Urban Land Use and its Dynamics

Land is surprisingly difficult to define. The Random House Dictionary of the English Language (1996) defines it as “any part of the surface which can be owned as property, and everything annexed to it whether by nature or by hand of man.” Land use has a connotation that depends upon the objectives of the life of the people living therein. It represents the interaction of the physical and the economic factors (Stamp, 1964). Land is used for cultivation, pastoral activities, afforestation and construction of buildings, roads, railways, etc. therefore land use is the result of practices, processes, techniques, customs and traditions adopted and acquired by the people after inhabiting a part of the earth for developing its natural resources.

Urban system consists mainly of physical elements, such as buildings and structured open spaces with the objective to use these for socio-economic activities. Land use is, therefore, the key element of urban structure and the changing of land use and the extension of “urban” based land use forms are indicators of the urban growth. The land use activities impact the environment directly and change it, improving the living conditions or worsening them. Often new environmental risks emerge and an unhealthy urban environment affects large parts of the urban population.

The natural risks of unregulated urban growth often become life threatening in ecologically fragile and densely populated high mountain areas like the Lesser Himalaya. In view of this rapidly changing urban land use pattern under the increasing pressure of population and consequent ecological imbalances, thus the best and proper use of land has become a necessity. In order to do so, interpretation of land use pattern through proper land use survey, analysis mapping and monitoring of land use dynamics has become important.
4.1 Concept of Urban Land Use

The concept of land utilization is basically related to man’s physical environment superimposed by cultural landscape. The pertinent notion of the interactions of these two environments, physical and cultural, in patterning the uses of land has changed the economic structure of the region. Urban land use structure may be interpreted from two viewpoints, (i) Geo-ecological theories and (ii) Economic theories, which are discussed hereunder:

4.1.1 Geo-Ecological Theories

Environmental qualities are also to be considered for land use arrangement. The classical models for land use studies of an urban area had been formulated based on the following views:

4.1.1.1 Concentric Zone Model of E.W. Burgess

![Concentric Zone Model of E.W. Burgess](image)

**Fig. 4.1** Different Zones as described in the Concentric Zone Theory of Burgess (1929)

This theory put forth by Burgess in 1925 related population mobility and societal organization to the physical expansion of the city
(Burgess, 1929). According to him land-value decreased with increasing distance from the city or town’s core irrespective of time and space. This concept proposed a sequence of land uses: The CBD (Central Business District), Transition zone of mixed land use, Working class residential area, Better housing zone, the Fringe zone of High income residences and satellite communities (Fig. 4.1).

4.1.1.2 **Sector Model of Homer Hoyt (1939)**

![Sector Model Diagram](image)

**Legend**

1 - Central Business District (CBD)
2 - Wholesale, light manufacturing
3 - Low-class residential
4 - Medium-class residential
5 - High-class residential

**Fig. 4.2** Hoyt’s Sector Model of Urban Landuse (Source: Michael Pacione, 2001)
Discrepancies between the concentric model and the reality of the urban land use patterns have encouraged the formulation of other theories of urban structure. Notable among these is the Sector Theory proposed by H. Hoyt and M.R. Davie in 1939 (Fig. 4.2). This concept is conditioned by the disposition of routes radiating outward from the city centre. The differences in accessibility among the radial sectors cause much sectoral variations in the land-value and corresponding sectoral arrangement of land use. In this sequence the two middle residential zones of Burgess’s model were absent.

4.1.1.3 Multiple Nuclei Model of Harris and Ullman (1945)

![Multiple Nuclei Theory](source)

**Fig. 4.3** Multiple Nuclei Theory of Harris and Ullman (Source: Michael Pacione, 2001)
The assumption here was that urban land use pattern is not around a single centre (CBD) but is formed by the progressive integration of a number of separate nuclei into the urban fabric (Fig, 4.3). They demarcated five definite zones within an urban area; these five zones are the CBD, light manufacturing zone, heavy industrial district, different residential areas, and the peripheral dormitory suburbs.

4.1.1.4 Hybrid Models

Hybrid models have tried to include the concentric, sector and nuclei behaviour of different processes in explaining urban land use. They are an attempt to integrate the strengths of each approach since none of them appear to provide a completely satisfactory explanation. Thus, hybrid models, such as that developed by Izard (1955), consider the concentric effect of nodes (CBDs and sub-centres) and the radial effect of transport axis, all overlain to form a land use pattern.

4.1.1.5 Peter Mann’s Model

![Mann’s Model](image)

**Fig. 4.4** Mann’s Model of a typical medium-sized British City
(Source: P. Mann, 1965)
Peter Mann took Hoyt’s and Burgess’ models and combined them in his model of a typical British City in 1965. He based his model on studies of Sheffield, Nottingham and Huddersfield. His model illustrates the structure of a hypothetical British city. The model also incorporated a climatic consideration relevant to the UK by assuming a prevailing wind from the west. The features of this model are (Fig. 4.4):

i. The best residential area (A) is located on the western fringe of the city, upwind and on the opposite side of town from the industrial sector (D).

ii. The areas of the working class and the main council estates are located close to the industrial zone.

iii. The lower middle class housing (B) borders on each side of the best residential area.

4.1.1.6 Vance’s Urban Realms Model

Fig. 4.5 Urban Realm Model of Vance (Source: J. Vance, 1964)
By extending the principles of the multiple-nuclei model, Vance (1964) proposed the Urban Realms Model. The key element is the emergence of large self-sufficient urban areas, with each focusing on a downtown and central city. The extent, character and internal structure of each ‘urban realms’ is shaped by five criteria:

i. Terrain - especially topographical and water barriers;
ii. Overall size of the metropolis;
iii. Amount of economic activity within each realm;
iv. The internal accessibility of each realm in relation to its dominant economic core; and
v. Inter-accessibility among suburban realms.

Particularly important here are circumferential links and direct airport connections that no longer require them to interact with the central realm in order to reach other outlying realms and distant metropolises (Fig. 4.5). Though conceived on the basis of work on the San Francisco Bay area, the model has subsequently been applied to describe the general land use structure of other U.S. cities.

4.1.1.7 Kearsley’s Modified Burgess Model

Kearsley’s model was an attempt to extend Mann’s model of urban structure by taking into account contemporary dimensions of urbanization such as the level of governmental involvement in urban development in Britain, slum clearance, suburbanization, decentralization of economic activities, gentrification and gentrification and ghettosiation (Kearsley, 1983). Manipulation of the model’s various elements, such as the extension of inner-city blight, minimization of local and central government housing and expansion of recent low density suburbs offers a North American variant of the basic model (Fig. 4.6).
4.1.2 Economic Theories

Market economy acts to change the society as well as the pattern of land use through the functions of demand and supply of goods and services. On the basis of this dynamic operation all land-values vary from town to town or from city to city. Three conclusions can be drawn from that above concept:
i. Land value is highest in and around the centre of dynamic market operations and decreases outward.

ii. Major arteries of transport and communication supporting market operation have high land-values.

iii. Traffic intersections which are the points for collection and redistribution of goods have high land-values.

Hurd (1909) summarized his concept on land-value surface as “Land-value depends on nearness and industrial and collective taste.” Ratcliff (1935) on the other hand stated that “Land-value depends on the efficiencies of various uses, which is determined by the rent paying ability”. On the basis of these concepts land use models have been proposed and examined later on.

4.1.2.1 Bid-Rent Theory

![Bid-Rent Theory Diagram](Source: Singh, O.P., 2009)

**Fig. 4.7** Bid-Rent Theory (Source: Singh, O.P., 2009)
The mainspring of the concentric zone model of urban land use is the expansion of the inner zone outwards. This movement is triggered by excessive demand for central city land. The neo-classical economics “Trade-off” model employs the concept of bid-rent curves to explain the demand for land, and therefore, land use patterns vary across the urban area (Michael, 2001). The Bid-Rent Theory suggests different functions will bid differently for land in various parts of a city. It suggests the more accessible the site of land, the higher is its value. Proximity to secondary shopping centre, local site characteristics, Government policy and security are the factors influencing land values (Fig. 4.7).

Although the economic concepts have been considered, the basic requirements of an urban area are still not totally acceptable. Theoretically it was only Ratcliff who tried to give a complete shape to the theory.

None of the classical ecological models are applicable over the present study area. Because the environmental factors cannot change the personal tastes, the above economic factors should be considered. The major constraints identified in different aspects of fittings the municipalities of Lake Region in any of the discussed models and theories are:

i. Availability of data is a major problem in the region. No-complete land-value or rental data is available. Depending on inadequate information the determination of land value as well as land use zone is not possible.

ii. In small urban areas like the towns of Lake Region it is not possible to demarcate the CBD. The reason being that nothing is concentrated at a single place.

iii. The land uses of the area are not classified; they are often mixed in character neighbourhoods. Different types of land use spread all over the urban area. So, the land use distribution does not satisfy any of the three ecological models.
From the above discussion it can be concluded that none of the models regarding urban land use is universally accepted. They were made on the basis of a case study of a particular city considering the individual city’s problems only. But the problems of these ecological models did not formulate concepts for small urban areas.

## 4.2 Current Urban Land Pattern

Land use signifies the classification of land according to the utilization made of it. Land use studies were commonly carried out for rural areas, but of late, have also been conducted for urban areas. In India a nine-fold classification system of land utilization has been in vogue. Probably this classification has the roots linked to the ancient revenue classification of land use developed by Sher Shah Suri and Raja Todarmal around 1550 A.D. Nine-fold classification system of land utilization is being followed by Ministry of Agriculture and the figures are published every year. This classification is not suitable for urban areas because of all the nine classes, only one class – the land put to non-agriculture use – encompasses the whole of the urban area. As per the definition, land put to non-agriculture use includes the built-up areas like roads, railways, settlements etc. and water bodies like tanks reservoirs, canals etc. A simple and scientific urban land use classification is essential for any development planning.

Prof. L.D. Stamp (1931) has given the first elaborate classification of land use (in First Land Utilization Survey) which was primarily applied for studies on Great Britain. This classification still forms the base of many other land use classifications. Anderson et al. (1976) has proposed another classification of land use which has been accepted more or less by all.

The land use interpretation and classification in the present work is based on Lake Development Authority’s general land use classification. It includes everything which is present over the surface of the land and occupies space. Detailed land use survey and mapping were also carried out using field mapping technique on town maps of
the region and land use dynamics have also been monitored during

The land use patterns that emerged in these towns on the basis of
the analysis and interpretation of data collected from Lake
Development Authority and field survey are as follows:

4.2.1 Land Use of Nainital Town

Proximity to the plains, good and healthy climate, and beauty of
the lake led to the selection of Nainital as a recreation and health
resort by the British. As a result, the town witnessed a phenomenal
growth in settlement along with rise in many new urban functions,
services and facilities. These developments attracted people to
Nainital, who contributed in the rapid increase of population of the
area, as Nainital became increasingly urbanized. Therefore, the
pattern of land use too changed gradually with the increasing
population pressure.

Table 4.1  Land use of Nainital town during 2007

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area (ha)</th>
<th>Percent of total town area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Area</td>
<td>278.73</td>
<td>23.76</td>
</tr>
<tr>
<td>Commercial Area</td>
<td>23.54</td>
<td>2.01</td>
</tr>
<tr>
<td>Administrative Area</td>
<td>34.00</td>
<td>2.90</td>
</tr>
<tr>
<td>Community Services</td>
<td>124.00</td>
<td>10.57</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>76.68</td>
</tr>
<tr>
<td></td>
<td>Medical Area</td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>Transportation</td>
<td>15.62</td>
</tr>
<tr>
<td></td>
<td>Religious Area</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>Graveyards</td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>Utility Services</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Other Community Services</td>
<td>3.27</td>
</tr>
<tr>
<td></td>
<td>Recreational Area</td>
<td>6.69</td>
</tr>
<tr>
<td>Rural Area</td>
<td>19.52</td>
<td>1.66</td>
</tr>
<tr>
<td>Forest Area</td>
<td>508.76</td>
<td>43.38</td>
</tr>
<tr>
<td>Water Bodies</td>
<td>68.90</td>
<td>5.87</td>
</tr>
<tr>
<td>Open Undeveloped Area</td>
<td>115.55</td>
<td>9.85</td>
</tr>
<tr>
<td>Total</td>
<td>1173.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The total Municipal area that was 5 km² in 1981 increased to
11.23 km² by the census year 2001. The total number of wards in the
municipality is 13 at present. The spatial distribution of different land use is identified and demarcated in the Table 4.1 and Fig 4.8.

Fig. 4.8

NAINITAL TOWN
LAND USE PATTERN - 2007

Legend
- Residential area
- Commercial area
- Administrative area
- Cultural / Community area
- Educational area
- Recreational area
- Agricultural area
- Horticultural area
- Forest area
- Restricted area
- Water bodies
4.2.1.1 Residential Area

A large residential population, a common characteristic of all urban areas, also exists in case of Nainital. This land use cover was about 278.73 hectares or 23.76 % of the total geographical area. The development of residential area is not proportional around the lake. It shows a bi-nodal character with two separate clusters developing along the southern (lower) and the north-western (upper) end of the lake (Fig. 4.8). Both of these may be regarded as central areas with respect to the area these serve, i.e. Tallital and adjoining area and Mallital and its adjoining area - separated by the expanse of the lake which is about a kilometre in length. Besides this, settlements tend to be distributed all along the slopes, the distribution being determined by a variety of factors.

The distribution of settlements in the town shows a tendency of dispersal with increasing elevations from the lake. But there are other several factors that tend to qualify this effect such as the ease to approach by motorable roads, connecting link roads, availability of suitable and approved land for constructions purpose, Government buildings, proximity to important urban services, land developed through huge investments and geological or topographic constraints or restrictions due to protected forest area, etc.

4.2.1.2 Commercial Area

Commercial land use includes different types of shops, market areas and handicraft industries. The areal extent of this as estimated is about 23.54 hectares or 2.01 % of total geographical area. The town has developed commercial activities for its own population and also to take advantage of a large number of tourists visiting the town almost throughout the year. Thus, in order to meet wide ranging needs of the tourists, Nainital has developed commercial activities to a good extent. There are four main commercial areas in the town located at different parts and deal with products of different kinds.
Tallital market has developed near the bus station. It is a small market, generally with shops that have existed since the early times of the settlement having little scope for further expansion. Mallital market is situated at the upper end of the lake and is the main market of the town. Tibetan market was developed for Tibetan refugees after the Chinese war of 1962 in the flats near Naina Devi temple. Mall Road is the main thoroughfare of the town with most of the good hotels, restaurants and showrooms lining its east side and the lake on the west.

Beside these, commercial areas are also located at Naya Bazaar on Haldwani road, Cantonment market on Bhowali road, a small market near Nainital Club and small cluster of daily-needs shops in most of the wards.

4.2.1.3 Administrative Area

Administration has been one of the oldest functions of the town. The total area under this type of land use is 34.0 hectares which is 2.90% of total geographical area.

At present almost all important offices are situated around a radius of 300 metres of the Collectorate at Tallital. The district office, supply office, treasury office of district and session judge, police line commissioner’s officer and office of public work department, irrigation, forest offices, L.D.A. department and P.W.D. department all are located around Collectorate.

The growth of the town and limited space and accommodation available near Collectorate has resulted into establishment of offices at number of places scattered throughout the town few offices are located along the Mall Road too. However, most of the government offices have been shifted to Vikas Bhawan at Bhimtal ever since the Uttarakhand High Court was set-up here. The High Court and forest offices are located in Mallital on the slopes of the Cheena Peak hill. Apart from these, there are a few other offices also such as Municipal...
office, G.M. Roadways, Employment office, etc. which are located in different parts of the town.

Nainital Club that exists as a Government owned guesthouse accommodation for officers, VIPs and other dignitaries is located in Mallital. The Governor's House is a spacious residence for the Head of the State located in Tallital. The residential complexes for various categories of Government officials exist in different parts of the town, especially close to the High Court and other offices, around the Collectorate and other offices, within the close to Nainital club complex, near Sukhatal and near the Administrative Academy.

4.2.1.4 Community Services

i. Education: The areal extent of this category is estimated to about 76.68 hectares which is 65.36% of total area under community services. This type of land use in the town is located in different parts. With the early growth of the town is also associated the establishment of a number of residential educational institutions, founded and established during the British Administration.

The town presently has as many as 5 junior high schools, 2 high schools, 10 intermediates colleges, over 37 schools of nursery and preparatory type and one polytechnic for providing technical education. A state level institution known as the Administrative Academy providing training to the probationers of Provincial Civil Services (P.C.S.) /I.A.S. and other allied services and a University with its Campus to cater to the needs of higher education.

ii. Medical Area: The medical land use of Nainital is about 8.0 hectares or 6.82% of the total area under community services.

These are 7 hospitals in the town. The B.D. Pandey Hospital located near Mallital Bazaar, G.B. Pant Hospital below Sher-Ka-Danda area at Tallital, Sitapur Eye Hospital near Mall road and Police Hospital at Tallital. Beside these other hospitals and private clinics are located in Mallital Bazaar and Tallital Bazaar.
iii. Transportation: Transportation land use includes roads, parking stands and bus and taxi stands. The Aerial extent of this category is about 15.62 hectares or 13.32% of total area under community services. There are only at Tallital, car parking is located near Sukhatal and some area of flats area. The main roads of Nainital are Nainital- Haldwani road, Nainital-Bhowali road and Nainital-Kaladhungi road. Beside these other local roads, connecting different parts of the town are Upper Mall, Lower Mall, Middle China, Upper China, Snow View, South Mall, Ramsay, Middle Ayarpata, Upper Ayarpata, China Lodge, Tanki road, Sukhatal road etc. many cart roads are also found throughout the town.

iv. Religious Area: This type of land use extent spread over about 5.0 hectares which is 4.26% of total area under community services.

The area around the lake is self-contained in as much as it has temples Naina Devi, Pashan Devi and Golu Devta, a Gurudwara, a Mosque, Arya Samaj Mandir, and Church. But these are scattered around the lake and other places throughout the town.

v. Graveyards: This type of land use covers 8.0 hectares or 6.82% of total area under community services. This area scattered in the extremities of the town.

vi. Utility Services: The total extent of this category is estimated to about 0.74 hectares or 0.63% of total area under community services. This includes water supply, electric supply and sewage and sewerage facilities.

vii. Other Community Services: Other community services like post-offices, telephone exchange, T.V. station, police station, and fire brigade offices occupied 3.27 hectares or 2.79% total area under community services. Police stations are located near Mallital and Tallital Bazaar, telephone exchange near High-Court, T.V. station is
located east of Naina Peak, Fire Station is near Pump House and Head Post Office and 5 other sub-post offices are located in different parts of the town.

viii. Recreational Area: This category is estimated to be about 6.69 hectares or 5.39 % of total area under community services. It includes play grounds and other areas, Golf Course, Parks, Zoo, etc.

The main centre of all recreation is the flats where all types of amusement and recreation is possible. Within a radius of 500 metres from the flats, there are two cinema halls, a band stand, the famous Boat House Club, a park, Zoomland and a children’s park are all located around the flats. Beside these parks are located near High Court near A.T.I. and at Snow View. A famous Golf Course is located near Government House, A High Altitude Zoo at Sher-Ka-Danda ridge and many other facilities scattered throughout the town.

4.2.1.5 Agriculture Area:

This type of area in Nainital is about 19.52 hectares or 1.66 % of total geographical area. This area is prominently found in Chorkhet and Babooliya villages that lie within the Municipal limits of Nainital.

4.2.1.6 Forest Area:

Forest land use is the dominant land use occupying 508.76 hectares or 43.38 % of total geographical area. Forest area is identified all around the Nainital hills.

4.2.1.7 Water Bodies (Lake/ Stream and Rivulets):

The area occupied by this category is 68.9 hectares or 5.87 % of total geographical area. The study area includes the Naini Lake, seasonal Sukhatal Lake, with 26 major drains that connect the lake with its catchment area and a perennial outlet in Balia Nala stream.

4.2.1.8 Open Undeveloped and Restricted Areas:

The area occupied by this category is 115.55 hectares or 9.85 % of total geographical area. This includes restricted area, i.e. areas
where development work should be restricted due to geological and other factors and steep sloped area. The area located on the three sides of the lakes, first on the northern part of Mall Road and Snow View area, second on the southern side of lake, the Ayarpata area and third in Harinagar and Baliya Nala area.

4.2.2 **Land Use of Bhowali Town**

With the purpose of giving a well managed and planned direction to the physical development of the city of Bhowali, it is necessary that an extensive study of the existing land use of the town should be made. On the basis of this conclusion, the allotment of the available limited land-use should be made in such a way that, along with imposing restriction on the extension of unplanned and uncontrolled physical development, planning in land use should be made in conformity with the planned measures within the city area. The coordination of time and distance should be ascertained in such a manner that the spheres like residence, office, community facilities, commercial centres, recreation, etc. are planned so that the environment of this region could be conserved in the best possible manner.

Presently, there is 1.32 hectares of land in Nainital town region (Table 4.2). In this region, under various town activities the particulars of physical and land-wise analysis have been made as follows (Fig 4.9):

4.2.2.1 **Residential Area:**

The areal extent of this category in the Bhowali town is about 37.91 ha or 28.72 per cent of total geographical area.

4.2.2.2 **Commercial Area:**

There is mixed land-use in Bhowali town as there are commercial activities in the residential areas and the market areas.
Fig. 4.9

Legend
- Residential area
- Commercial area
- Administrative area
- Educational area
- Recreational area
- Agricultural area
- Horticultural area
- Forest area
- Buffer area
- Water bodies
- Cultural / Community services
At present about 4.97 hectares of land is under commercial activities, which is 3.77 % of total town area. The commercial area is spread in a ribbon pattern on Nainital-Bhowali road, Bhowali- Ranikhet road, Bhowali-Bhimtal road and Bhowali-Mukteshwar road. Therefore, the market area, hotels related to tourism, lodges and relevant activities may be included under the commercial region.

### Table 4.2 Land use of Bhowali town during 2007

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area (ha)</th>
<th>Percent of total town area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>37.91</td>
<td>28.72</td>
</tr>
<tr>
<td>Commercial</td>
<td>4.97</td>
<td>3.77</td>
</tr>
<tr>
<td>Administrative</td>
<td>3.45</td>
<td>2.61</td>
</tr>
<tr>
<td>Community Services</td>
<td>14.62</td>
<td>11.07</td>
</tr>
<tr>
<td>Education</td>
<td>2.56</td>
<td>17.49</td>
</tr>
<tr>
<td>Utility Services</td>
<td>1.15</td>
<td>7.87</td>
</tr>
<tr>
<td>Transportation</td>
<td>8.95</td>
<td>61.23</td>
</tr>
<tr>
<td>Cultural Community</td>
<td>1.96</td>
<td>13.41</td>
</tr>
<tr>
<td>Agricultural area</td>
<td>23.53</td>
<td>17.83</td>
</tr>
<tr>
<td>Horticultural</td>
<td>1.31</td>
<td>0.99</td>
</tr>
<tr>
<td>Barren</td>
<td>10.98</td>
<td>8.32</td>
</tr>
<tr>
<td>Forest</td>
<td>35.23</td>
<td>26.69</td>
</tr>
<tr>
<td>Total</td>
<td>132.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

4.2.2.3 **Administrative Area:**

About 3.45 hectares of land comes under offices and government use which is 2.61 % of the total town area. There are few offices in Bhowali, which include those of Central Govt. State-Govt., Semi-Govt. and autonomous institutions and other offices.

4.2.2.4 **Community Facilities:**

The community facilities or basic facilities are very essential in the civic life. The use of these services or facilities is also essential along with economic, social and cultural development of the town. Under these services we can include mainly education, medical,
recreational, public services, etc. In Bhowali town about 14.62 hectares of land comes under these services. At present it is about 8.37% of the total town area. About 2.56 hectares land comes under education, 8.95 hectares under transportation, about 1.15 hectares under community services and 1.96 hectares of land comes under cultural community services.

4.2.2.5 Agriculture Area:

About 23.53 hectares land comes under the agriculture which is about 17.83% of total geographical area.

4.2.2.6 Horticulture Area:

About 1.31 hectares land comes under the horticulture which is about 0.99 % of total geographical area. It is includes orchards mainly.

4.2.2.7 Barren Land:

In the town about 10.9 hectares of land comes under this category, which is about 8.32 % of the total town area. Barren land is a steep sloped area which cannot be brought only under forest/plantation as a land use

4.2.2.8 Forest/Green Area:

The forest plays an important part in environmental conservation and for this reason forests have occupied a special place since times immemorial. In the last decades as a result of the process of rapid expansion the existing dense forests has gradually dwindled. The ill-effects of decreasing forests and increasing urbanization are being manifested in the form of landslides and other environmental challenges in the present times. At present about 35.23 hectares land comes under the forest/green area, which is about 26.69 % land of the entire urban area of Bhowali town. It becomes indispensable to propose the utilization of more land from town planning and
environmental point of view keeping in mind the geological condition and nature of environment.

4.2.3 Land Use of Bhimtal Town

In comparison to Nainital town Bhimtal has developed recently. It was only after Independence and few decades following it (1962-63), that Bhimtal attracted notice for being developed as an industrial area because of the availability of level land. However, by the mid-1990’s more than 75% of these industries had shut down. Presently, Bhimtal is developing as a satellite town of Nainital and as a hub of government offices housed in the Vikas Bhawan. At present it has attracted attention due to it being in the hills with a picturesque lake, proximity to Nainital and road link to Kathgodam (only 22 km), the nearest railhead. The total area of Nagar Panchayat is 3.95 km² in the census year 2001. At present only four wards are in the town.

Table 4.3 Land use of Bhimtal town during 2007

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area (ha)</th>
<th>Percent of total town area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Area</td>
<td>84.36</td>
<td>21.36</td>
</tr>
<tr>
<td>Commercial Area</td>
<td>15.63</td>
<td>3.96</td>
</tr>
<tr>
<td>Administrative Area</td>
<td>13.82</td>
<td>3.50</td>
</tr>
<tr>
<td>Industrial Area</td>
<td>27.82</td>
<td>7.04</td>
</tr>
<tr>
<td>Community Services</td>
<td>32.32</td>
<td>8.18</td>
</tr>
<tr>
<td></td>
<td>23.85</td>
<td>73.79</td>
</tr>
<tr>
<td></td>
<td>2.77</td>
<td>8.57</td>
</tr>
<tr>
<td></td>
<td>5.70</td>
<td>17.64</td>
</tr>
<tr>
<td>Agricultural Area</td>
<td>92.48</td>
<td>23.41</td>
</tr>
<tr>
<td>Horticultural Area</td>
<td>5.26</td>
<td>1.33</td>
</tr>
<tr>
<td>Forest Area</td>
<td>58.33</td>
<td>14.77</td>
</tr>
<tr>
<td>Barren Area</td>
<td>8.23</td>
<td>2.08</td>
</tr>
<tr>
<td>Water Bodies</td>
<td>56.75</td>
<td>14.37</td>
</tr>
<tr>
<td>Total</td>
<td>395.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

4.2.3.1 Residential Area:

The residential area of the town is about 84.36 hectares or 21.36 % of total geographical area.
The residential area of the Bhimtal being developed along the lake sides and the slopes facing the lake. The main cluster is found in Mallital market area, near bus station, post office and the Industrial
Estate. Tallital area the southern end of the lake near the Government Normal School on Kathgodam road. The residential area is also found along the transport routes towards Bhowali Kathgodam, and Nokuchi Tal.

4.2.3.2 Commercial Area:

This type of land use covers 15.63 hectares or 3.96 % of total geographical area.

The main commercial area of the Bhimtal is the Mallital market, located at northern part of the lake. Other business area is extending narrowly along the Nainital Naukuchiatal and Kathgodam road. The roadside settlement serves as shops, restaurants while the upper stories are used as residence.

4.2.3.3 Administrative Area:

The areal extent of this category is about 13.82 hectares or 3.50 % of total geographical area.

In Bhimtal town a specific area for administrative use is located along the Bhimtal-Bhowali road west of the existing industrial areas. Many offices are shifted from Nainital to Bhimtal in Vikas Bhawan, along with a separate residential complex to accommodate the staff associated with these offices. Besides these offices Bhimtal Nagar Panchayat and irrigation department located near the famous Bhimeshwar temple.

4.2.3.4 Industrial Area:

The area occupied by this category is about 27.82 hectares or 7.04 % of total geographical area. The industrial area had been developed along the “Anu Ka Maidan” near Mallital market due to availability of vast tract of level land. About a decade ago, this industrial estate was flowing with a good number of industries but of late, due to policies of the Government financing agencies or due to
problems of market or profit many industries have gradually been shifted or closed.

4.2.3.5 Community Services:

i. Educational Area: The Arial extent of this category is estimated to about 23.85 hectares which is 73.79 % of total area under community services.

At present Bhimtal is an important centre of education and has institutions ranging from primary and higher secondary level to technical education. The Birla Institute of Applied Sciences and Lakes International are located near Block office and B. Pharma and M.B.A. are located near Ramleela ground, S.O. S. Village School and District Institute of Teachers Education are located southern part of lake. Beside these many schools are located at different part of the town.

ii. Culture Community Services and Others: This category is estimated to about 2.77 hectares or 8.57 % of total geographical area.

There are two play grounds located at near Tallital and Mallital market. The main recreational centre of the town is an island in between the lake.

There is a ladies hospital located at southern part of the lake near Tallital market. Beside this a Primary Health Centre and a Veterinary Hospital are also located in the town.

iii. Transportation: Transportation land use is about 5.70 hectares or 17.64 % of total geographical area. It includes Bus station and roads.

4.2.3.6 Agriculture Area:

The aerial extent of agriculture land is estimated to about 92.48 hectares which is 23.41 % of total geographical area.
4.2.3.7 Horticulture Area:

The area under horticulture is about 5.26 hectares which is 1.33 % of total town area.

4.2.3.8 Forest Area:

Forest area covers 58.33 hectares or 14.77 % of total geographical area.

4.2.3.9 Barren Area:

Barren land use is about 8.23 hectares or 2.08 % of total geographical area.

4.2.3.10 Water Bodies:

The area occupied by this category is 56.76 hectares or 14.37 % of total geographical area. The area includes Bhimtal Lake and gadhera etc.

4.3 Urban Land Use Dynamics

The highly dynamic land use system undergoes significant changes according to the changing socio-economic parameters as well as natural environmental conditions. With the increasing pressure of population on the land, the human transformation process of the biophysical components has brought about remarkable changes in the land use pattern of the urban centres. Consequently, the settlements are now pushed into forested areas, marginal lands and up slopes without taking into account the suitability of this land for construction activities, and the vegetal cover is being lopped and cleared for meeting the increasing demand of population. This land transformation process has brought about critical environmental changes through the erosion of soil and reduction of ground water recharge in this ecologically sensitive and geo-morphologically high-energy region.
In order to monitor the process of land use changes and assess their environmental impact, an experimental study was carried out for the Nainital, Bhowali and Bhimtal towns of the Lake region. The land use changes were monitored between 1995 and 2007 (Tables 4.4, 4.5 and Figs 4.11, 4.12, 4.13, 4.14). Field mapping techniques were used for the monitoring of land use changes.
NAINITAL TOWN
LAND USE PATTERN - 1995

Legend
- Residential area
- Commercial area
- Administrative area
- Cultural / Community area
- Educational area
- Recreational area
- Agricultural area
- Horticultural area
- Forest area
- Restricted area
- Water bodies

Fig. 4.11
Table 4.4  Land Use Changes of Nainital Town between 1995-2007 (in ha)

<table>
<thead>
<tr>
<th>Land Use Classes</th>
<th>1995 Area (ha)</th>
<th>Per cent of Total Town Area</th>
<th>2007 Area (ha)</th>
<th>Per cent of Total Town Area</th>
<th>Change Area (ha)</th>
<th>As percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Area</td>
<td>90.54</td>
<td>7.72</td>
<td>278.73</td>
<td>23.76</td>
<td>188.19</td>
<td>207.85</td>
</tr>
<tr>
<td>Commercial Area</td>
<td>17.75</td>
<td>1.51</td>
<td>23.54</td>
<td>2.01</td>
<td>5.79</td>
<td>32.62</td>
</tr>
<tr>
<td>Administrative Area</td>
<td>34.00</td>
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<td>34.00</td>
<td>2.90</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Community Services</td>
<td>113.83</td>
<td>9.70</td>
<td>117.31</td>
<td>10.00</td>
<td>3.48</td>
<td>3.06</td>
</tr>
<tr>
<td>Education</td>
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<td>76.68</td>
<td>65.36</td>
<td>1.93</td>
<td>2.58</td>
</tr>
<tr>
<td>Medical Area</td>
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<td>7.03</td>
<td>8.00</td>
<td>6.82</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Transportation</td>
<td>14.07</td>
<td>12.36</td>
<td>15.62</td>
<td>13.32</td>
<td>1.55</td>
<td>11.02</td>
</tr>
<tr>
<td>Religious Area</td>
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<td>4.39</td>
<td>5.00</td>
<td>4.26</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Graveyards</td>
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<td>7.03</td>
<td>8.00</td>
<td>6.82</td>
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<td>0.00</td>
</tr>
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<td>Utility Services</td>
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<td>0.74</td>
<td>0.63</td>
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<td>0.00</td>
</tr>
<tr>
<td>Other Community Services</td>
<td>3.27</td>
<td>2.87</td>
<td>3.27</td>
<td>2.79</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Recreational Area</td>
<td>6.62</td>
<td>0.57</td>
<td>6.69</td>
<td>0.57</td>
<td>0.07</td>
<td>1.06</td>
</tr>
<tr>
<td>Rural Area</td>
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<td>19.52</td>
<td>1.66</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Forest Area</td>
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<td>43.37</td>
<td>508.76</td>
<td>43.38</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Water Bodies</td>
<td>68.90</td>
<td>5.87</td>
<td>68.90</td>
<td>5.87</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Open Undeveloped Area</td>
<td>313.08</td>
<td>26.69</td>
<td>115.55</td>
<td>9.85</td>
<td>-197.53</td>
<td>-63.09</td>
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<tr>
<td>Total</td>
<td>1173.00</td>
<td>100.00</td>
<td>1173.00</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Land Use Changes between 1995 and 2007 in Nainital Town

The exercise revealed some very interesting facts about the trends of land use dynamics in the region. The land use change detection exercises was carried out for the total geographical area (1173 ha) of Nainital town and it was found that 395.06 ha has changed from one land use to other during the last 12 years. Table 4.4 reveals that residential area has increased from 90.54 ha to 278.73 ha of Nainital town between 1995 and 2007. This is due to increasing pressure of population in the town. Open undeveloped area has drastically reduced from 313.08 ha (1995) to 115.55 ha (2007) due to construction activities. The study reveals that the proportion of commercial area has increased from 17.75 ha to 23.54 ha during the period. The area under community services has also increased from 120.45 to 124.00 ha due to tourism activities.
Fig. 4.13
## Table 4.5  Land Use Changes of Bhimtal Town between 1995-2007 (in ha)

<table>
<thead>
<tr>
<th>Land Use Classes</th>
<th>1995</th>
<th>Per cent of Total town Area</th>
<th>2007</th>
<th>Per cent of Total Town Area</th>
<th>Change</th>
<th>As per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Area</td>
<td>11.41</td>
<td>2.89</td>
<td>84.36</td>
<td>21.36</td>
<td>72.95</td>
<td>639.35</td>
</tr>
<tr>
<td>Commercial Area</td>
<td>1.11</td>
<td>0.28</td>
<td>15.63</td>
<td>3.96</td>
<td>14.52</td>
<td>1308.11</td>
</tr>
<tr>
<td>Administrative Area</td>
<td>0.15</td>
<td>0.04</td>
<td>13.82</td>
<td>3.50</td>
<td>13.67</td>
<td>9113.33</td>
</tr>
<tr>
<td>Industrial Area</td>
<td>42.83</td>
<td>10.84</td>
<td>27.82</td>
<td>7.04</td>
<td>-15.01</td>
<td>-35.05</td>
</tr>
<tr>
<td>Community Services</td>
<td>24.03</td>
<td>6.08</td>
<td>32.32</td>
<td>8.18</td>
<td>8.29</td>
<td>34.50</td>
</tr>
<tr>
<td>Education and Others</td>
<td>17.56</td>
<td>4.36</td>
<td>23.85</td>
<td>73.79</td>
<td>6.29</td>
<td>35.82</td>
</tr>
<tr>
<td>Cultural Communities</td>
<td>0.77</td>
<td>0.02</td>
<td>2.77</td>
<td>8.57</td>
<td>2.00</td>
<td>259.74</td>
</tr>
<tr>
<td>Transportation</td>
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<td>0.00</td>
</tr>
<tr>
<td>Land Under Non-urban Uses</td>
<td>315.47</td>
<td>79.87</td>
<td>221.05</td>
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<td>-94.42</td>
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<td>Agricultural Area</td>
<td></td>
<td></td>
<td>92.48</td>
<td>23.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticultural Area</td>
<td></td>
<td></td>
<td>5.26</td>
<td>1.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest Area</td>
<td></td>
<td></td>
<td>58.33</td>
<td>14.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barren Area</td>
<td></td>
<td></td>
<td>8.23</td>
<td>2.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Bodies</td>
<td></td>
<td></td>
<td>56.75</td>
<td>14.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>395.00</td>
<td>100.00</td>
<td>395.00</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.5 reveals that in Bhimtal town the residential area has increased by over 7 times, from 11.41 ha to 84.36 ha in the period 1995-2007. The land under commercial uses, administrative uses and community services has increased from 1.11 ha to 15.63 ha, 0.15 ha to 13.82 ha, and 24.03 ha to 32.32 ha during this period due to tourism related activities. The land under non-urban uses and industrial area has decreased from 315.47 ha to 22.05 ha and from 42.83 ha to 27.82 ha, respectively. The main reason for this transformation is that the Nainital town due to its natural beauty and geographic advantage is popular as a hill resort, and due to proximity to it, the land use of other towns have also changed.

No relevant land use data was available for Bhowali town from the authorities. However, from a visual interpretation it was found...
that the forest land and agriculture land has been reduced due to population pressure, proximity to Nainital and the junction of roads.

### 4.4 Factors of Urban Land Use Changes

Various processes or tendencies operating within the towns for evolving their specific urban landscape are called ‘forces or principles’. Colby (1933) described two fundamental forces, centripetal and centrifugal forces that are made up of a combination of uprooting impulses in the central zone and attractive qualities of the periphery, while the centripetal forces focus on the central zone and make that zone the centre of gravity for the entire urbanized area. Colby (1933) again subdivided the centripetal forces as (i) site attraction, (ii) functional convenience, (iii) functional magnetism, (iv) functional prestige, (v) human equation, and the centrifugal forces as (i) spatial forces, (ii) site forces, (iii) situational forces, (iv) force of social equation, (v) status and organization of occupancies, and (vi) human equation.

Dickinson (1964) explains that the spatial-functional structure of the towns is the result of three basic forces: centripetal, centrifugal and forces of spatial differentiation. Dickinson described the seven forces for the site and distribution of different functions within the towns. The elements like economic forces, social and government legislations are the major works behind these forces (i) centralization, (ii) concentration, (iii) deconcentration, (iv) decentralization, (v) recentralization, (vi) residential segregation, and (vii) dominance, invasion and succession.

The history of Nainital town is related to a short span of little over 160 years, the town as well as its surrounding region referred to here as the ‘Lake Region’ has witnessed large scale land use changes over a span of relatively small period of time. In the context of towns of the lake region, beauty of the lakes, cool and healthy climate, administrative importance and transport function work as the centripetal forces and lack of subsequent space for expansion of the
toms, high land values and some physical and geological factors work as centrifugal forces. Beside these factors some local factors, i.e. growth of population, tourism and its increasing demands of development activities in the form of settlements, roads and other infrastructural facilities are also responsible for the land use changes. The main factors or urban land use changes in the region may be discussed and analysed under the following categories:

4.4.1 Growth of Population

During the recent years the rapidly growing population of the town has created large land use changes in Nainital itself as well as Lake Region. The growth of population of the town between 1881 and 1891 was 28.57. This shows that by 1880 the town has already emerged as a popular summer resort. During 1891-1901 the growth of population decreased by 10% in 1901. The main cause of this decrease was said to be the plague by the Census. In 1911, again urbanization grew to 34.97%. In 1911, there was a decrease of total rural population due to natural calamities. Later, the town population and urbanization both increased. From 1921 to 1941 the population growth rate fluctuated, particularly in the war decades, being 9.35% in 1921, 3.34% in 1931, and 12.81% in 1941. The causes of the decrease were the First World War and Second World War. After this, urban population recorded a very high growth rate between 1941 and 1951. This can partly be attributed to the regained status of Nainital as the summer capital of the state after Independence. The end of the Second World War the changes ushered in new opportunities brought by Independence. They were also responsible for growth of the urbanization of the hill resort and the population recorded a very high growth rate particularly in decades 1941-51 (20.40%) and 1951-61 (22.81%). The first major rise in the population of Nainital was recorded in 1971 when the population was 25,167 showing a decadal growth of 56.5% the highest ever observed so far. In 1981 and 1991
the growth had not been very high, the population being 26,093 and
29,831 respectively. In 2001 the growth is increased 28.97.

The statistics of population usually available from the Census of
India do not give a true picture because it takes only the population
living in the town. This thus omits a large proportion of the town’s
population which returns to the town during second/third week of
March every year, coinciding with the reopening dates of the public
schools after the three months winter break. While a good numbers of
schools reopen after winters in the month of February. Many
residential public schools and preparatory, nurseries, or schools
imparting education up to Vth standard, normally open by mid-
March, which include the following: Sherwood College, All Saints
School, St. Joseph’s College, St. Mary’s Convent, Birla Vidya Mandir,
MLS Bal Vidya Mandir, MLS Balika Vidya Mandir, Bhartiya Shahid
Sainik School, Ashdale School, Sanwal School, St. John’s School,
Shishu Mandir, Amtul Public School, St. Xavier School, Long View
Public School, Holy Angels School, and a host of Preparatory and
Kindergarten Schools.

While many of these schools are residential, their total strength
may range around 7,000 and about 2,000 persons may be added to
this number associated with this school population that include
teachers, school management and other category of persons
depending exclusively on providing various kinds of services to these
schools.

Besides this Nainital is also the seat of Uttarakhand High Court.
As a result of the population of Nainital is continually increasing but
is not included nor reflected in the census data which considers only
the permanent residents.

Similarly tourism, which is a major activity in the town, attracts
a good number of people during different periods of the year. Though
this population has a very short stay but owing to its vast numbers
and its impact on related activities needs to be taken into account.
At present, the town has grown into a full-fledged tourist resort with inflow of tourists almost throughout the year. Besides this, it is also getting popular as an ideal destination for organizing meeting, seminars and visiting of student groups from schools and colleges. Many other occasions also attract tourists, especially from Delhi and other nearby centres in a fairly good number. It is also an ideal honeymoon destination for the newly weds due to its serene atmosphere and scenic beauty.

Due to ever increasing demand and exorbitant rates of residential accommodation in Nainital, a good number of people now prefer to live in smaller suburban centres of Bhowali, Bhimtal, Ghorakhal and Khurpatal etc around Nainital. A large number of commuters live in such centres, the maximum being in Bhowali and Bhimtal wherefrom frequent bus services and private taxis operate to Nainital throughout the day. Such population mostly includes people engaged in various services, students and small businessmen. In order to cope with this demand, these small centres have also grown remarkably during the last few years and a cluster of new residential accommodation are added each year. It has been estimated that in Bhowali alone there has been about 42% increase in the number of houses during the last 5-7 years periods. A similar trend is also observed in Bhimtal town.

Bhowali and Bhimtal have also been preferred by a large number of people who have either retired or are willing to settle in the hills. Since the cost of land and construction in Nainital is very high, these places seem to provide a much better alternative to the crowded city and yet are not very far off from the facilities of a big urban centre being only 11-22 km from Nainital.

4.4.2 Expansion of Tourism

The largest land use changes are obviously associated with the growth of tourist activities, which is now a well established industry in Nainital town and is gradually expanding to the various centres of the
Lake Region. During recent years, the infrastructural growth for this industry has been in the shape of:

(a) A good number of hotels and lodging houses have come up along with numerous roadside restaurants and shops to cater to the need of the tourists.

(b) Tourist Rest Houses were built by Kumaun Mandal Vikas Nigam or U.P. Tourism at Nainital, Bhowali, Bhimtal and Sattal.

(c) New roads have come up to show view, Laria Kanta, Sattal and Kilbury and adjoining places.

(d) Restaurants and eating places for tourists in these centres which are mostly frequented by tourists like Sattal, Bhimtal, Naukuchiatal and Bhowali.

(e) Growth of travel agencies, tourist guide services and recreational facilities.

The growth of the kind of infrastructure developed for the tourist industry has been responsible for large scale changes in the landscape.

4.4.3 Rise of New Functions

The paucity of space in Nainital and the ease of access due to developed transport have led to the diffusion of many functions to the outer zone of Nainital town, which largely constitutes the Lake Region. Nainital being a hill station has its added advantages. Besides being the headquarters of a Division and a district of the same name, it also happens to be the seat of High Court of Uttarakhand. Due to its salubrious climate in summers, it becomes the venue of various high level meetings, seminars and symposia.

Bhowali is the most notable town in this respect, which is a focal point in terms of transport and is also a collection and distribution point for the horticultural produce from the surrounding region. It is a nodal point in the entire Lake Region, which connects hills to the plains, through which all transport has to pass, both
commercial and tourist based. Due to rise of many transport and commercial functions, its status has now risen to a sub-town or a satellite town of Nainital providing shelter to hundreds of commuters who either work or study in Nainital and also a good number of tourists during peak seasons, when accommodation in Nainital is either too costly or not available at all. Thus, during recent years it has emerged as a small township providing facilities of hotels, restaurants, taxi services and market facilities. Thus, new functions now tend to be located more and more in and around the town, \textit{viz.}, Air Force Colony for Air Force personnel posted in Laria Kanta complex. Many sites in Nainital and its Lake region have also come up as those required for purely military use. The vast radar and telecommunication complex developed at Laria Kanta, a one time picnic spot, has led to large scale changes even at high elevations.

The region has also been preferred for various kinds of functions mainly for setting up educational institutions. In Nainital many training institutions like PGDCA, Department of Biotechnology, Microsoft Academy, have recently come up. Bhimtal has also shown growth of Training Institute for MCA, MBA and B.Pharmacy. with affiliation for Kumaun University and Birla institute sponsored by the Birla have recently been started in Bhimtal.

The commercial needs have led to the growth of large scale fruit collecting and distributing centres in Bhowali, which has a road-side market that caters to the need of a large surrounding horticultural belt. Local level administrative units both government and private are located either at Bhowali or Bhimtal includes Blocks Development Office, Vikas Bhawan in Bhimtal, branches of a few nationalized banks and local banks in Nainital, Bhowali and Bhimtal. All such activities have been responsible for giving rise to new settlements.

4.4.4 Real Estate Business

The most recent development has been a phenomenal growth of real estate business in and around Nainital, particularly in such areas
of the Lake Region as Naukuchiatal, Sattal and the valley between Bhowali and Bhimtal. These areas have an ideal location, being hardly at a distance of 20 kilometres from the nearest railhead Kathgodam and at the same time are situated in close proximity to Bhowali and Nainital (15-25 km). There are all-season motorable roads connecting these places.

Builders from outside the region have invested huge amounts in purchasing lands and have entered into real estate business by constructing houses and complexes at many sites near Bhowali town particularly along the Ramgarh road. The most spectacular development can be witnessed along the Bhowali-Bhimtal road where a good number of such projects are either complete or under way and have led to a total transformation of the landscape.

4.5 Urban Landuse: Dimension of Extension and Problems

With the growth of population is associated the rise in the density of urban settlements and its expansion in hitherto unoccupied areas. Such a growth can, therefore, be precisely reflected in a map of settlement distribution showing various patterns. The pattern and distribution is largely conditioned by topographic constraints as well as the availability of road transport. In a mountainous topography settlement distribution tends to be scattered and dispersed since favourable sites are limited and far between. At the same time, availability of transport is a strong factor and attracts settlement growth despite unfavourable topography.

The growth of urban settlement and its extension can be understood by the stage of development achieved by a specific area which can easily reflect the need of the people as also the cultural level acquired by them. In order to explain the process, the Lake Region has been discussed under different zones and sub-zones.
4.5.1 Nainital Urban Area

Nainital and its immediate surrounding zone is a fully urbanized area showing related characteristics. The pattern of settlement, however, is largely conditioned by the mountainous topography of the town. The typical site is provided by the geographical conditions, where a large lake exists surrounded by sloping hills on almost all directions except the south. This has resulted into a characteristic pattern of settlement around the lake which is the governing natural phenomena in the local geography of the town. The settlement, thus, initially tends to distribute all around the lake in different directions and invariably facing the lake.

At some later stage, the growth of main roads and other approach roads, the pattern of settlement since this cultural feature exerts a strong influence on the pattern of settlements because these are the only life lines that make interaction between people possible.

The town, which has acquired almost all urban functions, is presently also an important tourist resort, attracting a large number of tourists from different covers of the country and the world. As such, to meet such demand relevant development has also taken place during the last two or three decades and such growth have been very fast.

There are vast areas have been retained by the Municipal Board as a restricted area due to geological or topographical constraints and protected forest, thus, the growth of built-up area in a most haphazard manner. The already congested areas are now getting more and more congested since residential houses and hotels are coming up in all vacant space. Because of limited expansion of these areas the houses are getting three or four storeys.

4.5.2 Semi-Urban Areas

Semi-urban growth is found at Khurpatal, which lies close to Nainital town and due to the presence of a close by metalled road that connects Nainital to Ramnagar, Bazpur, Kashipur, etc., it shows
urban influences in the building material of houses, the pattern of roofs and other aspects. Since this is not a truly urbanized area we can simply recognize the urban influences due to its proximity to the town. As such, the growth is very slow and does not vary much with those of the adjacent rural areas.

Since the settlement now happens to be within the jurisdiction of Lake Development Authority and also because of increased tourist activity, specific type of activities and development has taken place during recent years particularly in the form of ‘Tourist Reception Centres’ on residential flats occupied by commuters or other category of people from outside who wish to retain an alternative accommodation in the hills. In accordance with the needs of such a population, facilities of local transport, market, communications etc. are gradually emerging in the settlement and due to its connectivity and proximity to the main town; it shows adequate potential of development into a small suburb.

4.5.3 Nainital Cantonment Area

Moving east wards from Nainital urban zone, the adjacent area, falling within the Nainital Cantonment is also a characteristic area with regards to the growth and distribution of settlements. The zone an abrupt change in the density of settlement which also tends to be sparsely distributed. This is due to the prevailing policies of the Defense Department under whose control the area falls-where, but for very specific and urgent nature of activity, expansion of residential settlement is largely restricted. It is due to this factor alone that there is a marked change in settlement density along the boundary of the Cantonment. Thus while the zone very much falls being part of the Nainital urban zone, the urban spread has been very limited and the pace of development has also been very slow.

With almost no changes over a large period of time, it represents a buffer zone between the rapidly changing urbanized area of Nainital Municipal Board to its west and south-west and the remaining part of
the Nainital Lake Region falling to east and south-east where the different parts are in varying stages of development and thus several characteristics pattern of settlement.

4.5.4 **Bhowali and Sub-Urban Areas**

Towards further east lies yet another semi-urban zone around Bhowali, a small sub-town of the study area. Bhowali, due to its locational advantages has grown into a fully developed suburb of Nainital and in a sense commands a central location within the area providing transport links to various areas and providing transport links in different directions.

Bhowali initially shows a linear pattern of development along the roads that radiate in different directions which tends to be very dense in certain areas due to growth of population. Such settlement is mainly used for commercial purposes - the ground floor being used as a shop and the upper floors serving as residential accommodation invariably in all cases. Such functions have grown very fast during the last 10 or 15 years due to the increased frequency of tourist movements along the transport routes that connect Bhowali.

Beside this, linear cluster of settlements exists along the roads. Bhowali also shows distribution of settlements along the upper elevations due to rapid growth of its population, advantages of site, increased commercial and related functions, and the lack of space for further urban expansion in the nearby town of Nainital. Close to Bhowali, we find zones under varying degrees of urban influences or stages due to the operation of one or many factors.

i) There are three small pockets towards the north-west, west and south-west of Bhowali, and although these lie close to Nainital town and Bhowali town, but they reveal a scattered pattern of settlement distribution with a very slow growth rate. This is also despite the fact that two main roads pass through these areas - first, the Bhowali-Nainital road, and second, the Bhowali-Haldwani road. The settlement
thus tends to develop generally along the roadside and with increased elevations the distribution gets very sparse.

In fact, much of this region is the eastward extension of the Nainital Karst zone, and therefore is dominated by limestone or shale, which is highly prone to erosion. As such, the rock structure does not provide a stable base and such areas are liable to suffer from landslide, creep, subsidence and erosion in the event of high intensity rainfall, which is a characteristic of this area. This factor, thus largely precludes settlement growth and distribution.

Apart from this, the elevated areas of generally above 2,200 metres elevation are invariably covered with thick forest, and thus have do not present suitable sites for settlement growth.

Under these conditions, this zone is more or less rural in character and includes area like Bhowali Sanatorium, Bhumiyanthar, Kuriagaon and Bhawanipur.

ii) This sub-zone lies east of Bhowali and taking advantage of the ideal network of roads in all directions, has grown very fast. Due to its proximity to Bhowali, the settlements show urban influences and these are presently undergoing fast changes due to the coming up of new function, *viz.* real estate business, government colonies, building owned by private people – both local or from outside the region, small industrial units and orchard areas with farm house, etc.

In this way the patterns that have emerged reveal well laid-out and planned settlements with provision of area for gardening or plantations. There may be multi-storeyed structures also while sometimes, colonies enclosed with boundary walls or lodging houses for tourist purpose may also be found. In general, the pattern does not reveal clustering but sometimes there is a trend towards a linear growth along or in alignment with a road nearby. This growth is very recent and has been very fast also.

The sub-zone includes areas in Nagarigon (North) and Kahalquira rural areas, adjacent to Bhowali Municipal Board, where
topographical conditions also have a favourable growth of settlement over widespread areas due to a low gradient over large patches of land and in general, low gradient and stable slope all-around. These settlement areas, showing a relatively fast growth, may be grouped under semi-urbanized category.

iii) With increased distances from the urban centre, the influences also tend to get reduced. There are two such zones under this category which include Luvesal and parts of Nagarigaon (south), which are situated 4 to 5 km from Bhowali. While the road between Bhowali and Bhimtal passes through one of these, the Nagarigaon (south) has no such connection which is also topographically fragmented.

These areas still retain a rural character, showing only minimal urban influences and as per circumstances these are very slow growing areas, recording negligible changes in the landscape.

### 4.5.5 Bhimtal-Naukuchiatal Zone

The eastern most zone of the Nainital Lake Region has been termed as the Bhimtal-Naukuchiatal zone and it extends between a vast area encompassing part lying north-west of Bhimtal, the entire Bhimtal valley and the Naukuchiatal valley lying further south-eastwards. In this way, the zone stretches across a spatial distance of about 10 kilometres and includes two large lake valleys at Bhimtal and Naukuchiatal. The various sub-regions are at different stages of the growth, as will be evident from the following description:

The area includes the lower part of the Bhowali-Bhimtal valley including many rural areas lying north-west, north and north-east of Bhimtal mainly Bhagturia, Mehragaon, Bohari, Soangaon and Pandegaon (north). The Bhowali-Bhimtal road passes through the central parts where a linear pattern along the road is usually found. The growth is quick and related to such activities as transport, business, small-scale or household industries, etc. The houses reveal influences of their proximity to the road mainly in the imported
building material such as bricks, cement or tin-sheets. Such areas may appropriately be termed as semi-rural since the road provides an easy access to nearby towns and sub-towns which exert their influences in many ways.

A rural landscape predominates on both sides of the valley with increasing elevations from the road. These areas are obviously related with slow changes, a minimal urban influence and a scattered pattern of settlement characteristic of all mountain areas. The crest or the highest areas are covered with patches of thick forest and such areas are usually devoid of any settlement mostly to the north east of Mehragaon, Saungaon, Sangurigaon and Bhimtal.

**4.5.6 Bhimtal Urban and Suburban Area**

This includes the entire urban area falling within Bhimtal and the surrounding region - basically within revenue villages of different names but now within the urbanized area in the periphery of Bhimtal. The revenue villages that fall within this zone include Sangurigaon, June Estate, Dungsil Rawat, Dungsil Sah, Dungsil Malla and Pandegaon (south).

The core of this urban growth may be identified with linear pattern of settlement along the Bhowali road, which tends to get denser towards the bus station. Likewise, settlements along the Naukuchiatal road are also found aligned with the road. Besides this, which forms the earlier settlement lying to the northern and south-eastern slopes of Bhimtal, the opposite slopes are sporadically occupied by private estates with small orchard areas owned by foreigners or rich people belonging to other parts of the country. The earlier settlement growth was very slow and although a road existed to connect Bhimtal, the place was never preferred by tourists or visitors from outside as against the famous lake town of Nainital situated nearby. For quite sometime the place had a slow growth of population and retained, more or less a rural character.
4.5.7 **Naukuchiatal and Surrounding Areas**

To the south-east of Bhimtal there is situated yet another picturesque valley around a large and beautiful lake, known as Naukuchiatal. Although, the region is presently connected by a metalled road of Bhimtal, it still retains a rural character and development so far has been relatively slow. The landscape is still characterized by the presence of cultivated patches and horticultural areas with scattered and dispersed type of settlements in between.

The intrinsically rural zone includes the village Naukuchiyatal, Siloti pant, Siloti Pande, Skhola, Naula, Thapalia Mehragaon and Channoti but shows slow growth. The most recent patterns related with tourist activity constitute lodging houses and restaurants etc. that cater to the needs of tourists that visit the lake valley for a short visit. For future growth of tourism, however, this region has the greatest potential.