Chapter V

SPATIAL ANALYSIS OF LAND USE CHANGE IN RANCHI CITY (1991-2011)

5.0. INTRODUCTION

Land use change is largely determined by social, economical, political conditions, in time and space. At a micro-level land uses are to a large extent determined by the locational advantages governed by physical proximity or accessibility, quality or prestige of location and opportunities to benefit from external economies (Sharma and Mishra, 2011). Replacement of direct government controls on the economic activities by a regulatory system has altered the entire social and economic landscape, which in turn has brought a significant change in the urban land use. Structural changes have also been brought by the Nagar Palika Act.

5.1. TEMPORAL CHANGES IN LAND USE

The land use of Ranchi has undergone significant change, especially after the formation of the Jharkhand state. The land use land cover maps of the different periods, shown in Figure 5.1 shows the change in the change in the different categories of land use. All the land use categories have undergone changes, although with varying percentage and rate. There has been a significant increase in the built-up area in relation to the decline in agricultural area. There has also been a fall in the other categories of land use like plantation, water bodies and open spaces.
**Figure 5.2:** Percentage Distribution of Land Use Classes, 1990 to 2015

**Source:** Based on Land use Classification, 1990, 2005 and 2015

**Table 5.1:** Distribution of Land use Classes (1990 to 2015), in Square kilometres.

<table>
<thead>
<tr>
<th>CLASSES</th>
<th>1990</th>
<th>2005</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUILT-UP</td>
<td>17.258</td>
<td>26.490</td>
<td>60.364</td>
</tr>
<tr>
<td>AGRICULTURAL LAND</td>
<td>76.750</td>
<td>68.103</td>
<td>36.889</td>
</tr>
<tr>
<td>OPEN SPACES</td>
<td>0.962</td>
<td>0.962</td>
<td>0.962</td>
</tr>
<tr>
<td>VEGETATION/PLANTATION</td>
<td>0.439</td>
<td>0.227</td>
<td>0.197</td>
</tr>
<tr>
<td>WATER BODIES</td>
<td>4.588</td>
<td>4.218</td>
<td>2.150</td>
</tr>
</tbody>
</table>

**Source:** Based on Land use Classification, 1990, 2005 and 2015
5.1.1. Built-Up Area and Land Use Change

The land use change has been more apparent in terms of built-up area (Figure 5.3). There has been an overall increase in built-up area by 249 percent in a span of 20 years, from 1990 to 2015. The area has increased from 30.58 square kilometres (17.26 percent of the total area of the City) in 1990, to 46.94 square kilometres (26.49 percent) in 2005 and more than double in 2015 to 106.96 square kilometres (60.36 percent) in 2015, after a span of only 10 years. The increase in the built-up area may be attributed to the increase in population, increase in public facilities and structural changes due to developmental activities. The percentage change has been more rampant after the formation of the state capital.

The rate of change in the built-up area has varied with time. The increase was at the rate of 3.57 percent in the period 1990 to 2005 which after the later years of the inception of the Capital increased at a rate of 12.79 percent. That is it increased by 249.78 percent in a span of 25 years from 1990 to 2015. There was an addition of 9.23 square kilometres to the built-up area between 1990 and 2005, while a considerable portion of 33.87 square kilometres was added to the area. The increase in the built-up area has been in the form of Residences, Commercial Activities, Industries, Social and Physical Infrastructure.

5.1.2. Agricultural Land and Land Use Change

This transformation in the built-up area has primarily been at the cost of agricultural land, which decreased by 51.94 percent (39.86 square kilometres) from 1990 to 2015. Agricultural land which covered 76.75 percent of the total area, covering a total area of 135.99 square kilometres in 1990, reduced to 120.67 square
kilometres covering only 68.10 percent of the total area in 2005. It further reduced to only 65.36 square kilometres covering 36.89 percent of the total geographical area.

The rate of decrease in the area of water bodies has been in correspondence to the increase in built-up area. The area decreased by 11.26 percent (8.65 square kilometres), at a rate of 0.75 percent, between 1990 and 2005, and by 45 percent (31.21 square kilometres), at the rate of 4.5 percent, between 2005 and 2015. The other land use categories have also shown a decline in area; however the change has not been much.

5.1.3. Water Bodies and Land Use Change

Ranchi City after becoming the state capital has undergone significant changes in its, demographic, administrative, socio-economic and socio-cultural set up. This has exerted pressure on the existing water bodies. The water bodies have reduced from 8.13 square kilometres (4.58 percent) in 1991 to 7.47 square kilometres (4.21 percent) in 2005 and remained only 3.81 square kilometres (2.15 percent) in 2015.

The area decreased by 8.07 percent and 49.04 percent between 1990 and 2005 and 2005 and 2015 respectively and at a rate of 0.54 percent and 4.9 percent respectively.

5.1.4. Vegetation and Land Use Change

The development of the City has to a large extent ignored the environmental ethics. With the shrinkage of water bodies the vegetation of the area has also reduced, however not at a very high rate. It has reduced from 0.78 square kilometres (0.44 percent) to 0.40 square kilometres (0.22 percent) to 0.35 square kilometres (0.20 percent) in the years 1990, 2005 and 2015 respectively.
The Vegetation has reduced at a rate of 3.21 percent and 4.9 percent in the periods 1990-2005 and 2005-2015 respectively. The clearing of vegetation has mainly been as a result of developmental activities, mainly in the form of broadening of roads and for setting up new structures.

5.1.5. Open Spaces and Land Use Changes

These are primarily the areas which have been barren and rocky, unfit for settlement and for any economic activity. Not much change has been noticed in this category of land use. However some parts of these have been encroached by built-up area. It has reduced by only 0.003 percent of the total area of the City from 2005 to 2015.

There has been an insignificant change in the rate of decrease in the Open Spaces due to its instability to support residence and economic activity.

5.2. LAND USE TRANSFORMATION

The land use of the City has undergone significant transformations across time, corresponding to the changing administrative, demographic, socio-economic and socio-cultural conditions. Major transformation has been observed in case of Built-up area and agricultural land. There has been a significant increase in the built-up area and the area under agricultural land has reduced significantly. This transformation in the built-up area has mainly been at the expense of Agricultural land, indicating towards the urbanization of the area. On the basis of Table:5.2 and 5.3, showing the land use matrix, the following transformations have been found out.
Table 5.2: Land Use Matrix for 1990-2005

<table>
<thead>
<tr>
<th>CLASSES</th>
<th>BUILT-UP</th>
<th>AGRICULTURAL LAND</th>
<th>OPEN SPACES</th>
<th>VEGETATION / PLANTATION</th>
<th>WATER BODIES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUILT-UP</td>
<td>30.579</td>
<td>16.183</td>
<td>0</td>
<td>0.011</td>
<td>0.287</td>
<td>46.938</td>
</tr>
<tr>
<td>AGRICULTURAL LAND</td>
<td>0.099</td>
<td>135.994</td>
<td>0</td>
<td>0.364</td>
<td>2.002</td>
<td>120.671</td>
</tr>
<tr>
<td>OPEN SPACES</td>
<td>0</td>
<td>0</td>
<td>1.704</td>
<td>0.000</td>
<td>0</td>
<td>1.704</td>
</tr>
<tr>
<td>VEGETATION/PLANTATION</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.778</td>
<td>0</td>
<td>0.403</td>
</tr>
<tr>
<td>WATER BODIES</td>
<td>0.028</td>
<td>1.605</td>
<td>0</td>
<td>0</td>
<td>8.130</td>
<td>7.474</td>
</tr>
<tr>
<td>TOTAL</td>
<td>46.938</td>
<td>120.672</td>
<td>1.704</td>
<td>0.403</td>
<td>7.473</td>
<td>177.19</td>
</tr>
</tbody>
</table>

Source: Based on Land Use Change Detection, 2005 to 2015

Table 5.3: Land Use Matrix for 2005-2015

<table>
<thead>
<tr>
<th>CLASSES</th>
<th>BUILT-UP</th>
<th>AGRICULTURAL LAND</th>
<th>OPEN SPACES</th>
<th>VEGETATION / PLANTATION</th>
<th>WATER BODIES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUILT-UP</td>
<td>46.938</td>
<td>55.481</td>
<td>0.994</td>
<td>0.203</td>
<td>3.210</td>
<td>106.759</td>
</tr>
<tr>
<td>AGRICULTURAL LAND</td>
<td>0</td>
<td>120.671</td>
<td>0</td>
<td>0.027</td>
<td>0.570</td>
<td>65.264</td>
</tr>
<tr>
<td>OPEN SPACES</td>
<td>0</td>
<td>0</td>
<td>1.704</td>
<td>0.004</td>
<td>0</td>
<td>0.714</td>
</tr>
<tr>
<td>VEGETATION</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.403</td>
<td>0.275</td>
<td>0.444</td>
</tr>
<tr>
<td>WATER BODIES</td>
<td>0.066</td>
<td>0.524</td>
<td>0</td>
<td>0.000</td>
<td>7.474</td>
<td>4.009</td>
</tr>
<tr>
<td>TOTAL</td>
<td>106.759</td>
<td>65.264</td>
<td>0.714</td>
<td>0.444</td>
<td>4.009</td>
<td>177.19</td>
</tr>
</tbody>
</table>

Source: Based on Land Use Change Detection, 2005 to 2015

5.2.1. Land Use Transformations between 1990 and 2005

In the initial stages of state formation there was significant increase in the built-up area, due to the increase in the demand for land to accommodate the sudden increase in population and the developmental activities of the new capital City.

The 53.50 percent increase in the built-up area was mainly due to the transformation of 11.90 percent (16.18 square kilometres) of agricultural land that existed in 1990, into built-up. 1.42 percent of the vegetated land and 3.53 percent of the water bodies also added to the built-up area to increase its total area to 46.94 sq kms.
(26.49 percent of total geographical area). On the other hand 0.32 percent of the built-up, mainly the unproductive structures were insignificantly transformed into agricultural land. Similarly there was an insignificant transformation of 0.09 percent to water bodies to built-up area.

The decline in the area of the agricultural land may be attributed to, the transformation of 11.90 percent of agricultural land to built-up structures and 1.18 percent of it were transformed into waterbodies. On the other hand about 0.36 square kilometres of the vegetated land were cleared and converted to some amount of agriculture activities and 2 square kilometres of water bodies which actually dried up were encroached by agricultural activities.

The water bodies were also significantly transformed into built-up area and agriculture. On the other hand the area under vegetation was transformed into built-up area and agriculture. The open spaces were more or less unaltered.

5.2.2. Land Use Transformations between 2005 and 2015

The transformations in land use gained pace towards the later phase of the inception of the City, 2005 to 2015. The built-up areas increased at a much faster rate and so was the decline in the agricultural land. The built-up areas encroached into the other categories of land use, owing to the demand of the growing and developing City and the infrastructural development therein. With increasing rate of urbanization nearly 45.98 percent (55.48 sq kms) of the agricultural land that existed in the year 2005 were transformed into built-up area. Similarly a significant area under water bodies (42.95 percent, 3.32 square kilometres) was intruded by built-up area. Most of the pre-existing ponds were filled up for building purposes with the decline in the
The vegetation mainly in the form of secondary plantations were removed to accommodate expanding built-ups. The built-up area also extended to the open spaces (0.99 square kilometres) which earlier were not deemed fit for human occupancy or any other economic activity.

The agricultural land besides being converted to built-up was also transformed into water bodies (0.52 sq kms). Such agricultural land included such lands which were mostly swampy. However 0.57 square kilometres of the water bodies were transformed into agricultural land. Nearly 0.13 percent of vegetated land was cleared for some amount of agriculture. The water bodies underwent shrinkage due to climatic and anthropogenic factors and the area around them were planted with trees (0.48 square kilometres).

Hence it is quite apparent that there has been a remarkable expansion of built-up area with the changes in the administrative importance of the City. This expansion has been more rapid after the increasing significance of the City as the Capital. This growth in the built-up area has been largely at the expense of the agricultural land. There has been a significant decline in the area of the agricultural land, water bodies, vegetation area and in Open Spaces.

5.3. SPATIAL CHARACTERISTICS OF LAND USE CHANGE

The above discussion proves that there has been a significant change in the land use of the City from 1990 to 2015, with an increasing rate of change after the formation of the Capital. It has been inferred that the change has mainly been in the form of built-up area. A clear picture of the change can be looked into if the changes in the land use categories are looked into spatially. Spatial characteristics of the change that has occurred in the types of built-up area is also important to be looked at.
This is feasible if a further classification of the present land use is made, so that each category of land use can be looked at in detail, emphasising on the new developments. Therefore a next level classification has been made for this purpose (Figure 5.6). The land use under the Built-Up area mainly comprises of the following categories:

- Residential Land Use
- Commercial Land Use
- Industrial Land Use
- Administrative Land Use
- Land under Public Facilities

The above categories have undergone significant changes as the City has developed especially after the formation of the Capital. The other important categories that have undergone a decline in area, especially Agricultural Land and Water Bodies, need to be looked into. It is also important to look into the Defence Area which has been a hindrance to urban growth.
<table>
<thead>
<tr>
<th>LAND USE/LAND COVER</th>
<th>AREA COVERED (Sq. Kms.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavily Built-Up area</td>
<td>22.11</td>
</tr>
<tr>
<td>Mixed Built-Up Area</td>
<td>3.87</td>
</tr>
<tr>
<td>Low Built-Up Area</td>
<td>9.75</td>
</tr>
<tr>
<td>New Built-Up Area</td>
<td>45.16</td>
</tr>
<tr>
<td>HEC Township</td>
<td>3.25</td>
</tr>
<tr>
<td>Industrial Estate</td>
<td>4.94</td>
</tr>
<tr>
<td>Medium Scale Industries</td>
<td>1.54</td>
</tr>
<tr>
<td>Light Industries</td>
<td>0.41</td>
</tr>
<tr>
<td>Government Land</td>
<td>2.17</td>
</tr>
<tr>
<td>Government Offices</td>
<td>4.62</td>
</tr>
<tr>
<td>Wholesale Godowns</td>
<td>0.43</td>
</tr>
<tr>
<td>Retail</td>
<td>1.43</td>
</tr>
<tr>
<td>Weekly Market</td>
<td>0.009</td>
</tr>
<tr>
<td>Stadium/Playground</td>
<td>0.28</td>
</tr>
<tr>
<td>Graveyard/Cremation Ground</td>
<td>2.99</td>
</tr>
<tr>
<td>Airport</td>
<td>1.92</td>
</tr>
<tr>
<td>Defence</td>
<td>17.58</td>
</tr>
<tr>
<td>Agricultural Land</td>
<td>65.36</td>
</tr>
<tr>
<td>Plantation</td>
<td>0.35</td>
</tr>
<tr>
<td>waterbodies</td>
<td>3.81</td>
</tr>
<tr>
<td>Ring Road</td>
<td>424</td>
</tr>
<tr>
<td>Major Roads</td>
<td>309.27 (kms)</td>
</tr>
<tr>
<td>Secondary Roads</td>
<td>633.66 (kms)</td>
</tr>
</tbody>
</table>

Source: Based on LANDSAT TM, 140-44, 2015, Ranchi Utility Information System, JSAC
5.3.1. Change in Residential Land Use

The increase in built-up area in the City has mainly been in the form of residences. There has been a remarkable increase in new Residential areas and the early settled areas have been intensified. The open spaces and unutilized areas have been taken up by extension of Residential areas, as evident from the land use map in Figure:5.6. A marked variation can be seen in the distribution of residences in the City. However these are found more concentrated towards the City core.

5.3.1.1. Changes in the Distribution of Residences

A distribution index has been developed to represent the concentration of residences for each ward (Figure 5.7).

**Concentration Index:**

\[
\text{Concentration Index} = \frac{\text{Total area Covered by the Residences in the Ward}}{\text{Total Residential Area of the City}} \times \text{Total Area of the City}
\]

5.3.1.1. a. Areas with Very High Concentration Index of Residences

These include wards with a concentration more than 450. These include wards numbers 26, 28, 20, 30, 51 and 16. These include mainly the Commercial areas like ward numbers 26 and 30, up-market areas of ward number 20, Old Residential Pockets dominated mainly by Christian and Muslim community and government residences. These areas are mainly dominated by Residential Areas with very less open area and area under non-Residential use. It also includes the newly developed administrative...
region of Doranda region. This area mainly constitutes of new government residences and few apartments, which are mainly the new developments.

5.3.1.1. b. Areas with High Concentration Index of Residences

Adjacent to the areas having very high concentration of residences are the areas with high concentration index between 300 to 450. These are comparatively newer developments. Around 33 percent of the wards fall under this category. That is the City mainly has high concentration of residences. These include the Up-Market areas, both the newly developed ones and the pre-existing ones where the number of residences has increased. The newer developments like the newly developed downtown areas and transformed arable land have also developed high concentration of residences of late. There has been a further increase in the concentration of residences in the Old Residential pockets. The areas dominated by the mixed community are primarily areas which are dominated by the in-migrants. With the increase in migration there has been an increase in the residences in such areas. The industrial areas namely the Kokar and the ResidentialQuarters of HEC area has also shown an increase in the concentration of residences. With the increase in the Commercial activities in the core of the City, the residences especially of the business class has also increased. This also includes the new developed administrative area of Doranda region, as a consequence of increase in the Residential developments with the increase in the administrative importance of the region.
5.3.1.1.c. Areas with Medium Concentration Index of Residences

Such areas include wards with a concentration index ranging between 150 and 300. These mainly include the newer developments towards the eastern, western, north eastern and south eastern edge of the City. These lie towards the outer edge of the City and have been the most recent extension of the Residential areas. These are mainly in the form of transformed arable land area and newly developed downtown areas. Besides these it also includes the most favoured locations of the City like the Up-Market Areas, Commercial Areas and Old Residential Pockets. Moreover with the increase in administrative activities in the pre-existing administrative area, the residences mainly in the form of government residences have increased.

5.3.1.1. d. Areas with Low Concentration Index of Residences

These areas include the areas in their nascent stage of development especially the north eastern edge of the City, which has not been much favoured for settlement, due to the dominance of hilly outcrops. These are also areas experiencing water scarcity. These have a concentration index less than 150. Such areas also include the HEC and the Tupudana industrial regions, which are mainly dominated by industrial set ups. The Tupudana region in its developing stage and its significance is increasing in terms of favoured sites for apartments.

In this way the Commercial areas like in ward number 36 and 26 as per the distribution index show high concentration of residences. Similarly the old Up-Market areas like in ward numbers 20 and 29, the Kokar Industrial area and ward number 51, which was earlier an down town area and gained importance due to its location near the new developed administrative area, have developed as areas with high
concentration of residences. This high concentration of residences in these areas may be attributed to the high concentration of population in these areas.

Adjacent to these lie the areas with relatively lower concentration of residences like the Up-Market areas, newly developed downtown areas, transformed arable land areas, Old Residential areas dominated by Biharis, New Administrative Area and the ResidentialQuarters of HEC, of ward numbers 32 and 21, 33,34, 13 and14, 47 and 43 and 44, respectively. Besides this ward number 19 which mainly constitutes of the Lalpur region has relatively higher concentration of residences, due to its prime location and its nearness and connectivity to the core Commercial area, administrative area, Kokar Industrial Area and other areas of significance. This area has gradually emerged as an important area where there has been a shift of Commercial activities along its roads, namely the Circular Road. The index of distribution gradually decreases towards the outer part of the City, especially in the transformed arable land areas in the north eastern part of the City, which are less developed, have less accessibility to the Commercial core and other facilities, like education, workplaces, medical facilities and other such facilities. There are fewer residences also in areas like Newly Developed Up-Market Areas, Industrial Areas of HEC and Tupudana. The Defence area has also restricted the growth of residences in its area.

5.3.1.2. Change in Household Density

The rapid increase in population has necessitated the need of residences, with the increase in the significance of the City. There has been an increase in the household density per ward as a result of this. As the Figure 5.8 indicates that there has been an expansion of households radiating from the core outwards along the
major roads. The core has become denser with residences, while the outskirts mostly still have relatively less density of residences. The overall household density increased from 2720 in 1990 to 3916, households per square kilometres in 2001. It recorded a household density of 3084 households in 2011. The fall in the figure is mainly due to changes in administrative boundaries, where the number of wards increased from 37 to 55. Depending upon the existing conditions there is uneven distribution of households in the city. The density of the households decreases from the core towards the periphery.

5.3.1.2. a. Areas with Exceptionally High Household Density

According to census 2011, maximum density of households has been reported in ward number 25 (9968 households per square kilometres). The ward mainly constitutes a part of the Commercial core of the city. Other wards having exceptionally high density of households (more than 4000 households per square kilometres), are ward numbers 18, 27, 31, 45, 16 and 46. Ward numbers 16 and 18 have been Old Residential areas. Ward number 31 is primarily dominated by Commercial activities. Ward number 45 falls in an Up-Market area. While ward number 46 which earlier was a down town area, is a newly developed Residential area. In this way the areas which have experienced increase in household density and have become exceptionally dense in terms of households include the Commercial areas, the Old Residential areas, the up-market areas and the downtown areas.
5.3.1.2. b. Areas with Very High Household Density

These are the areas mainly towards the core of the city and are the wards located along the major roads. These include the newly developed areas of ward numbers 32, 33, 34 and 48, new Up-Market areas of ward numbers 20, 21 and 8, Old Residential areas of ward numbers 14, 15, 17 and 19, the Kokar Industrial area in ward number 10, new administrative area in Doranda in ward numbers 28 and 47, ward number 44 of HEC area and the old Up-Market area in ward number 29. It is because of the location of these areas along the roads that these have developed into areas with very high household density.

5.3.1.2. c. Areas with High Household Density

These are the areas have relatively less density of household density, due to non Residential activities. These include the Commercial areas of ward number 23, administrative area in ward number 22, industrial area HEC in ward number 43 and ward number 9, which is dominated by medical services, which mainly comprise of the RIMS area. Ward numbers 12 and 53 also fall in this category with relatively less density of households due to Commercial activities. These areas have developed relatively less in terms of residences resulting in slightly lower household density, due to dominance Commercial, administrative and industrial activities.

5.3.1.2. d. Areas with Moderate Household Density

These are the areas have developed moderate household density mainly because these are newer in terms of development, like ward numbers 2, 6, 34, 35 and 37. These areas are larger in terms of area and are quite nascent in development.
However these are the areas most suitable for further urban growth. Besides these, the wards with significant amount of non Residential use have developed moderate household density like the administrative area in ward number 50 and industrial areas in ward numbers 40 and 41.

5.3.1.2. e. Areas with Low Household Density

These include the wards towards the outer fringe of the City including ward number 1, 4, 5, 36, 38 and 51. These wards are larger in terms of area and are located away from the Commercial Core of the City. Therefore these areas have experienced less growth of households. These areas again have potential for further growth of household density.

5.3.1.2. f. Areas with Very Low Household Density

The wards having developed very low density of households (less than 500 households per square kilometres) are ward numbers, 7, 52, 49, 55, 39 and 42, with the least (261 households per square kilometres). Ward number 7 is a new developing Residential area, that earlier was unoccupied. Similarly ward number 52 is a new developing Up-Market area. Besides these industrial areas of H.E.C and Tupudana (ward numbers 39, 42 and 55) have very low density of households. The average density of households in the city is 2243 households per square kilometres.

5.3.1.3. Changes in Residences by Type

There has been a variation in the occupancy of the residents in the City. A similar index for distribution of the various types of residences has been developed as for the distribution of residences (Figure 5.9 a and b). The residences cover a total
area of 29.55 square kilometres (Table 5.4.). On the basis of the nature of occupancy, the residences may be classified as follows and changes therein may be observed:

Table 5.5: Types of Residences in Ranchi, 2015

<table>
<thead>
<tr>
<th>TYPES OF RESIDENCES</th>
<th>TOTAL AREA (Square kilometres)</th>
<th>PERCENTAGE OF TOTAL RESIDENTIAL AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE UNIT RESIDENCES</td>
<td>13.02</td>
<td>44.04</td>
</tr>
<tr>
<td>BASTIS</td>
<td>13.23</td>
<td>44.77</td>
</tr>
<tr>
<td>GOVERNMENT RESIDENCES</td>
<td>2.62</td>
<td>8.85</td>
</tr>
<tr>
<td>APARTMENTS</td>
<td>0.69</td>
<td>2.34</td>
</tr>
<tr>
<td>TOTAL RESIDENTIAL AREA</td>
<td>29.55</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Based on LANDSAT TM, 140-44, 2015, Ranchi Utility Information System, JSAC

5.3.1.3.1. Single Unit Residences

The Single Residential Units are basically the privately owned residences. These cover a total area of 13.02 square kilometres; constituting 44.04 percent of the total Residential area. These have primarily developed in the oldup-market areas of ward number 20, 29, 32 and 45 and new administrative areas of ward number 28, Commercial areas of ward numbers 27 and 30 Old Residential areas dominated by the Biharis. These Single Residential Units range from single storey to five storied buildings. These have recently gone for building additional units in their premises. These are least concentrated evidently in defence areas, Industrial areas and administrative areas. The newly occupied areas also are scarce of Single Residential Units.
5.3.1.3.2. Apartments

The apartments have mainly developed in the newly occupied and the newly
developed areas, covering a total area of 0.69 square kilometres, comprising 2.34
percent of the total Residential area. Especially in newly developed downtown areas
and transformed arable land areas. The Up-Market areas and administrative areas
have also experienced emergence of apartments recently. Clusters of apartments have
developed along the Kanke Road and Lalpur area. These are the areas which have one
of the highest concentration of population. Here the demand for residences is high but
due to paucity of land there has been vertical growth of residences. These are the
areas with the highest rates of apartments.

5.3.1.3.3. Government Residences

The Government residences are mainly concentrated in the HEC area,
Doranda region (AG Colony, MECON Colony) and the administrative region
extending along the Kanke Road (CCL, CMPDI, Jawahar Nagar, Gandhi Nagar).
There has been increase in government residences with the increase in the
administrative activities in the region. The government residences comprise of 8.85
percent of the total Residential area, covering a total area of 2.62 square kilometres.
These are mainly colonies and have prevented to a large extent the encroachment of
non-government structures.
5.3.1.3.4. Bastis

The Bastis on the other hand are the unplanned mostly unauthorized residences, which have emerged between the developed areas, like the Commercial areas, administrative areas and Up-Market areas. These have emerged mainly to cater to the informal services of the developed areas. These have expanded as the City has expanded. These have often proved a threat to the development activities.

The City therefore, as apparent from the above discussion mainly comprises of Single Residential Units, followed by the Bastis which have been a consequence of the developments. Initially the area was mainly dominated by single residential units, but with the increasing population and the dearth of land high rise buildings in the form of apartments are coming up. There has been an increase in the government residences with the increase in the administrative activities in the City after the formation of the Capital.

5.3.1.4. Structural Changes in Residences

Apart from the changes in the areal extent of the residences there have been significant transformations in the structure of the residences as well, owing to the changing socio-economic and administrative conditions in the City. There have been changes in the tastes and preferences in the households and their choices to utilize land. The major changes have been discussed below.
5.3.1.4. Changes in the Units of the Dwellings

With the increasing demand for land and with a motive of maximum utilization of land, the lands within the Residential premises are brought into more productive use. There has been a significant decrease in the courtyards, kitchen and flower gardens and outhouses which have been peculiar characteristics of the residences of this region (Figure: 5.10)

![Change in Units of the Dwellings Surveyed](image)

**Figure 5.10: Changes in the Units of Dwellings Surveyed**

*Source: Field Survey*

There has been a slight increase in the parking area with the increase in the number of vehicles as a consequence of increase in come and urban needs of the households. However most of the households are mainly opting for porticos instead of separate garages. Water harvesting structures have been made compulsory for both the new constructions and the old ones. The households seeking new constructions have to have water harvesting plan in their respective building plans, to get approval.
Besides it is also mandatory for the old ones to set up their own water harvesting structures, but this has not been strictly followed. Few of the older constructions had basements but the new ones do not have such structures. Similarly earlier the households were mainly reliant on dug wells now people have been opting for other sources of water like pipeline supply and deep boring.

5.3.1.4. 2. Extension of Houses

After the formation of the capital City, remarkable areal extension of the built-up areas has been observed, to cater to the Residential needs of the growing urban population. Also after the formation of the capital the income of the households has increased as reported early, so such households have gone for extension of their existing buildings or building up new ones. Around 57.53 percent of households from all income groups have gone for extending their Residential units on the open spaces available or on less productive use of spaces. On the other hand 42.47 percent of them have built new buildings in such available areas or by demolishing the earlier ones (Figure 5.11).

Figure 5.11: Extension of Sample Houses
Source: Field Survey
Most of the households with relatively larger areas have sold their lands to build apartments and have been given a unit in those. This has been a very rapid practice as a consequence of which apartment culture has replaced the early existing traditional structures.

### 5.3.1.4. 3. Major Replacements in the Houses

Most of the units in the households have been replaced by extension and building of new buildings. However 37.43 percent of households show no such replacements.

![Figure 5.12: Major Replacements in the Houses](source: Field Survey)

It has been reported 21.14 percent of the households, have built new buildings and extended their residences, by demolishing the existing old ones and 18.57 percent of them report replacement of open spaces. Cultivated areas have been largely replaced as reported by 8.86 percent of the households. With the increasing demand for buildings flower and kitchen gardens have been reduced to a large extent. The new constructions are no more having outhouses. The pre-existing outhouses have been renovated for rent purposes. Many of them have been renovated and attached to the main residential unit. Earlier the houses had separate garages for parking but now they use porticos for parking.
5.3.1.4. 4. Vertical Extension

After the formation of the capital City rapid vertical extension of the buildings has been observed, in the form of addition of floors, which are primarily used for rent purposes. However, 45.71 percent of the households show no such addition.

**Figure 5.13: Vertical Extension in Sample Houses after Capital Formation**

*Source: Field Survey*

The above figure shows, after the capital formation 30 percent of them have added 1 floor, 20 percent have built-up 2 floors and 4 percent of them have added 3 floors. An addition up to 4 floors has been observed in 0.29 percent households, especially in the Commercial areas. In the Commercial areas it has been observed that, multi storied buildings are used both for Residential as well as Commercial purposes. Apart from rent the additional floors are being put to Non-Residential uses such as shops and offices. Normally the ground floors are used for Commercial purposes and the upper ones for Residential. The newly constructed multi-storied buildings have parking lot in the ground floor and the upper floors are used for Residential or Commercial purposes.
5.3.1.4. 5. Additional Use of Residences

With increase in Commercial and Residential demand in the City after the formation of the capital, the residences are also being used for non Residential purposes as well. About 48 percent of the surveyed households use parts of their residences for rent purposes mainly for residing or for renting them out for small Commercial purposes.

![Figure 5.14: Additional Use of Sample Residences](image-url)

**Figure 5.14: Additional Use of Sample Residences**

**Source: Field Survey**

The remaining households use their residences for carrying out small Commercial activities like coaching, food joint, handicrafts, lodge, parlour, shops and tailoring. Most of these activities have been a result of the increasing population of the students coming from neighbouring areas. Most of such activities are taken up by the females. 3.80 percent report to use parts of their residences for religious purposes like for holding church fellowships.
5.3.2. Change in Commercial Land Use

There has been an increase in the Commercial activities in the City with increasing demand of an increasing urbanizing population. Large portion of land in the City, which is under Commercial land use, is because of the administrative nature of the City. Most of the Commercial development is adjacent to the major streets or traffic corridors however, most of the Commercial activities are concentrated in the Central Business District (CBD) of the City. The City generally lacks planned Commercial areas and there is no hierarchy of Commercial centers existing in it. In fact, all the existing Commercial development has come up in linear fashion. Mixed Land Use characterizes most of the areas with Commercial activities being carried out in the ground floor.

The Commercial areas basically include:

Table No.5.6: Commercial Establishments in Ranchi

<table>
<thead>
<tr>
<th>COMMERCIAL ESTABLISHMENTS</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale</td>
<td>Pandra Bazaar, Harmu Bazaar</td>
</tr>
<tr>
<td>Wholesale-cum-Retail</td>
<td>Upper bazaar, Utensil market (Church Road) and Daily market</td>
</tr>
<tr>
<td>Retail shops</td>
<td>Albert EkkaChowk to Kadru Junction</td>
</tr>
<tr>
<td>Service Shops</td>
<td>Distributed throughout the City</td>
</tr>
</tbody>
</table>

Source: Field Survey

5.3.2.1. Wholesale Activities

Ranchi is one of the important wholesale centers in the region. Being centrally located and well connected, it is the most favoured trading destination.
Besides increase in the wholesale activities, these have become specialized. The locations of the major wholesale activities are as follows:

**Table 5.7: Distribution of Wholesale Markets**

<table>
<thead>
<tr>
<th>WHOLESALE MARKETS</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food-Grains and Perishable Items</td>
<td>Pandara Bazar</td>
</tr>
<tr>
<td>Fruits and Vegetables</td>
<td>Harmu Bazar</td>
</tr>
<tr>
<td>Clothes and Books</td>
<td>Upper Bazar</td>
</tr>
<tr>
<td>Utensils</td>
<td>Church Road</td>
</tr>
<tr>
<td>Electronics</td>
<td>Daily Market</td>
</tr>
</tbody>
</table>

*Source: Field Survey*

### 5.3.2.2. Retail Activities

Retail shopping areas are important as these create an image of the City. In Ranchi retail shops are spread all over the City; however, the Upper Bazaar area is the major City level retail trade centre. With increasing urbanization there has been specialization in the retail activities. These retail activities may be classified into the following:

#### 5.3.2.2.1. Shopping Malls and Shopping Complexes

The Mahatma Gandhi Marg, has come up with most of the big shopping malls and shopping complexes, beginning from Albert Ekka Chowk to Kadru Chowk. Important among them are Firayalal Shopping Mall, Shastri Market, Kashmir Vastralaya, Anjuman Plaza, Capitol Hill, G.E.L. Church Complex, Sainik Market, Hi-Street Mall, Roshpa Tower, Big Bazar and Ranchi Club Complex. This has been an important stretch for retail activities. However due to over-congestion in these areas
new developments are difficult. Therefore these activities have spilled over to other regions.

5.3.2.2.1. a. Spill Over of Big Retail Activities

The bigger retail activities in the form of Shopping Malls and Complexes have spilled over to major corridors like Circular Road, Kanke Road, Harmu Road and Hinoo Road. Most of the new shopping Malls have developed along these corridors. These include, Eastern Mall, Crosswords, Amaravati Complex, Hari Om Tower, Addidas, Woodland, Kelvin and Hobbes, Puma, Reebok, Tanishq etc along the Circular Road. The Kanke Road includes, Fab India, Reliance Mega Mart, Liberty etc. Retail Chains like Vishal Megamart are located in the Harmu Road. While Hinoo Road is the hub of new shopping malls, like Spring City mall, with Fun Cinema and Eyelex.

Besides this most of the renowned retail outlets have opened there branches in different parts of the City to cater to the demands of the residents.

5.3.2.2.2. Departmental Stores

With increase in the Residential areas, retail activities have developed in such areas to cater to the consumer needs. These are found almost in every Residential locality within a distance of 500 meters. Most of the departmental stores in such areas are carried out in a part of the residences. This is mainly taken up as secondary source of income and is managed mainly by the females.
5.3.2.2.3. Newly Emerged Retail Activities

Besides the above retail activities various other activities have emerged. Such activities include stationary, hardware, sweet, mobile, gift, tailoring shops, parlours, internet cafes, tent houses, catering services, pharmacies, etc. Treated water suppliers have been recent addition to such activities with the increasing drinking water problem.

5.3.2.2.4. Bazaars and Weekly Markets

Informal Commercial activities in the form of bazaars and weekly markets have also increased with the increasing demands of the City. These mainly deal with fresh vegetables and fruits, fish and meat. Such bazaars which deal with such stuff daily are set up mostly twice in a day, in the morning and evening, normally from 6 A.M. to 10 A.M and 4 P.M. to 8 P.M. Kanke Bazaar, Morhabadi Bazaar, Namkum Bazaar, Bahu Bazaar and Shalimar Bazaar are the five major weekly markets in the Ranchi. Except Bahu bazaar market, all other markets are situated on the out-shirts of the City. These markets are held twice in a week.

The Commercial Developments may be further classified into the following

5.3.2.2.5. Development of Permanent Commercial Activities:

These include such Commercial activities which have permanent structures and are registered ones. These cover a total area of 6.924 square kilometres and are 2748 in number, scattered in the City. On the basis of number of such set ups per ward these activities may be divided into:

Very High (More than 150 units)
These mainly include the Commercial activities in the Commercial core of the city, mainly in ward number 23, that is the Upper Bazaar region. This area constitutes of wholesale-cum-retail activities. Ward number 19 is a newly Commercialized area, which has experienced a spill over of Commercial activities and where permanent set ups have developed along the entire Circular Road running across this ward. Ward number 36 is also a new Residential development, which has experienced Commercial development along the entire Harmu Road. This is an extension of the wholesale and retail activities of the Upper Bazar region. Besides these several permanent Commercial activities have developed in the Kokar Industrial Area, with the increase in the industrial activities and the development of township in this area. This area mainly deals with motor vehicles, motor parts, building materials, tools, implements, fittings etc. This area has developed mixed type of Commercial activities, dealing with both Residential and industrial needs.

High (100 to 150 units)

Other areas that have developed relatively large number of permanent Commercial activities area the Commercial area of ward number 24, dealing mainly in retail activities. Besides this large number of permanent Commercial activities have developed along the roads of the Residential areas such as the newly developed Up-Market areas of ward number 32 and Old Residential pockets of ward number 15. These activities mainly deal with the day to day needs of the Residential area.

Medium (50 to 100 Units)
The regions with relatively less number of permanent Commercial activities include the retail activities of ward numbers 30 and 31, newer Residential developments on the earlier cultivated lands towards the outskirts of ward numbers 4, 5, 33, 34, 35, Up-Market areas adjacent to the administrative regions, of 1, 21 and 29 and the administrative area in ward number 22. The Tupudana Industrial area is also an area of developing area, catering the Residential needs of the growing population. Thus to meet the industrial and the Commercial needs, Commercial activities are developing but are in a nascent stage.

*Low (less than 50 units)*

The areas especially the administrative areas, HEC area, Defence area, Up-Market areas, Government Quarters, areas in their nascent stage of development and the areas away from the Commercial core of the City have developed low permanent Commercial developments. The Commercial activities in the Commercial areas of ward numbers 26 and 27 area are not permanent in nature. These mainly include the Lower Bazaar area mainly dealing with smaller retail activities.

5.3.2.2.6. Development of Temporary Commercial Activities:

These are the activities which are mostly not permanent or are semi permanent in nature and most of these have not been registered. There are around 14140 temporary or semi-permanent Commercial activities in the City covering a total area of 7.56 square kilometres, that is higher than that of the permanent activities.

Such activities have mainly developed in areas where permanent Commercial set ups cannot be developed. These include mainly smaller retail activities catering to the limited needs of the residents. These have mainly developed in the
Residential areas. Ward number 25 is a Commercial area which mainly comprises of temporary Commercial activities, mainly in the form of vegetables, fruits and perishables. It also comprises of the Daily Market area dealing with clothes and garments in sheds.

Besides this the Old Residential areas, Up-Market areas, government areas, industrial and administrative areas have few numbers of such activities to cater to their daily needs.

5.3.3. Change in Administrative Land Use

Ranchi was designated as the state capital of Jharkhand, when it got its autonomous status on the 15th of November 2000. There has been a remarkable increase in the administrative importance of the City. With the separation of the state there also was separation of administrative functions. A completely new administrative set up of the Government of Jharkhand was formed. New Administrative buildings came up. The administrative area of the City can be divided into three broad regions:

5.3.3.1. Changes in the Old Administrative Area

The old administrative area covers most of the part of ward number 22. This mainly constitute of the old buildings that existed before the separation of state, like the Commissioner’s Office, Kutchery, Ranchi Municipal Corporation, Ranchi Regional Development Authority, District Transport Office etc. However new structures have indeed come up after the formation of the Capital. One of the major additions was the State Administrative Building with most of the state Government Departments in it. Adjacent to it lies the Governor’s House, even before the formation
of the Capital. The new additions adjacent to this area are the Judicial Academy, New Administrative Training Institute, SoochnaBhawan, Anti-Corruption Department, Fire Brigade Service and government residences like the Speaker’s residence, Judges’ residences, the Chief Ministers residence and residences of administrative officers and ministers. Since this administrative area is situated near the Commercial core of the City and is nearly exhausted with establishments with no scope of expansion, few administrative services were forced to be shifted to new areas.

5.3.3.2. The Newly developed Administrative Area in Doranda

In order to accommodate the administrative services of the state another administrative area was developed covering ward numbers 28, 47 and 50. This area includes the State Secretariat with all the offices of the principal secretaries of different departments. The State Secretariat took over the pre-existing building, Nepal House. Few other buildings were added as well. Adjacent to it lies the newly formed Jharkhand High Court, which earlier was a district high court. The pre-existing court premises underwent extension and renovation of buildings. This area had few government residences of the Bihar regime, which were renovated. Few new establishments were added like the Judges Colony, the Forest Colony, Electricity Board Colony etc. This area includes the Attorney General’s Office, along with its training institute and residences. In order to cater to the needs of the residents of these areas an extension of the Ranchi Municipal Corporation was set up. The Van Bhawan was also a new addition in the Doranda region.

5.3.3.3. The New Industrial-cum-Administrative Area

Adjacent to the Doranda administrative area lies the most recent administrative area that is the H.E.C Industrial-cum-Administrative area. This area is nearest to the
airport and is well linked with VIP road with the other administrative areas. H.E.C in the late 90s started undergoing losses most of its producing units were closed. As a consequence the state government took most of its structures to utilize them for administrative functions. The Legislative Assembly was set up in the earlier Russian Hostel, meant for Czech experts and trainees of HEC. Other buildings of the industrial township were taken by the Fisheries department, Project Building, with different regional administrative departments, Ministry of Human Resource Development, Jharkhand Space Application Centre, Social and Women Welfare and other State offices.

5.3.4. Change in Industrial Land Use

Industries occupy a major portion in the land use of the City and have been responsible for bringing changes in other land uses, especially in terms of infrastructure and Commercial activities.

5.3.4.1. Types of Industries

As represented in Figure.5.18.a the total area covered by the industries at present is 6.88 square kilometres out of which 71.70 percent comprises of industrial estate, 22.31 percent is covered by medium scale industries and 5.99 percent area comprises of light industries.

5.3.4.1.1. Industrial Estate

The industrial estates include the large scale industries, covering a total area of 4.93 square kilometers. More than 15 large scale units, including 7 Public Sector Units have developed. These include Heavy Engineering Corporation, Dharwara, Marine Diesel Engine Project, Garden Reach Ship Builders Limited, Dharwara, Central Coalfields Limited, Ranchi, Metallurgical Consultant Limited, Doranda, Steel
Authority of India Limited, Hinoo, Central Mining and Planning Design Limited,
Kanke Road, Ranchi Ashok Bihar Hotel Corporation Limited, Doranda, Ranchi,
Bharat Sanchar Nigam Limited. The Public Sector Undertakings include Jharkhand
State Electricity Board, Ranchi Industrial Area Development Authority, Jharkhand
State Tourism Development Corporation, Jharkhand State Tribal development
Corporation, Jharkhand State Scheduled Tribe Development Cooperative Society,
Jharkhand State Scheduled Tribe Development Cooperative Society, Jharkhand
Government Tool Room and Training Center etc. HEC is the main large scale
industry of this region. However new industrial areas have emerged as shown below.

![Figure 5.18a: Types of Industries in Ranchi](source: Based on Land Use Classification, 2015)

Besides HEC the new areas that have developed are Tupudana, Kokar,
Namkum and Tatisilwai. Except the Kokar Industrial area all the other units have
developed towards the periphery of the City. The Getalsud area is still in a developing
stage. The growth of these industries has been mainly on the agricultural lands which
have been now left vacant for non agricultural use.
The expanse of the Tupudana Industrial Area is maximum covering a total area of 0.92 square kilometres (Figure 5.19). The other industrial areas which were initially engaged in medium scale undertakings have developed their ventures. The Getalsud area acquires a total area of 0.41 square kilometres but is in its nascent stage of development. The Namkum, Tatisilawai and Kokar area though have been existing since a very long time of industrialization of the City but these have gained importance in the recent years.

5.3.4.1.2. Medium Scale Industries

More than 21 medium scale industries covering a total area of 1.54 square kilometres have emerged in the City. The industries that have gained importance are:

- **Agro–based Industries**, like horticulture, animal husbandry, dairy, fisheries and food processing.

- **Modern Industry**, like Infrastructure, Mineral-based, Handloom, Khadi, Handicrafts, Sericulture, General Engineering, Foundry and Forging,

- **Service-based Industries**, like, Tourism and Information technology, Entertainment, have gained importance recently.

**5.3.4.1.3. Light Industries**

These include the micro and small enterprises and artisans units, covering a total area of 0.41 square kilometres. These are the units that are gaining importance. A diversification can be seen in the small scale undertakings, as shown in Table 5.8

**Table 5.8: Micro and Small Enterprises and Artisans Units in Ranchi**

<table>
<thead>
<tr>
<th>TYPE OF INDUSTRY</th>
<th>NUMBER OF UNITS</th>
<th>INVESTMENT (IN LAKHS)</th>
<th>EMPLOYMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO-BASED</td>
<td>383</td>
<td>2006.92</td>
<td>1590.00</td>
</tr>
<tr>
<td>COTTON TEXTILE</td>
<td>503</td>
<td>2635.72</td>
<td>2087.00</td>
</tr>
<tr>
<td>WOOLEN, SILK AND ARTIFICIAL THREAD BASED CLOTHES</td>
<td>43</td>
<td>225.32</td>
<td>178.00</td>
</tr>
<tr>
<td>JUTE AND JUTE BASED</td>
<td>149</td>
<td>180.76</td>
<td>618.00</td>
</tr>
<tr>
<td>READYMADE GARMENTS AND EMBROIDERY</td>
<td>67</td>
<td>351.08</td>
<td>278.00</td>
</tr>
<tr>
<td>WOOD/WOOD-BASED FURNITURE</td>
<td>1054</td>
<td>5522.96</td>
<td>4374.00</td>
</tr>
<tr>
<td>PAPER AND PAPER PRODUCTS</td>
<td>23</td>
<td>120.52</td>
<td>95.00</td>
</tr>
<tr>
<td>LEATHER BASED</td>
<td>355</td>
<td>1860.2</td>
<td>1473.00</td>
</tr>
<tr>
<td>CHEMICAL/ CHEMICAL BASED</td>
<td>341</td>
<td>1786.84</td>
<td>1415.00</td>
</tr>
<tr>
<td>RUBBER PLASTIC and PETRO BASED</td>
<td>55</td>
<td>2017.74</td>
<td>228.00</td>
</tr>
<tr>
<td>MINERAL BASED</td>
<td>249</td>
<td>1304.76</td>
<td>1033.00</td>
</tr>
<tr>
<td>METAL BASED</td>
<td>22</td>
<td>115.28</td>
<td>91.00</td>
</tr>
<tr>
<td>ENGINEERING UNITS</td>
<td>3385</td>
<td>1773.74</td>
<td>1405.00</td>
</tr>
<tr>
<td>ELECTRIC MACHINERY AND TRANSPORT EQUIPMENT</td>
<td>972</td>
<td>5093.28</td>
<td>4044.00</td>
</tr>
<tr>
<td>REPAIRING and SERVICING</td>
<td>1135</td>
<td>5952.64</td>
<td>4710.00</td>
</tr>
<tr>
<td>OTHERS</td>
<td>1763</td>
<td>9238.12</td>
<td>7316.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10499</strong></td>
<td><strong>40185.88</strong></td>
<td><strong>29345.00</strong></td>
</tr>
</tbody>
</table>

*Source: RIADA, 2011*
Important among these are the engineering units which comprise of 32 percent of the total units, followed by repairing and services, comprising of 11 percent of the undertakings, the wood and wood based industries have gained importance with increasing residences, Commercial areas and offices. Another sector that is significant is the electric machinery and transport equipment. Besides several other small scale undertakings have developed, as mentioned in Table 5.8.

5.3.5. Changes in Land under Public Facilities

The main reason commuting in the households have been work, education, entertainment and shopping for daily and other needs. These needs mainly comprise of domestic needs.
Most of such facilities are available within a distance of 1 kilometer to 5 kilometers (Table 5.9). Most of the households (71.8 percent) reported to have their work places between distances ranging between 1 kilometer and 5 kilometers, 69.8 percent have entertainment facilities like cinema halls and restaurants within this distance. With the increase in the influx of young population in the City in recent years, such facilities have increased. Shops for daily needs are available within this distance for 67.8 percent of the sample. There has been a remarkable increase in the grocery shops and vegetable and fish markets with the increase in the Residential areas. Educational facilities are also available for 67.5 percent of the households, within this distance. The areas like Residential Quarters and few apartments have such facilities within a distance between 500 meters to 1 kilometer. The newly developed and settled areas especially towards the outskirts of the City have such facilities available beyond a distance of 10 kilometers.
Table 5.9: Accessibility to Basic Facilities
(Figures represent percentage of surveyed wards)

<table>
<thead>
<tr>
<th>DISTANCE FROM HOUSEHOLDS</th>
<th>LESS THAN 500M</th>
<th>500M TO 1 KM</th>
<th>1KM TO 2 KM</th>
<th>2KM-5KM</th>
<th>ABOVE 5 KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH</td>
<td>23.4</td>
<td>72.6</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST OFFICE</td>
<td>25.1</td>
<td>67.1</td>
<td>7.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLICE STATION</td>
<td>18.9</td>
<td>87.4</td>
<td>13.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS STAND</td>
<td>15.4</td>
<td>65.1</td>
<td>16.0</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>TAXI AUTO</td>
<td>22.0</td>
<td>65.1</td>
<td>12.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAILWAY STATION</td>
<td>2.9</td>
<td>11.4</td>
<td>19.4</td>
<td>65.1</td>
<td>1.1</td>
</tr>
<tr>
<td>AIRPORT</td>
<td>1.4</td>
<td>7.4</td>
<td>8.3</td>
<td>7.1</td>
<td>75.7</td>
</tr>
<tr>
<td>BANK</td>
<td>23.4</td>
<td>67.7</td>
<td>8.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FUEL STATION</td>
<td>10.0</td>
<td>15.1</td>
<td>69.4</td>
<td>4.9</td>
<td>.6</td>
</tr>
<tr>
<td>COMMERCIAL CENTER</td>
<td>8.9</td>
<td>16.0</td>
<td>67.1</td>
<td>6.0</td>
<td>2.0</td>
</tr>
<tr>
<td>ATM</td>
<td>25.1</td>
<td>67.1</td>
<td></td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>COOKING FUEL</td>
<td>34.0</td>
<td>63.4</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROCERY</td>
<td>42.9</td>
<td>57.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEGETABLES</td>
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Source: Field Survey

5.3.5.1. Accessibility to Public Facilities and Land use Change

On enquiring the sample, why they have been residing in that particular location, it was found out that, the choice of proximity to the basic services has always been a preference of the households.
The sample includes 80.86 percent such households, which have chosen nearness to the basic services. Proximity to education and work place, land prices and rent, have been other preferred choices. With the increasing congestion of the City 2 percent report to have moved out of the City. 2 percent preferred accessibility to roads while others prefer to stick to their ancestral place. Therefore, accessibility to public facilities has played an important role in residential development, affecting the change in land use.

A Z-score analysis has been done to make the above argument stronger (Annexure 1). Each available facility in each ward is ranked (from 1 to 5), on the basis of their proximity. Thereafter, the frequencies of the ranks are taken out. Further weightages (from 1 to 5) are assigned to the frequencies of ranks. Rank one is
assigned a weightage of 5 and rank 5 has been assigned the lowest weightage of 1. Finally the Z-Score is calculated by adding the weighted ranks for each ward.

5.3.5.1. a. Areas with Easy Access to Facilities

These include such areas which have a Z-Score more than 85, on the basis of accessibility of facilities. These areas mainly include the relatively planned areas. The newly developed areas are being developed along with these facilities. Therefore the new developments show a higher Z-Score value. The Commercial area of Ward number 23 and the administrative area adjacent to it have the maximum value of Z-Score which is indicative of easy access to public facilities. These areas are located in the core of the City and have developed important facilities like medical, banks and ATMs, transport, Commercial Centre, Post Office, Police Station and other domestic and daily needs. Besides this the planned area of H.E.C Industrial Township and Administrative area in Ward number 41 and 42, the New Up-Market Area of Ward number 52 and the new Residential developments of Ward number 54, which are emerging as planned areas also have developed because of easy access to such facilities.

5.3.5.1.b. Areas with Fair Access to Facilities

These include most of the parts of the City. The accessibility is higher in areas near the Commercial Core of the City, like Ward number 26 and the planned areas like, Government Residences, in Ward numbers 2, 3 and 48, Up-Market Areas, in Ward numbers 1, 8 and 29, Administrative Areas, in Ward numbers 28 and 47 and the Industrial Areas, in Ward numbers 55 and 10. It has been seen that the Commercial areas have developed almost in every part of the City and other facilities are also available within a distance of 1 kilometer. The new developments that are coming up,
especially in Ward numbers 4, 7, 34, 36, 37 and 38 also have simultaneous
development of public facilities as they are developing. The Old Residential Pockets,
in Ward numbers 11, 13, 14, 15 and 19, which have some prospect for development
have also developed public facilities.

5.3.5.1. c. Areas with Limited Access to Facilities

The areas which are in their nascent stage of development or are already
exhausted with built-up and have no scope of further development, have limited
access to facilities. These are located away from the Commercial core. These include
Ward number 6 which is located quite far from the Core of the City. Though these
areas have sufficient space for development but the facilities are still developing.
Similarly Ward number 35 is still in a developing stage, inspite of its location
adjacent to the Commercial area. The Old Residential Pockets of Ward numbers 12
and 17 are already exhausted to incorporate further addition of public facilities. The
Commercial area of Ward number 27 is also not in a condition to support further
addition of facilities. Therefore such areas lack access to public facilities.

Therefore a dual impact on the City may be inferred. On one hand the new
areas are emerging because of the available facilities and on the other hand the
facilities are increasing as new areas are emerging. Consequently the rate of change in
land use is higher in the new developing regions.

5.3.5.2. Inconsistency in the Distribution of Public Facilities

There indeed has been increase in the public facilities in the City after its
formation. However if the distribution of such facilities is looked into, an in-
consistent distribution of few facilities has been observed.
**Parks**

The newly developed parks in the City have mainly developed in the outer parts of the City. These are 28 in number and cover a total area of 0.293 square kilometres. These are confined towards the north-western part of the City, mainly covering ward numbers 1, 2, 3, 4, 5, 22, 33, 34 and 35 the other wards of the City are devoid of any such parks.

**Fire Safety**

The City has become quite congested in terms of Commercial and Residential areas. In such a situation incidences of fire may cause great loss to life and property. Therefore it is necessary for the City to have a strong fire safety system. However the City has only 4 Fire Stations confined only to the Administrative areas in ward numbers 22, 29, 35 and 43. The Residential and the Commercial areas have no such facilities. Moreover with unplanned roads and road blocks the accessibility is quite poor.

**Cemetery and Cremation Grounds**

There are more than 58 Cemeteries in the City. A total of 2 Cremation Grounds exist in the City, specifically in on the banks of Subarnarekha and Harmu rivers in ward numbers 49 and 30. The City lacks electric cremation facilities. These cover a total area of 0.379 square kilometres. There is a remarkable inconsistency in the distribution with several wards lacking these facilities. However these are such facilities which cannot be established in every kind of location.
**Stadiums and Playgrounds**

The City has a noticeable importance in terms of sports. The potential of the area has been identified by the Ministry of Sports and Youth Affairs and several stadiums have been erected. The City has faced major infrastructural changes after the 34th National Games and IPL matches. Major Stadiums developed after the formation of the state are

- Khelgaon Mega-Sports Complex (ward number 7)
- JSCA International Cricket Stadium (ward number 40)
- BirsaMunda Hockey Stadium (ward number 2)
- BirsaMunda Athletics Stadium (ward number 2)
- BirsaMunda Football Stadium (ward number 2)

There are around 51 playgrounds covering an area of 570 square kilometres. These are mainly concentrated in ward numbers 2, 3, 4, 29, 36, 40, 47, 50 and 53, which have more than 2 playgrounds, while others are lacking these.

All the above developments have resulted in the form of built up area, that have caused the built up area to increase. This increase in the built up area has been mainly at the expense of agricultural land and water bodies.

**5.3.6. Change in Agricultural Land Use**

As discussed earlier and is clear from Figure: 5.3, there has been a significant has been a continuous decline in the agricultural area with the increase in the built up area, as a consequence of developmental activities. Major transformation of
The agricultural land area has been mainly been into built up area (table nos. 5.2 and 5.3). The agricultural land surrounded the urban area of the City, which has gradually reduced. Most of the households earlier engaged in cultivation, have switched to non-farm activities, which may be attributed to the following:

5.3.6.1. Factors for Switchover to Non-Farm Activities

Low land productivity

The region primarily possesses an undulating terrain. As a consequence of this the rate of leaching is high, that gives a highly infertile soil to this region. Therefore the productivity of land has been very low.

Uncertainty in Rainfall over the years

The cultivators in this region are mostly dependant on monsoon rains, which has been quite uncertain. The uncertainty has increased in the later years, because of which the cultivators often have to face crop failures.

Practice of Mono-Cropping

The region mainly practices mono-cropping, which is mainly confined to the rainy season, essentially due to lack of adequate agricultural development. Moreover with the uncertainty of rainfall the net return from agriculture is quite low.

Poverty

Jharkhand has been a poor state in terms of income. With low per capita income the cultivators have been unable to take up innovative techniques to
production and to bring structural changes in their fields, as a result the yield of land remained low.

**Alternative Source of Income**

With the inception of the new state and Ranchi becoming the State Capital, there has been an increase in several employment opportunities. With decreasing net returns from agriculture and better income generating sources the agricultural lands have been put to non-farm activities.

**Industrialisation and Infrastructural Development**

The process of industrialization gain pace with the formation of the Capital City. The industrial activities encroached into the agricultural land to accommodate their functioning. Industrialisation has also strengthened the infrastructure that largely consumed the agricultural land, which lie unevenly distributed in the region posing a hindrance to the development plan of the region.

**Educational Development**

With educational development along with the development of the city the children of the cultivators became educated, after which they lacked willingness to engage themselves in farm activities and looked towards better career opportunities and most of them migrated out.

**High Labour Cost**

The human labour in the households decreased due to better employment opportunities. Agricultural labourers were hired but there was manifold increase in the
labour cost. The ultimate income from that particular piece of land turned out to be much lower than other alternative sources of income.

Real Estate and the Chotanagpur Tenancy Act

The inception of the Capital City and subsequent sectoral demand increased the demand for residences. This gave a boost to the real estate. According to the Chotanagpur Tenancy Act, a tribal land can be sold only to a tribal. Keeping this in view most of the agricultural land especially towards the boundary of the City, which mainly belonged to the tribal community were given to tribal real estate developers.

As a result of the above factors, the agricultural land has been encroached by the developmental activities on one hand and on the other the hand cultivators due better returns have been willingly transforming their land for non-farm activities. At present most of the agricultural land are left vacant.

5.3.7 Shrinkage of Water Bodies

From the environmental point of view the City has been adversely affected, with the encroachment of river catchment and other water bodies, for developmental activities. In 1990, the total area under the surface water bodies was 64.19 sq. km, which reduced to 62.65 square kilometres and remained 58.61 sq. km. in 2015.
There are three major water bodies in the City namely, Ranchi Lake, Kanke Reservoir and the Hatia Reservoir, fed by streams, which themselves have been reducing due to the encroachment of their catchment area. The area under the major reservoirs of the study area (Kanke Reservoir, Ranchi Lake, Hatia reservoir) has undergone shrinkages.

5.3.7.1. Changes in Major Water Bodies

5.3.7.1.a The Kanke Reservoir

The Kanke Reservoir had an area of 16.93 square kilometres in 1990, reduced to 15.68 square kilometres in 2005 and 11.81 square kilometres in 2015. This is a reservoir that lies in a Up-Market area and has experienced emergence of high rise structures around its vicinity, particularly after the formation of the Capital City. A total of about 4, 52,000 population is dependent on this reservoir. Incidentally this is
the area that has the permit of construction of buildings up to G+13 floors. Clusters of apartments can be seen in this area.

5.3.7.1.b Ranchi Lake

The Ranchi Lake being situated in one of the most densely populated area of the City has been adversely affected by the development of the City. Initially with an area of 17.97 square kilometres in 1990, its area reduced to 17.02 square kilometres in 2005 and remains 10.35 square kilometres in 2015. The area around it is the prime Commercial area of the City, which has experienced rapid Commercial development along with congestion.

5.3.7.1.c Hatia Reservoir

The Hatia reservoir mainly serves the H.E.C area and the adjoining localities, covering a total population of more than 75,000. It has reduced from 34.73 square kilometres in 1990, to 30.64 square kilometres in 2005 to only 22.38 square kilometres in the year 2015. The H.E.C area has emerged as the new administrative area, where the government offices of the state, including the Legislative Assembly, were set up after Jharkhand getting the autonomous status, as most of the units of H.E.C had stopped functioning and it was undergoing losses.

5.3.7. 2. Decline in the Number of Ponds

Besides, with the decrease in the recharge zones due to increase in the built-up areas, the water bodies like ponds and lakes have been reduced. Ranchi has had a rural culture of *dobhas* and *talabs*. However due to increase in Residential demand, Commercial development and other developmental activities, these are disappearing
rapidly. The early settled Residential areas like those in ward numbers 12, 13 and 14, which were mostly engaged in vegetable farming, which had abundance of ponds, have been devoid of them and have been transformed into an area of compactly settled area. The vegetable gardens have been converted to residences and Commercial set up. The residents have converted their houses into multi-storied buildings. The courtyards have been used for extension. The area at present is an important area for lodges and hostels, being close to the educational institutions, catering to the needs of the students from outside the City. Residential cum Commercial set ups are evident in these areas.

Ranchi City after becoming the state capital has undergone significant changes in its, demographic, administrative, socio-economic and socio-cultural set up. There has been an increase in urban culture in the City. There have been infrastructural developments in the City with implementation of the Nagar Palika Act. All these have necessitated structural changes to go with these. This has altered the land use of the City.

The areal extent of the water bodies has been depleted significantly as a consequence of increase in other land use specifically that of built-up area, in the form of residences, Commercial set ups, infrastructure and public facilities.

The river catchments are being encroached by built-ups. Due to less usage of ponds and depletion of rural culture ponds are being filled for urban needs.

Recharge zones have also undergone a decline with the increase in built-up area and concrete roads and surroundings, resulting into drying up of water bodies. The encroachment of Commercial activities on the catchment of the water bodies have been to cater to the needs of the developing capital City and due to the
increasing opportunities in the Commercial sector. Decrease in the amount of rainfall and the increase in temperature of the City have also to an extent affected the shrinkage of the water bodies.

Besides the agricultural land and water bodies, vegetation has also undergone a decline.

5.3.8. Impact of Defence Land on Land Use Change

The main defence area of the City lies towards the eastern boundary, near the Namkum Region. The area being a defence area is planned in nature and prevents encroachment of other land uses in this area. Besides training areas, offices and army residences, the area is well equipped with small shopping areas for daily needs, schools, health centres and other minor public facilities. Other important Cantonments however with smaller expanse lie in the Bariatu and Dipatoli region, which lie between the mixed land uses. These areas have prevented the encroachment of other land uses in their areas.

Besides defence land the rocky outcrops have prevented expansion of development activities in such areas.

5.4. SUMMARY AND CONCLUSION

The City has observed changes in its land use after the formation of the City and the changes in the socio-economic conditions therein. The change in the land use has mainly been in the form of built-up area which mainly comprises of Residential, Commercial, Industrial, Administrative and Public Facilities. These changes have been taken place by transforming the other land uses such as agricultural, water bodies and vegetation. The rate of change of land use has been more rapid after the
formation of the Capital specifically in terms of Built-up area. The new developments have taken place mainly towards the outer boundary of the City. However the Defence land has restricted this growth. As the city is expanding outwards the public facilities are subsequently increasing in these areas.