Chapter II

THE STUDY AREA

2.0. INTRODUCTION

Ranchi is the Capital of the newly formed state of Jharkhand. Before being upgraded as the state capital it was serving as a district and commissionary headquarter. Several historical factors have been responsible for its origin, in 1834. It has been a center for administration ever since the period of the British. The establishment of the Heavy Engineering Corporation has been one of the major causes of the urbanization in this area. Coupled with urbanization new economic policies have brought about economic development in this region. There has been a rapid growth in the city after getting the status of a capital city. All these have brought about a remarkable change in the land use of this area.

2.1. LOCATION AND AREA

The study focuses on the Ranchi Municipal Area. The Study area, Ranchi city, lies roughly between 23°15’ N to 23°25’ N latitudes and 85°15’ E to 85° 25’ E longitudes. It is an integral part of the Chhotanagpur Plateau of India. It is a part of the Ranchi District of the Jharkhand State of India (Figure 2.1). The city is situated at an altitude of 618 meters above the mean sea level. The area of the city as per Ranchi Municipal Corporation (RMC) boundary is 177.19 square kilometres. This includes 55 municipal wards (as per 2013 municipal elections).
2.2. PHYSICAL SETTING OF THE STUDY AREA

Ranchi city primarily is a plateau region surrounded by hills on all sides, because of which the extension of the city is confined. It has a favourable moderate type of climate for human settlement. The warm and humid climate with granite and gneiss soil base has led to the growth of thick sal forests. All these have shaped up the present socio-cultural conditions of the region, which along with the physical conditions shape up the land use of the area.

2.2.1. Physiography

The Ranchi district is a part of the Ranchi plateau, located in the central part of the Chotanagpur plateau. This is the largest among the higher plateaus of the Jharkhand region. It is bounded by Pats in the west, the Damodar basin in the north, the Subarnarekha and Kharkairivers in the south-east. The limit of the plateau is determined by the 2000 feet contour on three sides, north, east and south, while 2,400 feet contour that toes the Pat-scarp sets the western limit. This is a region of flat or gently undulating country with occasional residual ridges, (Dunn, 1941). The plateau is a flat land that slopes away in all sides except in the west.

2.2.1.1. Historical Evolution of the Physiography

The long period of quiescence that followed the Gondwana sedimentation had reduced the plateau to a peneplain. The region experienced massive lava outpourings during the early Tertiary period. Since the Tertiary period various parts of the plateau have been subjected to successive uplifts and denudation, which have shaped up the present physiography. Some of the uplifts can be identified by fault lines and scrap faces. But sometimes uplift produces only upwards and ground
flexures. The streams of this area have been rejuvenated due to upliftments and have become active in vertical erosion.

The whole plateau represents an old land surface, divided into Dons and Tanrs, (lowlands and uplands respectively) above which rise the hills of residual rocks, locally known as Tongris. The topography of the region is roughly undulating with terraced slope. Numerous streams intersect the region. It is frequented with low rocky hills and isolated peaks of igneous rocks. Due to prolonged erosion the valleys in this region have widened and the ridges separated. The well marked contours of the region show that the land of the region slopes to the east giving rise to various streams flowing from west to east.

On the basis of elevation, morphologic features and slope of the land the region can be divided into two physical units, besides the hills and tongris.

2.2.1.2. Physiographic Units

2.2.1.2.1. Western Upland: It consists of the areas above 600 metres, drained by river Swarnarekha and its tributaries, which rise from the main water divide of the area running north-south till south of Ulatu and then turn towards the west along the 2000 feet contour line. It is clear from the flow of the streams that the land of this upland slopes towards the narrow basin of Swarnarekha

2.2.1.2.2. The Eastern Lowland: This is a comparatively low-lying plateau region, which has been dissected by the numerous tributaries of Swarnarekha running south and south east to meet river Kanchi in the south, Raisa in the south east and the Rharu in the east. All these streams flow below 500 feet contour. The dominance of valley deepening over valley widening reveals the existence of flat topped interfluvces.
2.2.1.2.3. Other Features of the Physical Landscape

2.2.1.2.3. a. Hills and Tongris

The hills are found scattered in both the above physical units especially in the eastern lowland. The Tongris are lower than the hills with an approximate height of less than 500 feet above the ground surface. These Tongris that they rise abruptly from the debris of the weathered rocks that form the top soil. Some of these are just rocky exposures or low eminences rising hardly to a height of less than 30 feet. These are made up of hard crystalline rocks of granite and gneiss and are generally devoid of soil cover. The bigger and the higher ones frequently assume a dome shape. Some of them have been dissected by radial gullies which through head-ward erosion have divided the hill surface into radial ridges alternating with the run-off channels.

2.2.1.2.3. b. Tanrs and Dons: The alternating Tanrs and the Dons are actually the inter-fluvial ridges and the river channels. Because of their gentle gradient and low location these prevent soil-creep and sheet-erosion.

2.2.2. Relief

The average elevation of this plateau is about 650 meters (Figure 2.2). It is a gently undulating area intersected by numerous steams studded with low rocky hills and isolated peaks which form prominent feature of the landscape. These residual hills and ridges are made up of resistant rock masses above the undulating gneiss surface. The rivers flowing over the hard crystalline rocks and the softer Dharwar with braided channels give picturesque view of peneplain.

The average slope of 1 to 3 degree (Figure 2.2) is an indicator of the flat character of the uplifted peneplain being evident from the uniformity of the plateau
surface, low relief within the plateau surface, isolated residual low hills, high degree of truncation of structures, rivers being indifferent to softer Dharwars and harder gneissess and granites. In the southern portion relief reduces by 300 meters within the span of 8 kilometers, but in the eastern part the relief decreases, ranging between 150 to 300 meters within the span of 30 to 35 kilometers. It indicates that the eastern scarp is relatively less sloping than the southern scarp. The southern scarp of the Ranchi plateau appears relatively higher than the Ranchi plateau. It is expected that these scarps might be formed due to anticline and syncline which is parallel to border the Ranchi plateau.

The highest portion of the plateau is a central east-west swell by 300 feet over the general level. From this central swell radiate numerous streams that drain the plateau namely Subarnarekha and its tributaries.

2.2.3. Geology and Structure

Geologically the City of Ranchi is a part of the Chotanagpur plateau, which is an integral part of the peninsular India. Chotanagpur plateau is one of the oldest part of the earth’s crust. To them most of the part has remained above the sea level long before the Paleozoic era. The Pre-Cambrian rocks mainly gneisses and schists form its basement over which other geological formations have taken place. Other geologic formations are the Dharwars, Vindhya and Gondwana. Ancient lava deposits are also found in its south eastern part. These rocks were formed in the process of solidification of the crust. It therefore constitutes the surface rocks over the greater part of the region. Diastrophism and intrusion have metamorphosed these rocks. The geological succession reveals the geological history of the plateau (Table 2.1.).
Table 2.1: GEOLOGICAL SUCCESSION

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<td>Tertiary</td>
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<td>Archaean</td>
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<td>Vindhyan Unconformity</td>
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<td>Archaean Gneiss and Schists Unconformity</td>
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<td></td>
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<td>Dharwars</td>
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Source: Ahmad, (1965), *Bihar: A Physical, Economic and Regional Geography*, Ranchi University, Ranchi, pp. 15.

The Ranchi plateau is about 600 meters above sea level. This is a region of flat or gently undulating country with occasional residual hills and ridges. The bed rock of this region is granite and gneiss, upon which a thin layer of alluvium has been deposited. The plateau is basically an erosional surface with practically no patches of depositional plain. Stratigraphically, Ranchi planation surface has always been a part of the stable block of Indian peninsula and there is no evidence of well defined
Caledonian cycle of earth deformation. This area has remained free from later disturbances; hence there are no scars of folding, tilting, warping or thrusting.

The basement of the region is made of gneissic granite known as Bengal gneiss or Chotanagpur gneiss. With these granite rocks are associated sedimentary, metamorphic, igneous intrusive and extrusive rocks. The granitic rocks here do not represent the basement complex that constituted the primordial crust. These appear to have been remelted, interbedded and highly metamorphosed at a later date, perhaps later than the iron ore series, (Prasad, 1973). The most outstanding characteristics of the granite here is its gneissic appearance. The hard crystalline gneisses and granites of the study area are supposed to represent the originally solidified crust. These roughly belong to the Archean era. The granite-gneiss surfaces are exposed and have been reduced to peneplain.

In some places it assumes schistose character and is frequently contaminated by the inclusion and absorption of schistose materials which have led to the development of gneiss like banding in the granite rocks. The basic extrusive rocks are found in the western part of Ranchi. These volcanic rocks are actually the outliers of the Deccan trap.

2.2.3.1. Structure

The structural framework of this region is, in general linked up with the Peninsular Upland. Like most of its parent body, the peninsular India, it has not submerged beneath the sea since the Cambrian period, nor could it succumb to the great orogenic movements of the Mesozoic and Tertiary eras. To these movements it reacted epeirogenetically and still preserves some very significant marks of its
reaction which outline the geomorphology of the area and are responsible for distinctive physical features, bold relief and present elevation of the plateau.

The structural frame of the region was laid down by the Archaean movements which folded the Dharwarian sediments and caused the Batholithic intrusions into the folded Dharwarians. The Archaean folds were subjected to further movements which caused the great thrust through which welled up ultra-basic magma.

The region appears to have been quiet until the Hercynian movements which put the region in a state of great tension and ultimately led to the development of east west linear fractures.

The Himalayan orogeny did not affect the region directly, but indirectly produced great effects on this ancient landmass. Prior to the rise of the Himalayas, the region received immense outflows of lava in some parts of the region. Further during the periods of the Himalayan folding, the region appears to have responded to epeirogenetic movements in various phases which uplifted the area in four successive jerks to a total of over 3000 feet, (Dunn, 1941).

The epeirogenetic uplift during the Tertiary period has been responsible for initiating a new denudational cycle which influenced the present landscape of the region. The region has experienced more than one cycle of erosion, with a resultant polycyclic topography. The fossil erosional features surfaces are the result of post semi arid climate (Proceedings of the Symposium on Erosional Surfaces, 1968)
2.2.3.2. Lithological Characteristics

The lithology of the area comprises of pre-Precambrian formations mainly granite and gneiss, along with Dharwar, Vindhyan and Gondwana formations.

2.2.3.2. a. Gneiss: These primarily belong to the Chotanagpur or the Bengal gneiss. These are also known as Fundamental or Peninsular gneisses. Such rocks are crystalline, coarse and foliated. These bear banded structure. Their hardness varies from place to place and these are hard enough not to be broken into pieces.

2.2.3.2. b. Granite: This is the most common variety of igneous rock of the area. It is medium to coarse grained and is generally light in color. The percentage of silica is very high. Besides quartz, feldspar and generally orthoclase are present. Sometimes plagioclase is also present. Mica both muscovite and biotite are frequently found. Hornblende can also be seen sometimes. Minerals like Megatite accessorize these granites. These again are very hard.

2.2.3.2. c. Granite-Gneiss: When granites are metamorphosed, they form bands or are foliated and are then known as granite-gneiss. These are coarse grained and of various colors, depending upon the mineral content.

2.2.3.2. d. Schist: This again is a crystalline rock and is characterized by foliations. It consists of a variety of minerals ranging from coarse to fine ones. It is also very hard and is generally used for construction of roads.

2.2.3.2. e. Recent Alluvium: Alluvium in the region under consideration is a residual soil derived from decomposition of granite and its inclusions. The soil capping over the entire region is quite thin. These soils are unconsolidated in nature with high permeability.
2.2.4. Climatic Conditions

The Ranchi plateau is characterized by heavy rainfall and considerable humidity, (Ahmad, 1985). It has a sub tropical climate owing to the tropic of Cancer passing through the region and its nearness to the Bay of Bengal. Owing to its high altitude of the region the climate of the region differs from the prevailing type in the adjacent areas. However there have been changes in its climatic conditions with changes in global climate (Figure 2.3)

![Ranchi Temperature and Rainfall Conditions, 1991 to 2015](image)

**Figure 2.3: Temperature and Rainfall Conditions of Ranchi, 1991 to 2015**

*Source: Department of Meteorology and Soil Science, Birsa Agricultural University, Ranchi*

On the basis of temperature, rainfall, relative humidity and the weather conditions Ahmad (1985) has divided Jharkhand into 7 climatic regions, of which Ranchi falls the Ranchi-Hazaribagh Climatic Region, which has a ‘Keen’ and ‘Bracy’ type of climate. The climate of this region has a distinctive characteristic of its own. Its high elevation has the greatest moderating influence on is climate and gives it a
uniformly low range of temperature. Ranchi is the coolest part of Jharkhand. In spite of the high day temperature the nights are cool and atmosphere so dry that the heat is by no means oppressive, (Prasad, 1973). The hot westerly winds do not reach this plateau and therefore it is free from *Loo* and dust storms. Occasional thunderstorms and the Norwesters bring refreshing showers which cause an appreciable fall in temperature. On an average, one storm reoccurs in this plateau every week during the pre-monsoon period. Sometimes during end of May and beginning of June precipitation from the visiting storms is so prolonged and heavy that it is often mistaken for the burst of monsoon. The air is never so saturated as to make it exhausting and uncomfortable. Strong cold winds blow during the second half of December and early January.

The months from June to September roughly are a period of rainy season. The region receives 80 percent of rainfall during this season, from the SW monsoons. It receives an average annual rainfall of 500 mm. Summers are practically rainless, except for some amount of convectional and frontal rainfall caused due to meeting of dry local winds and humid winds blowing from the sea. These are also known as Mango Showers or Norwesters that mainly occur towards the end of May. The temperature and rainfall conditions of Ranchi have been represented in Figure 2.4.

The distribution of relative humidity in different parts of the year is of great importance. It is directly related to the growth of vegetation during the dry period from November to May. It also affects the comfort aspect of weather, especially in summer and the rainy seasons. During the monsoon period the relative humidity is very high, but the plateau is free from sultriness. This is due to the thin air and the
strong winds. From October the maximum relative humidity begins to decline rather very fast. As Figure 2.5 shows, the relative humidity decreases from 89.05 percent in September to 87.04 percent in December. It increases in January to 88.02 percent due to western disturbances. Thereafter there is a continuous fall till May up to 78.95 percent. With the onset of monsoon in June it increases to 82.48 percent, after which it rises continuously till September.

![Annual Maximum and Minimum Relative Humidity, 2015](image)

**Figure 2.5: Annual Maximum and Minimum Relative Humidity, 2015**

*Source: Department of Meteorology and Soil Science, Birsa Agricultural University, Ranchi*

### 2.2.5. Edaphic Conditions

The plateau of Ranchi basically consists of Red soil. This type of soil has developed over the Archean outcrops consisting of a wide range of ancient crystalline metamorphic rocks. The soils of the region are primarily residual, which have developed on the underlying parent rocks, mainly gneiss and granite. The granite and the gneisses of the plateau are mostly acidic. The red soils comprise a number of subordinate types, depending on the parent material, slope and drainage conditions. The Archean rocks vary within a very wide range, from typical acid, soda and potash
granites and gneisses to quartzite, phyllite, schists and ultra basic intrusives and extrusive. Over the mica schists the soil cap is much more argillaceous and finer in texture.

These soils in general lack magnesia, phosphates, nitrogen and humus, but are rich in potash derived from muscovite and orthoclase. The color of the soil is generally red, but frequently grades into brown, chocolate, yellow, grey or sometimes even black. Few are of lateritic origin. In fact the red soils of the plateau are incipient stage in the formation of laterite and represent very old soil surface, (Dunn, 1941).

Granite consists of quartz, feldspar, orthoclase and mica. It gives rise to partly clayey and partly sandy soil. Soils from granite contain enough potash and small quantity of lime. But in case of hornblende granite replaces mica and the resultant soil contains good quantity of lime. At higher levels or on the inter-fluvial ridges coarse and sandy soils are found whereas in the lowlands stiff clay is seen. Here the granite soil contains a certain amount of iron-hydroxide which causes the soil in dry season to set almost as hard as cement at the immediate surface, (Dunn, 1941). As gneissic composition is akin to granites, the soils derived from gneisses are like those of granites. Many of the gneisses and granites contain large portion of biotite and hornblende, and as they are highly ferruginous, the soils derived from them are deep red and even black in color, (Ahmad, 1985).

Quartzites and quartz schists which crop-out do not form extensive tracts. They appear in linear patches of small dimensions and rise above the general undulations as elongated, sharp-crested ridges. The ridge sides are mostly bare and rocky, but along the intersection of the ridge slopes and the granitic country, they are usually narrow belts of loose debris washed down the ridge slopes, (Prasad, 1980).
The hilly areas of southern Ranchi provide the most variable soil caps. Here outcrops of granites, mica-schists, quartzites, phyllites, lavas, limestones and other rocks rapidly alternate. The granite and quartzites give rise to sandy soils, the mica schist and phyllites to loams varying to clay-soils, the lava to heavy clay-soils, while the small outcrops of limestone give rise to calcareous soils (Prasad, 1980). Over the mica schists the soil cap is much more argillaceous and finer in texture.

Because of the upliftment during the tertiary period, the rejuvenated topography and deep gradient cause a quick runoff and intense erosion over wide areas. The pedogenic processes and the soils of the plateau are relatively immature.

2.2.6. Drainage

The drainage of this region is basically rain-fed. There is hardly any other source of water giving rise to surface flow. This region does not get water through rivers from outside. The flow of water is influenced by the variation in amount of rainfall as well as the diversity of terrain. This region slopes in all directions; therefore flow of the streams is in all directions. The drainage system of the plateau primarily comprises of small streams, most of which are ephemeral. These steams follow the relief of the land. The most important river of this region is the Subarnarekha River rising from the PiskaNagri (West of Ranchi). After originating it flows towards the east and there after takes a south turn near Muri. After passing through Jharkhand state, the river enters West Bengal near Behragora and finally empties into the Bay of Bengal near Talsari in Balasore District of Orissa. It has a 470 kilometer course. The river passes through certain regions of Jharkhand state that are rich in bauxite, an ore from which aluminum is smelted. The literal meaning of Subarnarekha is 'the golden line' or 'the streak of gold'. Etymologically, the river
derives its name from two Sanskrit/Bengali words: Subarna meaning "gold" and Rekha meaning "line" or "streak"; their combination has given this river its name Subarnarekha or "golden line". In Hindi, the name of the river is "Swarnarekha" with the same meaning as in Subarnarekha. The legend is that some gold was being found in the river's bed near its origination point near Piska, a small village not too far from Ranchi. It has numerous tributaries namely Pandra, Harmu, Harua, Hinoo, Chota and Bara Ghaghra, Potpotto and many other nalas.

Because of variation in relief the river and the tributaries form several waterfalls along its course. The region is well drained and the marshy land or the natural depressions are conspicuously absent. The channels are narrow and deep in the upper courses. Due to the geological structure of the region different types of topography along the river courses are discernible. Sandy exposures in the river bed are remarkable.

The rivers have a radial and dendritic pattern. This type of stream pattern refers towards horizontal beds of homogenous rocks of low flat surface without marked slope. The catchment area of these rivers is not so large yet they carry huge amount of water during the rainy season. Most of the tributaries are seasonal. These are also smaller in length and size, locally known as Dhoras or Nalas. The gradient of these tributaries is steeper owing to the high relief and velocity of the streams, the catchment area of which is subjected to extensive gully and sheet erosion.
2.2.7. Vegetation

The plateau of Ranchi at one point of time constituted one of the most heavily wooded tracts of India. But with increase in population, multiplication of holdings and opening up of the country by roads and railways, timber became a marketable commodity and the forest areas began to shrink. Here the forests are preserved only in the mountainous and the less accessible areas. Besides the indiscreet acts of the people activities like fire are reducing the forest areas. Here the forests have been reduced to small scrub jungles locally known as *Patras*.

The region shows variation in the vegetation cover with local variation in elevation, runoff, rainfall etc. Though much of the original forest has been depleted by extension of cultivation and construction, in inaccessible areas still valuable forests lie conserved in the hilly and the rugged terrain.

The forest type is primarily moist deciduous. This type of vegetation basically consists of damp tropical flora. “Owing to the considerable growth of climbers and herbs and shrubs during the period of rains, the jungle, particularly in the damp ravines an low lying valleys look like damp tropical forests”. (Prasad, 1980). Forests cover 24.36 percent (2003) of the total land area.

The Ranchi plateau lies in the ‘Central Indian Sal Tract’ where Sal is gregarious. The best growth of Sal trees is invariably found in valleys and lowlands. On higher conditions, hill sides and steep slopes the trees have stunted growth. The drier uplands, hilltops and slopes have mixed vegetation. On the other hand the areas suffering from problems of water-logging and insufficient drainage have dominance of Asan (*TermidatiaTomentosa*), Semul (*Bomlaxmelabarium*) and other species. In valleys and sheltered situations Asan (*TermidatiaTomentosa*), Gambhar (*Gaelinaarborea*), Kend
(Diopyrosmelanoxylon), Semul (Bomlaxmelabarium) etc grow along with Sal. Mahua grows almost everywhere but its forests are confined to hills and dry uplands. Some of the valuable timber yielding varieties which are not native of the region are extensively planted and grow well. Important among them are Tun (CedrelaToona), Sisam (Dalbergiasissoo) and teak (Tectonagrandis). Other important species are Harre (TerminaliaChebula), Karam (Adina Cadifolia), Kusum (SchbicheraTriguga) and Paisar (PterocarpusMarsupium). In the inferior sal forests Dhaura (Anogeissuslatifolia), Piar (Buchanialatifolia), Khair (Acacia Catechu), Amaltas (Casia fistula) and bamboo (Dendro-Calamusstrietus) are common. Trees of Mango, Jamun, Karanj, Tetar, Bel, Katahal and Peepal are common in the round the villages. Palash (ButeaSuperba) grow in large number in both cultivated and wastelands.

2.3. SOCIO- CULTURAL SETTING

The study of the socio-cultural characteristics of a city, with respect to time and space, forms an integral part in urban analysis and land use, as the city attains its form and function with people living and working there, under a particular cultural environment.

2.3.1. Origin and Evolution of Ranchi Town from a Tribal Village

The geographical area now comprising Ranchi district was formerly part of old Lohardaga district of the British India. In the year 1831-32, a part of old Lohardaga district was carved out and given the name of the Non-regulation South-West Frontier, and in 1899 the name of the district was changed to Ranchi district. Ranchi was the name of a small tribal village which has since then been assimilated into the city of Ranchi. The main reason for urban growth in this region was its location in the middle of the ancient empires and also the huge wealth it possessed in
form of minerals and forest resources (Verma, 2006). Ahmad (1965) gives a detailed account of the origin of the Ranchi town. Attracted by its huge and boundless wealth and resources a large number of civilized people like traders, businessmen, travelers, monks, rebellions of estates etc., together with other people with specific motives and intentions came here and settled. After the creation of the North West Frontier Agency by the British in 1834, a hamlet named Kishanpur was selected as its headquarter. It started working as military-cum-administrative headquarters of the Principal Agent. The settlement area was later designated as Ranchi. In 1843 the headquarters of Principal Assistant of the Agent were also transferred from Lohardaga to Ranchi. Ranchi was given a town status in the first census of 1872. It was the only settlement that received the status of a town in that year and it remained the only town for nearly thirty years till 1901. Since then it recorded a remarkable growth rate of population. In 1951 census it attained a class I status with 70 percent increase over its population in 1941. After the establishment of Heavy Engineering Corporation in 1958 it became an administrative-cum-industrial town.

2.3.2. Administrative Changes and Evolution of the Capital City

During the British rule Ranchi district along with other territories was kept under the administration of the magistrate of Ramgarh, in Hazaribagh. But due to administrative complicancies, as Ramgarh lied outside the Ranchi Plateau, in the year 1833, the South-West Frontier Agency (SWFA) was formed that included the present district with the adjacent Parganas of Palamu and Dhalbhun. The headquarters of the Principal Assistant of the Agent to the Governor General, who administered the area, were initially placed in Lohardaga, which later on in 1843 was shifted to Kishanpur, a village, which was merged to the present town of Ranchi. After the abolition of
SWFA in 1854, Chotanagpur became a non-regulation province under a commissioner and the district that was still known by the name of the former headquarters of Lohardaga, consisted of two subdivisions, Pargana Palamu as the mofussil and the present district with Pargana Tori as the Sadar subdivision. In the year 1892, Palamu and Tori, along with 3 Parganas, which had been transferred from Gaya to Lohardaga in 1871, formed the Palamu district. In the year 1899, the name of Lohardaga was changed to Ranchi. Gradually the Ranchi district was organized into four subdivisions vis. Sadar, Gumla (1902), Khunti (1905) and Simdega (1915). The district remained intact till 1954, when an area of 118.2 square miles comprising of a total population of 15395 and 39 villages of Tamar police station in the Khunti subdivision was transferred to the Saraikela division of Singbhum district. In the year 1961, 9 towns of the towns were enlisted in the Census out of which Ranchi was one, along with, Doranda, Lohardaga, Khelari and Muri (Sadar subdivision), Khunti and Bundu (Khunti subdivision), Gumla (Gumla subdivision) and Simdega (Simdega subdivision).

Ranchi Municipality was constituted in the year 1869, the administrative jurisdiction of which covered parts of some small villages covering an area with a circumference of about 5 kilometers. The municipal area was expanded to nearly 15.59 square kilometers in 1917, which further increased to 23.09 square kilometers and 48.61 square kilometers in 1964 and 1971, respectively. In 1981 Ranchi received the status of a Municipal Corporation, which now incorporated a Doranda and Jagannath Nagar towns, enumerated in the 1971 census, along with the previous administrative unit. Ranchi Municipal Corporation (RMC) was established on the 15th of September 1979, by merging erstwhile Ranchi Municipality, Doranda Municipality and Ranchi Doranda Joint Water Board. It is the second Municipal Corporation of
erstwhile Bihar and the first Corporation in the state of Jharkhand. It comprised of 37 wards from the year 1979 to 2010. Before the Municipal Elections in 2011 it was further divided into 55 wards (Figure 2.7). It covers a total area of 177.19 square kilometers and is governed by the Ranchi Municipal Corporation Act, 2001.

Ranchi was designated as the state capital of Jharkhand, when it got its autonomous status on the 15th of November 2000. Ranchi City today is not only the capital and leading city of Jharkhand in terms of population size but also its political, economic and cultural nerve center. Ranchi City is experiencing a high rate of growth and it is one of the fastest growing cities in India. As per census from 1901 to 1941 the rate of growth was 3.5 percent per annum, whereas it was 14 percent during 1951 to 1971 and 8 percent during 1971 to 2001. After independence, population of Ranchi City in 1951 was only 1,06,849, which increased by over eight times to 8,63,180 in 2001. It served as the summer and commercial capital of Bihar during the British Raj. Hence, different population communities played a vital role in its social and economic development. Ranchi City has a varied ethnicity with 31 sub-castes numbering nearly 2 lakh, which played an important role in political and social movements. A majority of these groups are Munda and Oraon, which are dominant in most of the region. Ranchi started as a small city occupying an area of around 6 square kilometres in 1869 with a population of approximately 12,000 in 1871. The area gradually increased to 43.44 square kilometres in 1965, 175.29 square kilometres in 1985 and eventually stood at 177.19 square kilometres in 2004. From 1965 to 1985, the city grew at a rate of 6.6 square kilometres per annum, with a total growth of almost 77 percent over the 20 year period. Simultaneously, population also grew and it was 25,000 in 1901, crossing 1 lakh after independence in 1951 and reaching to nearly 6 lakh in 1991, crossing 8 lakh in 2001 and more than 10 lakhs
in 2011. Due to population growth, demand of land increased and the City expanded towards the scanty fertile and plain agriculture land towards the fringe, since the city is surrounded by hills and plateaus.

2.3.3. Population

The study of the population dynamics is essential for the planning and development of a city and its surroundings. In order to assess the amenities needed in a city, information on the socio-economic composition and the age-structure is required. The income structure gives an idea of the nature of the commercial activities and the type of dwellings needed in different parts of the city. According to Chapin (1957) population studies not only provide a means of scaling the total space needs for selected needs for selected land use categories at different periods of time, but also give an indication as to how the total space needs should be allocated to different parts of an urban area, at any particular time.

There are four essential things with which a population study of a city should concern itself with, in relation to land use;

a) It should present spatio-temporal changes in the population that would give a clue to understand the present and predict the future trend, besides giving information about the background;

b) It should give a precise information about the existing and the projected population;

c) It should analyze the composition, structure and distribution of population, so as to enable the urban planners to provide the required amenities by different groups of population; and
d) It should also analyze the present and projected occupational structure, to have some idea on the consumer needs and behavior.

2.3.3.1. Spatial Pattern of Distribution

The study of the spatial pattern of distribution indicates how the civic amenities are distributed in space and how the land is allocated to different uses. The distribution of population has implications for future planning as well. Moreover the socio-economic characteristics of population manifest themselves in the density and distribution pattern.

In conformity to most of the Indian cities, the residential density of population decreases from the core to the periphery. This is primarily because of the highly mixed land use and the intensity of use. However the gradient of population varies also according to the accessibility and land values (Mahadev, 1975). The average rate of decline gives some idea about the compactness of the city.

2.3.3.1.1. Household Density

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. According to census 2011, maximum density of households has been reported in ward number 25 (9968 households per square kilometres.) (Figure 2.8). 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 a up-market area. While ward number
46 is a newly developed residential area. The wards having 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 averaged density of households in the city is 2243 households per square kilometres. The areas with high density of households are mainly found in commercial areas, old residential areas and the most preferred areas dominated by high income group.

**2.3.3.1.2. Distribution and Density of Population**

Ranchi city comprises of 55 wards, comprising of a total population of 1073427 (Census, 2011). Figure 2.9 shows the distribution and density of population in the city. The population distribution seems to be concentrated in the core of the city and expand in all directions. The increase in population has been along the wards lying along the major roads. The commercially developed areas are highly populated regions of the city. Ward number 31 which falls in the commercial core of the city has the maximum population (38358), comprising of 3.57 percent of the total population of the city. Besides this the areas dominated by high income group like those in ward numbers 8 and 52 have also very high population. On the other hand the newly developed residential areas have also emerged as very highly populated regions with a population more than 25000. Apparently these are the areas which have accommodated the increase in population in the later decades, especially areas in ward number 4, 7, 34, 37 and 38. The areas dominated by government residences, like
in ward numbers 2 and 48 have also reported very high population. As we move away from the core of the city and away from the major roads the populations tends to decline. Ward number 51 has the minimum population, which has been an area dominated by agricultural activities and has been populated recently. Ward number 23 which lies in the commercial core of the city is primarily dominated by commercial set ups and are devoid of residences and therefore has very low population. Other areas which are being recently settled have comparatively low population. The average population of the wards is 19517 and 40 percent of the wards have a population above this average.

The city has a population density of 6058 persons per sq.km. The density of population also is higher towards the commercial core of the city and the adjoining old residential areas. It gradually decreases outwards. The areas around the educational institutions, workplaces, shopping places and areas with access to roads are most preferred areas for residences and have a higher density of population. The commercial area of ward number 25 has the highest density of population (58258 persons per square kilometres). This is a highly congested area with narrow roads unplanned residences. This is followed by ward number 18, which has been dominated by old residential areas. This is also an area of leading educational institutions. These wards are followed by commercial areas of ward numbers 27 and 31. The areas adjoining these wards are also relatively densely populated areas with a population density above 15000 persons per square kilometres. On moving away from the core of the city the population density gradually decreases. The areas lying towards the outer boundary of the city are the ones which were earlier under cultivation, were left unoccupied and have been recently settled, after the formation of the capital. The planned areas dominated by government residences and industrial
township of H.E.C have been prevented from dense occupation of population. Besides these the defence areas have also prevented encroachment of dense population therein. The Tupudana Industrial Area also has low density and is recently developing area.

2.3.3.2. Spatial Growth and Population Change

Ranchi started as a small city occupying an area of around 6 square kilometres in 1869 with a population of approximately 12,000 in 1871. The area gradually increased to 43.44 square kilometres in 1965, 175.29 square kilometres in 1985 and eventually stood at 177.19 square kilometres in 2011. From 1965 to 1985, the city grew at a rate of 6.6 square kilometres per annum, with a total growth of almost 77 percent over the 20 year period. Simultaneously, population also grew and it was 25,000 in 1901, crossing 1 lakh after independence in 1951 and reaching to nearly 6 lakh in 1991 and crossing 8 lakh in 2001. Today it has already exceeded 10 lakh. Due to population growth, demand of land increased and the City expanded towards periphery areas. Most of the extension occurred at the expense of agriculture land, since the city is surrounded by hills and plateaus. Population Growth has been discussed in detail in chapter 4.

2.3.3.3. Sex Ratio

Sex ratio is also significant in urban planning and land use in particular. It determines the amenities required by a particular sex, which determines the land use. Amenities like maternity homes, working women hostels, women welfare societies and women social clubs, specifically are meant for the female population. Similarly there are other amenities and land use specific to the male population.
However an equal representation of male and female population has been noticed, which indicates a more or less balanced sex ratio (857 in 1991; 879 in 2001 and 925 in 2011), (Figure2.10). The figure points towards an equal socio-economic status of the women folks in the city as the males. The ward wise pattern of sex ratio shows that earlier in the years 1991 and 2001, the sex ratio was higher in the developed areas of the City which mainly comprised of the wards towards the center of the City. On the other hand the wards lying outwards, which were mainly dominated by agricultural activities, had comparatively lower sex ratio. As the City developed outwards, there was a simultaneous increase in the sex ratio in the wards lying towards the outer boundary of the City. The sample represents a sex-ratio slightly in favour of males, showing 996 females per 1000 males. This may be attributed to migration of relative higher number of migration of males for education and employment.

2.3.3.4. Age Structure

The age structure of the population explains the nature of population from the productive and the consumption point of view. The information about the number of people in different age groups give an idea of the kind of civic amenities to be provided to the population. The location of parks, schools, colleges, maternity homes, hospitals, old age home etc. to large extent depends upon such information.
Figure 2.11. Age-Sex Pyramid, 2001

Source: Census of India, 2001

As per the census reports, majority of population is the working population and the child population. As the Figure 2.11 shows, a more or less equal participation of male and female participation in the workforce has been observed. Equal representation of males and females has also been noticed in the child age group. A relative fall in the representation has been observed in the young and adult age group, which signifies out-migration of young and adult population for higher studies and work. Minimum population is represented in the aged population, which may be either due to a low life expectancy or because of the shifting of the aged groups along with their children to other areas.
Figure 2.12: Age-Sex Pyramid for Sample Households

Source: Field Survey

As shown in Figure 2.12, the age-sex pyramid for the sample shows a broad base that is an indication of high birth rate. It gradually tapers towards the top, representing gradual decrease in the composition of population in higher age-groups. The representation of population in the age-groups beyond the age of 20 is comparatively lesser, primarily because the young population in these age groups has migrated out for education and work. The tip of the pyramid is relatively broader, indicating a relative higher life expectancy in the old age group. The pyramid shows a balanced representation of males and females in all the age-groups, pointing towards a balanced sex-ratio.

2.3.3.5. Economic Composition

The total working population of Ranchi City is 336357, comprising of 31.34 percent of the total population. Figure 2.13 and 2.14 show that this population comprises of 73.89 percent of male workers and 26.11 percent of female workers.
This workforce comprises of 85.65 percent of Main Workers and 14.52 percent of Marginal Workers. The figures show nearly 93.46 percent of the main workforce comprises of Main Other Workers, as the main population of the City is primarily engaged in tertiary activities. There is minor representation of population in the household industries, cultivation and people engaged as agricultural labourers, an indicative of urban characteristic of the region. In case marginal workers as well the representation of workers engaged in other activities is more, compared to the household sectors and agricultural sector. Figure 2.15 shows the ward-wise distribution of working population

Figure 2.13: Work Participation of Main Workers

Source: Census of India, 2011
Figure 2.14: Work Participation of Marginal Workers

Source: Census of India, 2011

The total population of the surveyed households comprise of 46.11 percent of working population and quite a heavy dependancy (53.89 percent) of population has been found. The sample shows quite a balanced share of males (57.95 percent) and females (42.05 percent) in the working population (Figure 2.16)

Figure 2.16: Working Population in the Sample

Source: Field Survey
There is workers in all age-groups. Highest representation (29.85 percent) of working population has been observed in the age-group of 30 to 40. The lower age group represent a relatively lower (23.88 percent) percentage of working population that indicates that the population is in professional or higher studies or there is lack of appropriate jobs for them. Beyond this age group the percentage lowers indicating a probable discontinuation from the services, as reported in the survey, due to health reasons and willingness of the children for not letting their parents work.

![Dependant Population in the Sample](image)

**Figure 2.17: Dependant Population in the Sample**

**Source: Field Survey**

The Figure 2.17 shows, the dependant population comprises of 53.61 percent of children and young population engaged in studies in colleges, universities or professional courses, quite a considerable percentage (28.58 percent) of population that is in its working age and is yet jobless and 17.81 percent of aged population. However most of the college going young population is engaged in part times jobs like tutions, beauty parlours, jobs in shops, internet cafes and alike. On the other hand the most of the aged population (34.86 percent of sampled households) have pensions and savings to add to the family income. There are 3 such households that depend completely on savings and pensions.
2.3.3.6. Literacy and Level of Education

The total literacy of the City, as per the 2011 census is 77.62 percent, comprising of 42.14 percent males and 35.48 percent females out of the total population. Because of the equal status given to the males and females there is equal representation of literacy in both the male and the female population. However the rate of literacy is quite low. The distribution of literacy is highly uneven (Figure 2.18). The literacy rate is relatively higher in the more developed areas areas dominated by high income group, commercial areas, administrative areas. The newly developed areas which were initially under cultivation show a comparatively lower literacy rate. In the sample literacy is found to be cent percent. There is a balance between the males and females in terms of literacy (Figure 2.19)

![Age-Sex Distribution of Literates in Sample Households](image)

*Figure 2.19: Age-Sex Distribution of Literates in the Sample Households*

*Ranchi has been an important center of education, ever since the coming of the British, both in terms of school and college education. As a consequence of this the level of education in the city has been satisfactorily high, with...*
population having graduation and higher degrees of education (Figure 2.20). With universalisation of education the proportion of the population having attained primary education is also high.

Figure 2.20: level of Education in the Sample

Source: Field Survey

2.3.3.7. Religious Composition

As per Census reports the city is dominated by the Hindu population, comprising around 64.58 percent of the total population. The followers of Islam form 16.86 percent of the population. Christians are in a minority forming 8.25 percent of the population. (Figure 2.21)
Most of the Christian population comprises the Anglo-Indians and the converts, as a consequence of the influence of missionary activities. Other religious communities are dominated by the Sarnas, the animists or the nature worshipers, who form the original population of the region. The Sikhs, Jains and Buddhists are relatively few in number. Ranchi has also been an area of religious importance, with several ancient temples like, PahariMandir, Ram Mandir, JagannathMandir, Jain Mandir and Kali Bari. Missionary activities in this area have led to the construction of the oldest cathedrals like St. Mary’s Cathedral, St. Paul’s Cathedral and Christ’s Church. The Jama Masjid has also been a centre of attraction for Islamic pilgrims. The Sarna Dharma in the area has led to the coming up of the Akhras, the oldest and the biggest among which is the KaramToliAkhra.

Figure 2.22 shows, in the sample surveyed the Sarnas, or the animists, who form a major proportion of the population of the city and who are included in the category of Hindus in the census, have been kept as a separate category. Similarly the Mona Punjabis, whom the census includes in the category of Hindus, have been placed in the category of Sikhs. In the sample the Hindus form a major (38.29
percent) proportion of the population, followed by the Christians comprising 34.86 percent of the sample population. The Muslims, who reside primarily in specific pockets like Hindpiri and KantaToli, form 13.43 percent of the population. The Sarnas or the Animists, who are primarily the original inhabitants of the region, are 8.57 percent. After the Punjab agitation in 1986, few Punjabis, along with Mona Punjabis, settled in few pockets of Ranchi, like P.P Compound and essentially started business activities. These followers of Sikhism comprise 4.86 percent of the sample population.

2.3.3.8. Language

Hindi is the main official language spoken in the city. In the study the main language spoken in the households have been considered as the language of the household, irrespective of the actual language of the household, the reason being, there are many such households, who do not use their original dialect or language to communicate.

Hindi is used as a medium of communication in 67 percent of the surveyed households. However most of the aboriginals (7.43 percent) use their local dialects, like Kurukh, Mundari, Nagpuri and Santhali. Nagpuri is essentially the bazaar language.
Besides with a major population of observed migrants from places like West Bengal and Punjab, the city records a remarkable Bengali (10 percent) and Punjabi (5.14 percent) speaking population. Being a part of Bihar earlier, it also shows a major population speaking Bhojpuri (4 percent). The city has been a district headquarter and now a capital city, with important industries and offices. As a result of this the city has many people from other states of India and other languages observed to be spoken in the city include, Maithili, Gujarati, Rajasthani, Marwari, Oriya, Nepali, Tamil, Telugu, Malayalam and Sindhi.

2.3.3.9. Scheduled Caste and Scheduled Tribe Population

An insight of the Scheduled Caste and Scheduled Tribe population is essential in knowing the nature of an area, as it provides a background for the government to take protective arrangements to enforce equality, affirmative actions to integrate this disadvantaged group to the mainstream society and to provide resources and benefits to bridge the gap between this class and other communities. Figure 2.24 shows the distribution of SC and ST population. The SC population comprises of 4.7
percent (50542) of the total population of the city. However there is no specific pattern in the distribution SC population in the region. Most of the wards have a medium percentage of SC population ranging between 5 to 10 percent of the total population of the respective wards. As far as the ST population is concerned, Ranchi has been a tribal dominated region, but the representation of this population is only 20.22 percent (217024) of the total population of the City. Although the STs are scattered in the entire city but clusters of the ST population is mainly found in the early inhabited areas, like KaramToli, Morabadi, SiromToli etc. and the early agricultural areas. Most of the wards have an ST population between 15 to 25 percent of the total population

2.4. HOUSING CHARACTERISTICS

2.4.1. Household Demography

A sample of 350 households has been selected, comprising of a total population of 2032. The average size of the family in the sample surveyed is 6 persons per household. The sample contains a minimum of one person household and a maximum of 17 persons has been found in the sample. The households with only 1 person include persons like ones unmarried, divorced, widowed, or ones who have migrated to the city for work. A significant 41.14 percent of the total sample of households has a family size of 6 to 10 persons, which mainly comprise of families which are joint families and ones with more than 3 children. Few households are such which have the relatives who have come to the city for employment or education, especially from the rural areas. There are 88.57 percent of such households which
have domestic helpers of which 23 percent have more than 1 helper to assist the household work.

91 percent of the total surveyed households have a nuclear type of family. The 9 percent of the surveyed joint families comprise primarily of Muslims (43 percent), 23 percent of Sarnas, 17 percent of Christians and 17 percent of Hindus. None of the Sikh families surveyed were found out to be joint in nature. It has been reported that earlier most of the families used to be joint but now the percentage of nuclear families is more. This is mainly because at present very few are left with family business or other economic activities and most of the family members have out-migrated for employment.

2.4.2. Housing Conditions

The sample households report to have been staying in the houses in different period of times both before and after the state formation. Out of them 28 percent have been staying in the houses built before 1991. On the other hand, 23.14 percent are the houses built after the state formation, 21.43 percent between 1991 and 2000. While 27.43 percent of the households are such, which are residing as tenants and are ignorant of the period of construction of their houses. These are mainly those who are residing in rented houses.
As per Figure 2.25 majority of the houses (38.6 percent) are self constructed. 28.3 percent are such which have been constructed by a builder. It primarily includes the apartments. 15.1 percent of them are ancestral and quite old structured. Remaining are the residential units that have been built by the housing boards and the respective offices and departments.
As shown in Figure 2.26, the sample mainly comprises of buildings more than 2 floors (36.86 percent). This includes the multi-storied apartments. This is followed by double storied buildings comprising 36.57 percent of the sample. Besides, 22.29 percent are single storied with terrace and most of the old quarters and low income households have single storied units without terrace. This exhibits a large vertical extent of the city. Most of the houses have 2 to 3 habitable rooms. While most of the buildings having more than 2 floors have 4 to 6 or more habitable rooms.

Figure 2.27: Roof and Floor Materials in the Sample Houses

Source: Field Survey
Figure 2.27 shows, the sample houses are mostly concrete house with RCC roofs (95.71 percent). While 0.86 percent of the sample comprises of tiled roofs or asbestos or sheets. These are basically the single storied units without terrace. Most of the old quarters and relatively low income groups have such roofs. The slums have thatched roofs. The houses being mostly concrete have concrete floors made of cement, marble, tiles or both. Most of the new constructions are going for tiles and marbles for flooring. Cemented floors have been reported by 53.43 percent of the sample, 21.43 percent are tiled, and 19.71 percent have marble ones, while others have mixed type of floors. Only 0.86 percent has kuchcha floors.

**Figure 2.28: Types of Residences and Ownership**

*Source: Field Survey*

The sample comprises of 60.29 percent single dwellings, which are used entirely by the owner or portions are rented out. 28.29 percent of them are apartments which have cropped up mainly after the state formation. These include the ones constructed in open spaces as well as those that have been constructed by demolishing...
the old structure and 11.23 percent are residential quarters provided by the offices and different departments including ones provided by the state housing board.

Among these 71.71 percent are self owned, mainly including the native population and 16 percent stay in rented houses, especially those who have migrated from neighboring areas. Besides these, 0.86 percent of the households are unauthorized constructions. There has been an increase in construction of rented houses after formation of Capital.

Figure 2.29: Nature of Land in the Sample
Source: Field Survey

The region being a tribal area, 58.29 percent of the houses are built on tribal land. According to the Chotanagpur Tenancy Act, a tribal land can neither be sold to nor purchased by a non-tribal. So accordingly the lands have been sold and purchased. However this has been an issue of strife as most of the tribal land has been taken by the government development activities without any adequate compensation and replacement.
The development activities have also led to the demolition of parts or whole of residential units, mainly for road broadening. 16 percent of the sample shows such kind of a demolition. Most of the demolition has taken place in the construction of the ring road.

**2.6. SUMMARY AND CONCLUSION**

The physical and the socio-economic conditions of Ranchi City have been conducive enough for human settlement and urban growth. Its relative location itself, in terms of its connectivity to other parts of the country has been favorable enough for its development. The rich level plateau region and moderate type of climate has favoured the socio-economic development of the region. The Mineral resources have resulted in the industrialisation in the region. Besides these the topography has favoured the setting up the infrastructure in the City. These physical conditions have led to the socio-economic development of the region. These socio-economic characteristics have been significant in shaping up the land use the City. With a
significant proportion of tribal population, the role of CNT act has been significant in the use of land.

There have been changes in the physical and the socio-economic conditions which have brought changes in the overall land use and land cover of the City. The changes in such conditions have been rapid and the land use has changed accordingly. The physical characteristics have been altered specifically by human intervention. The landscape has been altered according to human use. There has been significant decline in the water bodies and vegetation. Moreover, the climatic conditions have been also altered. The City has undergone administrative changes and spatial growth with the gradual process of industrialisation and urbanisation. With the development of the City, there has been an increase in the population. The population characteristics have changed. There has been an increase in the density of population. The occupational structure has been altered with increase in work participation especially of females. Sex Ratio, Literacy and Level of Literacy has also experienced significant improvement. The youth population of the City have migrated out for education and employment however the youth from neighbouring rural areas and other districts of the state have migrated to the City for the same reasons. The City is now dominated by a mixed community and a multi-lingual society. All these changes have played an important role in bringing changes in the land use of the City over time.