities of man, the physical forms of structure developed for these activities and their association and arrangements with one another and with the land. This is expected to provide theoretical notions regarding the morphology of the towns, that is, study of the layout and build of towns viewed as the expression of their origin, growth and function. Robert E. Dickinson concludes in his article on "The scope and status of urban geography" that much work has appeared in this field but of inferior quality though investigation of the town plan and build were systematically undertaken about 50 years ago. It has received virtually no serious attention from geographers. However attempts were made to study the individual towns, the layout of streets and blocks with public buildings which were analysed in relation to natural and planned growth. It is necessary that geographers should pay more attention to the physical ground plan on which the city
rests. As a matter of fact towns with their appreciable sizes have an internal geography that is full of interest and significance. Their social form and arrangements of space and buildings which consist of urban landscape provide an ample opportunity to geographers to investigate and analyse their nature, their relative disposition and their social interdependence.

The urban land use is a term which denotes urban area, land area of cities, including the area under water bodies in the cities and three dimensional space above the surface of the city, or the land we are concerned with can be described urban. In essence the term “urban land use” broadly refers to spatial distribution of city functions, its residential communities or living areas, its individual commercial and retail business districts or major work areas, and its institutional and leisure time functions. The past urban studies have clearly revealed the broad geographical pattern of these functional areas and their characteristics. How they develop or how they change is the burning topic of research from a variety of related fields, such as architecture, land economics, geography, human ecology, sociology, and others. Scientifically oriented systematic attempts at theoretical land use arrangement have been made by scholars such as Burgess, Hoyt, Meckenzi, Harris, Ullaman and Firry.
Some of the Indian geographers such as Ujagir Singh, V.N.P. Sinha and Taneja have studied the morphological structure of towns but there are significant variations in their emphases. For example, Ujagir Singh tried to explain that the morphology of towns is characterised by the existence of two distinctive forms of habitat differing from one another in layout, open spaces and type of houses. The old city and market (bazaar) represent a typical Indian urban environment with narrow lanes, old types of clustered houses crowded with little or no open space.

V.N.P. Sinha has considered the study of morphology of urban settlement as primarily concerned with the ground plan. The ground plan consists of an external outline and internal arrangement of streets, forms and materials of building and exhibit the functional structure of town. Tanuj's work demonstrates the morphological set up of the various functions that differ from place to place and time to time. It varies because it is the outcome of human creative instincts projected through the total setting of resources and cultures within the limits of time and space. However, the expression of urban land use arrangement based on scientific orientation is studied by R. L. Singh, K. S. Ramegowda and others.
The rationale behind the economics explanation of the urban land use pattern is based on the assumption that economies act beyond the immediate environs of any particular urban centre which involve consideration of the structure and functioning of the urban economy as it fits into the larger economy of the region and the nation. Both regional and localized forces interact in order to shape the land use patterns.

The social action in a particular city influence the location and arrangements of land use although they are less understood and frequently confused with the economic determinants. Although both kinds of influences interact with each other and it is difficult to differentiate the effects, social scientists in order to provide a coherent frame work for interpreting the urban land use structure are increasingly directing their attention to the role that social values and ideals play in the determining the land use pattern of cities. In essence the behavior patterns of individual institutions and forms which occur in the spatial patterns largely determine the physical structure of a city.

The urban land use pattern is the aggregate product of many individual and group actions in occupying and improving the land and one may view these action as a form of human behavior activated by certain human needs and wants (Fig. No. IV.4)
THE SEQUENCES OF ACTION AND THE INFLUENCE OF VALUES IN BRINGING ABOUT A CHANGE IN THE URBAN LAND-USE PATTERN

Fig. IV-1
In this chapter an attempt has been made to analyse the morphological characteristics of Hubli-Dharwad cities, general morphological appearance of the external form of city, land use and analysis of the detailed morphological characteristics in Hubli-Dharwad cities. (Fig. No\textordmasculine 4).

"The origin of a city is diverse and complex" in which both functional as well as environmental factors work conjointly in the origin of any pre-urban nucleus at a particular place (Renner G.T. 1933). A city grows in particular places to discharge necessary functions towards its inhabitants. The site and situation of Hubli-Dharwad cities is largely conditioned by environmental factors.

The twin cities of Hubli-Dharwad were separate towns before 1962. In March 1962, they were brought under a single municipal corporation for proper development. The distance between these twin towns is 20 kilometers. The formation of a corporation for these town has further helped to bring about a feeling of oneness among the public and a sense of unity.

Dharwad unit is the district headquarters and is popularly known as an educational, cultural and administrative centre. Hubli is well known for its commerce and industrial establishments.
STRUCTURE OF LAND-USE CLASSIFICATION SYSTEM BASED ON
LAND-USE CHARACTERISTICS

Fig. V-4
Origin of Dharwad City:

The stone inscriptions found in and around Dharwad indicate the town to have been built in the twelfth century. The town was ruled by western Chalukyas. Later the town and the whole district became a part of the newly established kingdom of Vijayanagara. In 1573 A.D. it was annexed to the Bijapur Kingdom. Later Dharwad was made into a sub-division in 1673 A.D under the rule of the Governor of Bijapur. But within a short time it came under the Maratha leader Chatrapati Shivaji, who after fortifying Naragund captured and ruled over Dharwad till 1685 A.D.

In 1771 the Marathas and the British launched a combined attack on Tippu Sultan of Mysore and captured Dharwad. In the year 1817, it came into the hands of the British who retained Dharwad as an administrative place. The town municipality was formed in 1856 A.D by the British with about 5.12 Sq. Km area.

Origin of Hubli City:

A carved inscription on an old slab is found near Bhavani Shankar Temple of 11th century in old Hubli dated (1054 A.D.) Hubli seems to have derived its name from Hubballi or Pubballi. Huppovalli, as mentioned in a record of Kadamba vir Jayakeshi (1167 A.D.). It was ruled by Chalukyas and later Vijayanagar
kings. In 1673 A.D. Hubballi is mentioned as a place of wealth and of great trade. It was plundered by Annaji Datto, one of Shivaji's Generals. In 1685 A.D. Mazzium, Aurangzab's son, took Hubli and Dharwad and placed garrisons there. About 1689 A.D. the Desai of Kittur distinguished himself in battle and as a reward, the title of Sardeshmukhi of the district of old or Rayara Hubli was conferred upon him.

In 1727 A.D. one Basappa Shettat of old Hubli built the new town and fort with the consent and aid of Majid Khan, the Nawab of Savanur. After the conquest of the city by the British, the control was taken over by General Munro, in 1818 from Phadke, the commandant of Peshwas.

In 1884 Captain Wingate found Hubli an important trade centre with a population of 33,000 living in 5,448 houses.

**A Brief History of Morphological Development of Hubli-Dharwad Prior to 1962:**

**Hubli City:**

The inscriptions which are found in the city denote that the city had developed since 11th century itself. Before 1727 A.D. only Old Hubli was existing with an area of 0.68 Sq. Km. Even though smaller in area, it was popular as a place of wealth and an important trading centre in Karnataka.
With the establishment of New Hubli by Basappa Shettar in 1727 A.D. the total area went upto nearly 2 Sq.Kms. In 1818 General Munro took over the town. In 1885 a municipality was established for old and new Hubli with an area of over 2.56 Sq.km and population of 35,278.

Further extension of the town took place in the year 1885 A.D. The Pune-Bangalore railway link was already established in 1878 A.D. and subsequently Vijayawada and Guntakal railway links were established in 1888 A.D. The establishment of the Mahadeva Spinning and weaving Mill in 1881 A.D. attracted the people from rural areas as labour in the mill.

This was the first big private enterprise of the area. A railway workshop also came into being in 1883, which marked the beginning of the industrial area. The growth of the city was rapid and further extension took place in 1940. The area had expanded to cover 9.68 Sq.kms. The extension this time was along the Hubli-Dharwad road. The population had increased to about 95,000 as against 83,894 in the year 1931. The total number of houses were about 11,228.
In 1940, rapid expansion of the city took place, due to the establishment of industries and educational institutions. The extension was towards north and north-east. The total area was 14.40 sq.kms. It included the villages Ayodhya, Bommapura, Bidnal, Keshvapur, Kirshnapur, M.Aralikatti, M.M.Timmasagar, Nagarshettikoppa and Virapura of Yellapur. Again in 1949, 2.00 Sq.Kms, was added and the boundary was extended towards south-west, which includes, Siddharudhmath area. With this the total area covered rose to 16.40 Sq.kms and the population went upto more than one lakh. By 1956, in all, thirty factories, excluding minor ones, were registered. Due to this rapid development of industries and educational institutions, the area was extended towards North West along the Hubli-Dharwad road in 1960.

The Mysore Kirloskar Ltd. and K.S.R.T.C. workshop were established on the western side of Hubli-Dharwad road. The total area extended to 24.14 sq.kms and the population had gone up to more than 1.5 lakhs. The total number of houses was 30,246. Due to this rapid development, further extension was beyond the limits of municipality. At Dharwad also extension was irregular and city plans were not observed by the public.
Dharwad City:

Dharwad was selected as district headquarters since the British took over the place and it became famous for educational and cultural activities of the north Karnataka region.

In 1820 the offices of the District Magistrate and Collector were constructed and subsequently all the District Head Offices were started one by one. The population at that time was about 10,000. In 1856 the Municipality was established which an area of about 5.12 Sq. kms. Actually the survey work was commenced by the survey department in 1871 and it was completed only in 1882.

The number of houses were 5,484. Many revenue villages like, Madihal, Haveripeth, Gulgajikoppa, Narayanapur, Saidapur, Saptapur, Hosayellapur, Tejaswinagar and Someshwar were added to Dharwad and actually the first map of Dharwad was prepared in 1882. By 1885 A.D. the town area was extended to 7.68 sq. kms. and the population had increased to 28,296 and the number of houses had increased to 7,468. But still there was a lot of open space in the municipal limits. With the further growth of town its area was extended into the surrounding villages and also along Hubli-Dharwad road. In 1916 the total of Dharwad Municipality area covered was 12.16 sq. kms. and the population was 30,289.
In 1960 the expansion was towards south-west, which includes the Karnataka University Campus and Attikolla. Total area was about 16.64 sq. kms. and the population was about 76,000 and there were about 13,200 houses as against 10,174 in 1951. By 1962 various types of educational institutions and small scale industries were established. For the proper and planned development of both Hubli-Dharwad cities, they were merged into one municipal corporation on 2nd March 1962. Subsequently the following villages were partly merged into H.D.M.C. area. (Fig. No.2)

The total area of Hubli-Darwad in 1962 was 179.2 Sq. Kms. with a population of 248,489.

The proper growth of Hubli and Dharwad municipal corporation area is taken care of by the Urban Development Authority which was constituted in 1966.

It is observed that there is a little increase in the total area in 1971 i.e. by 3.5 sq. km. bringing the total area to 182.30 sq. kms. The population which was 2,48,489 in the year 1961 had increased to 3,79,166 in the year 1971. It is further noticed that the total area of H.D.M.C. was increased to 190.04 sq.kms. in the year 1981 and the population had increased to 5,27,108. In the year 1991 the total area of Hubli-Dharwad cities had increased to
The total area of Hubli-Dharwad city at different times have been occupied by various urban activities. During the course of time between 1961 and 2001, various morphological units came into existence giving rise to diversified urban activities accommodating the continuously increasing population. The development of various morphological units in the twin cities is as follows. (Fig No IV4)

The following are the main morphological units found in Hubli-Dharwad city:

1) Residential layout
2) Commercial centres
3) Industrial areas
4) Transportation networks
5) Areas of public and semi-public functions
6) Parks and open space

The above listed morphological units have been developing in various directions according to the needs of functions to serve...
MORPHOLOGICAL DEVELOPMENT OF HUBLI - DHARWAD MUNICIPAL CORPORATION
(1961 TO 2001)

Fig.: P-4

SCALE

1991-2001

□ I I

□ I I 1981-1991

1963-1970

1971-1981

1961-1962

INDEX
the urban population. The directional development of various morphological units is as follows:

i) Development units in north ward direction

During a span of four decades i.e. from 1961 to 2001 the main streets and other morphological units that have been developed in northward direction are given below.

**Hubli:**

a) Cotton Market at Hosur - Commercial activities units
b) N.B.D. Colony - Residential
c) Shanti Colony - Residential
d) Raj Nagar - Residential
e) Amargol along the northern limits of Railway track - Commercial
f) Unkal on NH4 - On the Sholapur road Nagashettikop - Commercial units
g) K.H.R. Colony - Residential units.

**Morphological units that have been developed in North-eastern direction.**

a) Vivekanand Nagar - Residential Units
b) Keshwapur - Commercial Unit
c) Byahatti Road - Commercial Unit
d) Hosayallapur - Commercial Unit
e) M.Aralikatti cross Mantur road - Commercial Unit
f) Shanti colony - Residential Units

g) Venkatesh colony - Residential Units

**Development Units in east direction**

a) Vijayanagar - Residential units
b) Devangpeth - Commercial units
c) Oddar Oni - Residential units
d) Bidnal extension - Commercial units
e) Myageri Colony - Residential and Commercial Units.

**Development of units in South-east direction**

a) Karemma Temple - Commercial units
b) Rayapur township - Industrial units
c) Gokul area - Industrial units
d) Bhairidevarakop - Residential and Commercial Units

e) Christain Colony - Residential units
f) Tarihal - Industrial units

**Development of units in South direction of Hubli**

a) Chanandranath Nagar - Residential units
b) State Bank colony - Residential units
c) Nehru Nagar - Commercial units
d) Karwar road extensions - Commercial units
e) Ayodhya road on NH4 - Commercial units
Development of city with Morphological units in south-west direction:

a) Siddharudhmath - Commercial units
b) Vidhut nagar - Residential units
c) Ayurvedic College - Public units
d) Sundatta Factory - Industrial units
e) A.T.R. Colony - Residential units
f) Unkal crossing NH4 - Commercial, public, Semi-Public Park units.

Development of city and morphological units in Dharwad

Morphological units along west direction

a) Agricultural college - Public & Residential Units
b) Police headquarters - Commercial units
c) Malahar colony - Residential units
d) Adarsh nagar - Residential units
e) Deshpande nagar - Commercial units
f) Kusum nagar - Residential units
g) Shrinagar - Residential units
h) Hoysal nagar - Residential units

The Cities Developed North-East Direction with Morphological Units:

a) Laxminarayan Mill - Small industrial estate
b) Kampli Basveshwar Nagar - Residential unit
c) Raj Nagar - Residential unit
d) Mrutyunjayanagar - Commercial & Residential units.
e) Sadhankeri  - Public and commercial and Residential units.
f) Narayanapur  - Residential units.

**Extension in the direction to the South :**

a) Ambedkar Nagar  - Residential units
b) Attikola  - Commercial and Industrial and Residential units.
c) Gandhinagar  - Commercial
d) Jogeyallapur  - Residential

**Extensions in the direction to the South-West**

a) Navodaya nagar  - Residential
b) Gauvkar plot  - Residential
c) Nirmal nagar  - Residential
d) Karnataka University Guest House.  - Public & Semi – public

e) Shalmala Hostel  - Public & Semi – public

**Extension in the direction to the South-east.**

a) Sattur colony  - Industrial
b) Vivekanand Nagar  - Residential unit
c) Yalakkishettar colony  - Residential unit
d) A.P.M.C.  - Public
e) Cancer Hospital  - Public
Extension in the direction to the North

a) K.C.Park - Public
b) Saidapur - Residential
c) Koppa Naka - Commercial
d) Cattle market - Public

The above list shows various extensions of H.D.M.C. and this was by merging many villages. The details follow:

After Hubli-Dharwad cities were merged under into one single municipal corporation in the year 1962. Between 1963 - 1970 Malapur, Saidhapur, Gulagnjkopp, Satapur in Dharwad, Amargol, Bhairdevarkopp, Gokul, Unkal, Rayanal, Gopankop, Bhampur, Narayanpur in Hubli villages were merged into the corporation area. In the year 1971-1981. Lakamnahalli, Navalur, Rayapur township, Kelageri in Dharwad and Sutagatti, Gamanagatti in Hubli were merged into Hubli-Dharwad municipal corporation area. In the year of 1991-2001 Yerikopp, Itigati, Jogeyellapur, Nuggikeri in Dharwad, Tarihal in Hubli merged municipal corporation area. With the inclusion of these villages, the total area of the corporation extended to 190.04 sq. kms. in 1991 and 202.28 sq. kms. in 2001.
Though these villages have been brought under corporation limit, they are still have rural characteristics. However the impact of urbanization and the resultant transformation from rural to urban has been taking place in all these villages.

During 1961 to 2001 i.e. four decades, the following villages have been merged to form the present Hubli-Dharwad city. These villages and their respective year of merger into Hubli-Dharwad Municipal Corporation are given below. (Table No: IV.I and Fig. No. IV. 4).

**LAND USE IN DIFFERENT MORPHOLOGICAL UNITS.**

Land-use analysis of urban centres is closely associated with their morphological analysis. The details of the land-use in various morphological units in three different divisions of Hubli and Dharwad cities (Table : IV.II, IV.III, IV.IV and Fig. No IV. 5). Gives the idea of Hubli – Dharwad Municipal Corporation land use pattern 2001.

i) **Residential Area:**

The total residential area of Dharwad City is 12.41 sq.kms which accounts for 42.95 per cent of the total city developed area and in Hubli total residential area is 19.76 sq.kms. accounting for
<table>
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<tr>
<th>Sl No</th>
<th>Name of Villages in Hubli</th>
<th>Area in Sq.Km</th>
<th>Sl No</th>
<th>Name of Villages in Dharwad</th>
<th>Area in Sq.Km</th>
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<td>1</td>
<td>Keshwapur</td>
<td>4.39</td>
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<td>Doddanayakan Koppa</td>
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<td>Bidnal</td>
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<td>26</td>
<td>Attikolla</td>
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<td>3</td>
<td>Nagashettikoppa</td>
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<td>27</td>
<td>Shahar Saptapur</td>
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<td>4</td>
<td>Mariyane Timmasagar</td>
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<td>Shahar Dharwad</td>
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<td>5</td>
<td>Agrakar Timmasagar</td>
<td>1.93</td>
<td>29</td>
<td>Shahar Saidapur</td>
<td>1.84</td>
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<td>6</td>
<td>Madanaikan Aralikatti</td>
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<td>30</td>
<td>Yettinagudda</td>
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<td>7</td>
<td>Krishnapur</td>
<td>4.52</td>
<td>31</td>
<td>Malapur</td>
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<td>8</td>
<td>Yeppuru</td>
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<td>9</td>
<td>Ayodhya Ahobalapur</td>
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<td>Kamalapur</td>
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<td>34</td>
<td>Naraynapur</td>
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<td>Tarihal</td>
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### Table NoIV Land use of Dharwad (1964)

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<th>Total Area in Sq.Km</th>
<th>Percentage of the Total Area</th>
<th>Percentage of the Developed Area</th>
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Source: Hubli-Dharwad urban development authority (1964).

### Table NoV Land use of Hubli (1964)

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Source: Hubli-Dharwad urban development authority (1964).
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<thead>
<tr>
<th>Land use</th>
<th>Dharwad</th>
<th>Hubli</th>
<th>Rayapur</th>
<th>Total</th>
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<tr>
<td></td>
<td>Area in Sq. Km</td>
<td>Percentage</td>
<td>Area in Sq. Km</td>
<td>Percentage</td>
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<tr>
<td>Residential</td>
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<td>42.92</td>
<td>19.76</td>
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<td>Commercial</td>
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<td>3.76</td>
<td>1.88</td>
<td>3.98</td>
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<td>Public and Semi - Public</td>
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<td>6.44</td>
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<td>Parks and Open spaces</td>
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<td>5.14</td>
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<td>Transportation</td>
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<td>Karnataka University &amp;</td>
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<td>Agricultural University</td>
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<td>Regional Park</td>
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<tr>
<td>Agriculture</td>
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<td>0.08</td>
<td>4.36</td>
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<td>Aerodrome</td>
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<td>1.78</td>
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<td>Total</td>
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<td>Grand Total</td>
<td>40.67</td>
<td>49.19</td>
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Source: Hubli - Dharwad Urban Development Authority - 2001
41.75 per cent of the developed area, during 1991-2001. In Rayapur township 1.76 sq.kms. of area is under residential use. Hubli-Dharwad and Rayapur together have 33.93 sq.kms. of land under residential use.

In the year 1964 the total area under residential use was 9.01 sq. km. Out of this total residential area Dharwad has 3.54 sq.kms. and Hubli has 5.46 sq.kms. The total number of houses in the twin cities was 53,483. The morphological observation of houses, reveals the number of double storey buildings and multi-storey buildings of modern architecture. However, there are old type buildings also constructed with mud, bricks and roofs of bamboos, dry grass and tiles. The different types of houses also indicate the economic conditions of people. The high income group of people possess multi-storied buildings and medium income group people possess single houses and double storey buildings and low income group of people have buildings of old type.

Generally in the extension areas which are developed by the Urban Development Authority, the built up areas have been systematically planned. The arrangement of streets and houses and all civic amenities are being taken care of by the Urban Development Authority. In old residential areas the houses are
constructed unsystematically in a congested manner and there is generally no open space in such areas. Streets in these old residential areas are very narrow and people generally face the problem of free movement. There is lack of public toilets and sewerage facilities in congested areas. These characteristics are however absent in the newly built-up areas. The main areas of residential use have been spread in different parts of Hubli-Dharwad cities (See. Map.No: IV-5)

The number of houses in the year 1971 increased to 62,055 along with an increased population of 3,79,166. and the number of houses increased to 84,378 in 1981 with a total population of 5,27,108. In 1991 and 2001 the number of houses have increased to 1,00,885 and 2,09,805 respectively. The population during 1991 and 2001 increased to 6,48,298 and 7,86,018 respectively. There is a rapid increase in the total number of houses while the population increase was more or less constant. This has resulted in reduction of accommodation population per houses.

In Hubli around the large scale industries such as Kirloskar industries B.D.K. industry, Akay industry, Railway workshops etc. a number of residential colonies have been developed to accommodate factory labour.
ii) **Commercial area:**

The commercial areas of market centres have spread in various sizes in both the cities. Generally in the central parts of both the cities old established areas of commercial or market centres have been developed in order to cater to the need of the people. There are also a number of shops with auxiliary goods in the industrial areas.

In Dharwad city 1.08 sq.cms. of area is under commercial activities and accounts 3.76 per cent to the total city's developed area and in Hubli 1.88 sq.kms. area is under commercial activities which represent 3.98 per cent of its total developed area. The Rayapur township has 1.09 sq.km. of land under commercial activities representing 5.64 per cent of its total developed area. Thus the three divisions together represent 4.06 sq. kms. of commercial areas. The percentage of commercial area is 4.52 out of the total developed area.

The whole-sale business is concentrated on Saundatti road in between Bharat High School and School and at cotton market, and central part of Dharwad city. The retail business and wholesale business are carried on side by side around Moti tank and no definite demarcation can be made. The existing central business of the district extends from corporation offices to K.C.C.
Bank from east to west and cotton market to Line Bazar from north to south. Shopping areas have come up along the Azad park road, station road, nearby Hanuman temple, Line bazar, Yammikeri tank and Belgaum road in fact, all along the main roads.

In Hubli, the wholesale business activities of cotton, oil seeds, cereals etc., are concentrated in cotton market area near Deshpande Nagar and the whole sale business in cloth, arecanut, grocery business is found in different areas like Javali Bazar, Belgaum galli and Hirepeth.

The retail commercial activity is heavily concentrated in Durgad bail area which happens to be the centre of the city. The frontage of the roads radiating from the centre of Durgad Bail exhibit a large varieties of retail shops dealing in almost all types of consumer as well as industrial goods.

Many new shopping areas have recently come up along busy streets and thorough fares, Mentioned may be made of station road, Dajibanpeth, along Pune-Bangalore road, swimming complex, Hosur area etc..

In Raypaur township though there is 1.09 sq.kms. of commercial area., the activities concerned to business and marketing have not been developed an a large scale. However there are some minor commercial activities in this township.
The State Government has built Agricultural Produce Market Corporation Yard for the benefit of the farmers for wholesale trading.

The total commercial area of Dharwad city in the year 1964 was only 0.24 sq. km. and in Hubli it was 0.50 sq. km. adding up to a total of 0.75 sq. km. With the development of Hubli-Dharwad cities since 1962 the total commercial area increased to 4.06 sq.kms. This represents more than five fold increase in the area under commercial activities during 4 decades. The morphological observations reveal the fact that there is a lack of space and proper buildings to perform whole sale and retail business in both the cities. Though there are 3,050 stalls and 225 commercial buildings, the market areas have been developed irregularly and in a haphazard manner. There is no separate or particular place to perform a single business. No part of the city has been left untouched by the people engaged in vegetable business. However in the cities peripheral areas there are godowns or ware houses where cereals and other are stored. Such store houses are necessary in the central business district are not available. The roads in the market areas are very narrow and it is very difficult for the movement of heavy vehicles through such roads. The business men face great difficulty in loading and unloading of their goods due to narrow roads. In the vegetable markets very unhygienic conditions prevail in both Hubli- Dharwad cities particularly during the rainy season.
iii) **Industrial area:**

Industrial activities are the integral part of urban centres. It is because of the development of industrial activities that the urban centres grow and develop. Whether an urban centre is smaller or bigger, the industrial activities are common features in almost all classes of urban centres.

In the year 1964 the total area under industrial use was only 0.06 sq.km. in Dharwad city, while it was 1.24 sq.kms. in Hubli city. The Hubli city has been developed as a commercial and industrial centre whereas the adjacent city, Dharwad has developed as an educational and cultural centre.

The total area under industrial activities in the year 1964 for Hubli-Dharwad cities (see Table NoV. 23) was 1.49 sq.kms. When the figures pertaining to 2001 are observed (See Table NoV. 24) the total area under industrial units in Hubli-Dharwad cities was 7.98 sq.kms. This represents 8.89 per cent of the total developed area in Hubli-Dharwad cities out of the total industrial area of 7.98 sq.kms. (Dharwad has 1.36 sq.km, Hubli has 4.64 sq.kms. and the Rayapur township 1.97 sq.kms) This total industrial area represents a number of industrial units, from small scale to medium and large scale units in the twin cities.
Hubli city has engineering industries, manufacturing of spare parts and fixtures, stainless steels and pumps, machine tools, manufacture of diesel engine, sewing machines, electrical wires, soda water machines, ginning and pressing, food products, wood working units printing units, steel furniture and domestic utensils. These are scattered all over the city. These manufacturing units are located near important roads and junctions and commercial uses are mixed up with the industrial uses.

A cluster of industries are found near the traffic island and along the four main principal streets viz., station road, Koppikar road, Neeligin road and Dajiban road, Gokul and Tarihal. Most of the ginning factories are located to the east of the Pune-Bangalore National Highway No. 4. In Amargol area, parts of Sutagatti area and Gamanagatti area some factories are located, immediately adjacent to the commercial areas in Hubli. Some are located along NH4 towards Dharwad and also along the peripheral areas of Hubli city. The industrial units are established along the National Highway No.4 between Hubli-Dharwad and also in the peripheral areas in Hubli City.
Dharwad has small and medium scale industries such as cotton pressing and ginning factories, rice mills, flour mills plywood factory, groundnut oil mills, Timber saw mills, metal works, milk products. Star Volkman located near railway station road and cotton market road, Sattur industrial area Lakamanahalli industrial area on the west of NH4. They have good and suitable buildings and sufficient space for these activities. The factories that are located in the vicinity of commercial areas suffer due to lack of space and convenient buildings. There is no proper drainage for the discharge of industrial effluents in such areas.

Dharwad city has only small and medium scale industries which are spread over various parts of the city and are established with moderately convenient buildings. Since these factories are small and industries small scale discharge of industrial waste is not in a large scale.

Rayapur township located in between Hubli and Dharwad on NH4 and there are 8,434 industrial units.

Hubli-Dharwad cities have been chosen to locate growth centre in the North-west Karnataka. But the development under this is near Belur village outside the corporation limit.
Transport:

Transport system within the city plays a vital role in all urban activities. Without good transportation within the city, no urban centre can function properly and hence it cannot be developed.

In the year 1964 in Dharwad about 1.11 sq.kms. area was covered by transport network and in Hubli about 1.74 sq.km. area was under the transport within the city. By the year 2001, the area under transportation in Dharwad city increased to 7.78 sq.kms. which accounts for about 26.93 per cent of area developed in Dharwad city. In Hubli (2001) 12.48 sq.kms. area was under transportation representing 26.38 per cent of the total developed area of Hubli city. In Rayapur township the area under road transport is 4.5 sq.kms in 2001. The total area under the transportation network in Hubli-Dharwad city is thus 24.78 sq.kms. which represent 27.59 per cent of the total developed area of the twin cities.

In Hubli city, major junctions are situated on major trade routes. The island near the bus stand forms the nucleus of the external communication system by road as the three state highways viz., Karwar Bellary road, Sholapur-Hubli Road and the Pune Bangalore National Highway converge at this point. The
railway station which is about 500 meters to the east of traffic island is connected by the principal interior road of the city known as the Lamington road.

Lamington road is the only road which is fairly in good condition. The other mainstreets are Koppikar road, Dajibanpet and station road.

The state highways and national highways are sufficiently wide and well maintained, and there are no traffic problems on major roads. The congested road is only in the central business area that too from Bus stand to K.C.C. Bank.

The south western railway has a major workshop and a divisional office with residential quarters. In Dharwad city the roads connecting C.B.T. and residential areas are mostly P.W.D. roads.

Railways – Most of this areas is covered by the railway station and yard, residential quarters and a training school for railway employees.

Public and Semi Public Areas:

Government offices and non-governmental offices, other social institutions clubs and theaters, specialized and general educational institutions are common features in all urban
centres. Such Public and semi-Public institutions occupy a large portion of urban land use and are found in all the morphological units.

In Dharwad city in the year 1964 the total area under public and semi-public activities was 8.60 sq.kms. while in Hubli city it was only 1.38 sq. kms.

But in the year 2001 such public, semi-public areas, in Dharwad decreased to 1.86 sq.kms. excluding the area under Karnataka University and University of Agricultural Sciences. These two universities together occupy 10.71 sq.kms. area and thus the total area accounts for 12.57 sq.kms.

In Hubli city it increased to 3.40 sq.kms. The decrease in area in Dharwad city is due to shifting of public and semi-public institutions to Hubli city and also to other areas. But in reality this area has increased to 12.57 sq. kms. The total area under public and semi-public activities in both Hubli-Dharwad cities is 17.02 sq.kms. in 2001, representing 7.81 per cent of the total developed area of the twin cities.

In Hubli public and semi-public areas are found all over the city. However in the central area the location of buildings like corporation offices, town hall, library, hospital, school and other public offices have resulted in the concentration of areas meant for public and semi-public uses. But the major portion of the area
is occupied by institutions such as Karnatak Medical Colleges, B.V.B. Engineering college, Arts, Science and commerce colleges and government polytechnic and other institution on the northern fringes of the city while in Dharwad the area is covered by the Deputy Commissioner's offices, Karnataka University, University of Agricultural sciences, Karntak College, J.S.S. College campus and many other educational institutions. They are many other district offices located in Dharwad.

**Parks and Open Spaces:**

Parks and open spaces are essential features of urban centres and the development of parks and open spaces generally play an important role in maintaining the urban ecology.

In Dharwad parks and open spaces had occupied 1.83 sq.km. of area in 1964, while in Hubli city they had occupied only 0.38 sq.kms. area, but in the year 2001 the area under parks and open spaces increased to 4.88 sq.kms. in Dharwad city and in Hubli it increased to an area of 5.14 sq.kms. The Rayapur township represents 2.50 sq.kms. of area under parks and open spaces. Thus the total area under parks and open spaces in Hubli-Dharwad city is 12.04 sq.kms. accounting for 13.40 per cent of the total developed area of the cities. Apart from the above mentioned area there is a regional park covering an area of 1.06 sq.kms. in Dharwad. In Hubli city there are small parks within
city which cover an area of 0.08 sq.km. The aerodrome in Hubli city covers an area of 1.78 sq.kms. which remains almost as an open space due to its non-functioning.

In Hubli city the open space includes large areas of silted up tanks, beds, Akkihonda behind Hirepeth, Gulkavankeri neat town hall and Tirakarmkeri on Dharwad Road. Of these the Gulakavankaeri open space is being used as playground for the Lamington High School which is run by the corporation. The Tirakaram tank has been developed as a commercial-cum-recreational complex with a small park. There is also a small park in front of the corporation offices. The railway authorities have also maintained one children’s park in Vinobhanagar in Hubli. There is also one park each in Ashok Na^r and Indira nagar. Most of the schools have neither sufficient open spaces nor have sufficient play-ground on their own. The Nehru Stadium, the railway play ground, K.M.C. Sports ground and the ground developed by youth centres on Ashoknagar road are some of the play grounds in Hubli city worth mentioning.

In Dharwad city the open spaces include orchards playgrounds, dried tank beds etc. There are many playgrounds which are attached to high schools and colleges. The playground
attached to police headquarters, Karnataka College, Karnataka University and R.N.Shetti stadium, Jubilee circle are important.

The major parks at Dharwad are Kittur Chennamma park, Azad park, Horticultural park near Deputy Commissioner's Office, and Botanical garden-University park in the University Campus. In the newly developed colonies small areas are left as park-cum-playground for children.
Conclusion:

Morphological development of Hubli – Dharwad Municipal Corporation is along the national highway. Land use pattern of each city is unique, though most of the cities contain residential, Commercial and industrial areas. The arrangement of these land uses in most cities can be understood by studying the concentric zone theory, the sector theory and the multiple nuclei concept. But these theories are not applicable to Hubli-Dharwad twin cities.