Title

"THE LAND USE LAND COVER ANALYSIS OF BHIWANDI TALUKA"

By

Mr. PRATIK KISHOR SAWANT

A DISSERTATION

Submitted To

Department of PG GeoInformatics,

Nagindas Khandwala College of Commerce, Arts and Management Studies,
Mumbai- 400064

In partial fulfilment of the requirements for the degree of

Master of Science in Geoinformatics

Academic Year – 2021-22

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MALAD KANDIVALI EDUCATION SOCIETY'S

NAGINDAS KHANDWALA COLLEGE OF COMMERCE, ARTS & MANAGEMENT STUDIES and

SHANTABEN NAGINDAS KHANDWALA COLLEGE OF SCIENCE

AUTONOMOUS

DEPARTMENT OF PG GEOINFORMATICS

Certificate

This is to certify that **PRATIK KISHOR SAWANT** has successfully completed the Dissertation as a part of the MSc-II- Semester IV syllabus titled **"Land Use Land Cover Analysis of Bhiwandi Taluka"** under the guidance of **Dr. Amrita Aggarwal** during the Academic Year 2021-22.

Guiding Teacher

Prof. Dr. Moushumi Datta

I/c Principal

Co-ordinator

N.K. COLLEGE OF COMM. ARTS & MGMT. STUDIES & N.K. COLLEGE OF SCIENCE MALAD MUMBAI 400064

College Seal

I/c PRINCIPAL
NAGINDAS KHANDWALA COLLEGE OF COMMERCE
ARTS & MANAGEMENT STUDIES AND SHANTABEN
NAGINDAS KHANDWALA COLLEGE OF SCIENCE
(AUTONOMOUS)
MALAD (W), MUMBAI - 400 064

Date: 25th April ,22

DECLARATION

I wish to state that the work embodied in this dissertation titled

"Land Use Land Cover Analysis of Bhiwandi Taluka" is my own contribution. The dissertation is carried out under the guidance of **Dr. Amrita Aggarwal** in the academic year 2021-2022.

Pawant

SIGNATURE OF THE CANDIDATE

PLACE : MUMBAI

DATE : 25th April, 2022.

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CHAPTER 1

1.1 INTRODUCTION

Bhiwandi is also known as commercial town in Thane district which lies in a Western Maharashtra. Bhiwandi Nizampur is located in the beautiful coastal plain of Konkan with undulating hills and waterways. In addition to the natural ethnic group, Bhiwandi is well known as a major commercial center in the state of Maharashtra. Bhiwandi serves as the primary link between Mumbai and many parts of India via the Mumbai Agra Highway. Bhiwandi is also known as Manchester of India. Agriculture, fishing, and wheelbarrows were the primary activities of the peoples in the early Twentieth century. In the 1930s, it became the heart of the textile industry.

Bhiwandi was having a port on the Kamwadi River and it was known as Bunder Mohalla in the early 16th century. The trade of Woods and Spices was massive from this port. Since then, traders have made frequent visits to the city. The merchants were known as "Saudagar" during the period, and the area was known as Saudagar Mohalla. Sutar Wada and Hamal Wada were the names given to the homes of labourers who were working for the shipping industries. Bhiwandi was known as "Islamabad" during the time of the Mughal Empire. Islamabad Masjid & Eidgah is a mosque on Eidgah Road. The textile industry transformed the landscape of Bhiwandi in many ways, and people from all across India began to move there for business or labour.

Due to its accessible transportation and 24-hour electrical supply, Bhiwandi has become an industrial magnet which attracts many industrial opportunities because of Mumbai's textile sector has declined. The demand for power looms was so tremendous that employees from Uttar Pradesh and Bihar relocated there. Surat still ranks at number one in a power loom and Bhiwandi is at second position in power looms. Bhiwandi manufactures and transports the majority of power looms used in India's textile industry. Bhiwandi has a high-quality power plant that also exports energy.

Bhiwandi has a variety of stories to tell about its history and power. This location has been a major trading centre since the Mughal era. The only difference between yesterday and today is that the things available for trade have changed. Bhiwandi serves as a vital link between Mumbai and the rest of Maharashtra. This distinguishing feature has charged up

industrialists to locate their operations in Bhiwandi. Bhiwandi's history is intertwined with the development of Indian industry.

Land usage is not the same as land cover. Although they are sometimes used similarly, they have distinct meanings. Understanding both land use and land cover offers a thorough understanding of a certain region.

- **Land Use**

Residential, commercial, industrial, and institutional land use is included, as well as agricultural transportation, parks, and green space. Residence: Residence refers to where you reside and is essentially the property on which your house is built. Dwellings in many regions, such as cities, rulers, and residences. Commercial industrial land is land utilized for business. Commercial Zone: These are used to be a lot of tiny shops in the commercial district, but now huge stores are assisting us. That is, there are locations such as crossword puzzle shops, clothes stores, residences, fine pharmacies, restaurants, and even the little ones to succeed, they have all the things as a small shop, but they are in a small space and are typically inexpensive. Industrial Products Industrial Products Industry plots are used to create processing or storage of raw resources. A star school, emergency service, religious facility, library, sporting agreement, and government office are examples of system management sites utilized for community services. These structures serve not just one location, but also individuals from all around the community, as far as farmland in agricultural farmland is used to grow and harvest livestock such as crops, ranches, and pasture. Transportation - The roadside train must be constructed to transport people in the neighbourhood and throughout the country. Agricultural businesses in the field of agriculture companies include urban cities and cities inside cities in urban green spaces for the relocation of space sports in locations where agricultural companies in the field of agriculture companies operate. Continue to shield residential neighborhoods from industrial noise and traffic.

According to **Meyer W.B., (1995)** every parcel of land on the Earth's surface is unique in the cover it possesses. Land use and land cover are distinct yet closely linked characteristics of the Earth's surface. The use to which we put land could be grazing, agriculture, urban development, logging, and mining among many others. While land cover categories could be cropland, forest, wetland, pasture, roads, urban areas among others.

- **Land Cover**

Coverage of the Land or Land cover refers to the physical and biological cover of the earth in a country, according to the Food and Agriculture Organization. In the body of water, the land is covered with flora grassland scrub bodies of various sorts of barren soil. Land cover refers to all of the naturally occurring plant cover. The Fine mark of the Food and Agriculture Organization is a total of people's activities on various sorts of land covers. Area cover shows the physical characteristics of the land, such as woods and open water, whereas land use depicts how people use the land. The amount of land covered by forests, wetlands, paved surfaces, agricultural, and other lands and water species is recorded in land cover data. Satellite and aerial photos can be used to determine land cover. Satellite photos cannot be used to assess land use. Managers can use landscape maps to have a better understanding of the existing terrain. Managers may use maps to analyze city expansion, simulate water quality concerns, anticipate and assess floods, rising seas, and sea level rise, and focus regions.

1.2 LITERATURE REVIEW

(Rajeev Kumar Jaiswal, 1999) Land use/land cover changes in a region of Gohparu block, Shahdol district, Madhya Pradesh, were researched using remote sensing technologies during a 30-year period. Visual interpretation of two periods of remotely sensed data was used to create land use/land cover maps. For this, a post-classification comparison approach was used. Between 1967 and 1996, 22% of the plant cover was lost, and 14 percent of the two was discovered to have been turned into wasteland. During this time, the overall rate of change was determined to be 1.8% every year.

(Sushila Rijal, et al, 2021) Changes in an area's land use/land cover (LULC) have a significant impact on the delivery of ecosystem services. Using Landsat satellite imagery, we examine spatiotemporal variations in LULC in Nepal's rapidly changing Bagmati River Basin (BRB) from 1988 to 2018. We also use the Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) model to estimate carbon storage in different physiographic areas and LULC classes, and the benefit transfer approach to assess economic valuation of carbon. Carbon storage was shown to be higher in urban/built-up and shrubland environments,

whereas it was lower in cultivated land, forest, barren land, water bodies, and grassland. The LULC change and projected carbon stock in BRB offer a foundation for planners and policymakers to develop relevant policies to mitigate carbon loss and area's land cover by sustainably management.

(Cassia Brocca Caballero, 2021) In Brazil, major land use and land cover changes (LULCC) have occurred, including large-scale forest conversion to agriculture. LULCC changes the timing and quantity of vitality flows, affecting the partitioning of available energy and, as a result, the climate and water balance. The goal of this study was to examine how LULCC has impacted surface-atmosphere interactions throughout Brazilian territory, with a specific focus on affects on precipitation (P), evapotranspiration (ET), and atmospheric humidity (h). The Amazon was the most investigated biome, followed by the Cerrado, in our systematic review, which provided 61 papers. The most studied variable was precipitation, which was followed by ET. Few studies have looked at the effects of LULCC on h. In the Amazon biome, there was a decrease in dry season P and yearly ET. The most typical results in the Cerrado biome were decreased P in both the wet and dry seasons, as well as decreased dry season ET. Increased yearly P and rainy season ET were found in the Atlantic Forest biome, most likely owing to reforestation. LULCC effects on surface-atmosphere interactions in the Brazilian biomes Caatinga, Pantanal, and Pampa have been demonstrated in a few studies. As a result, further study is needed to investigate LULCC's implications on these biomes, including studies of atmospheric moisture recycling and LULCC's connections with global climate and climatic extremes, such as droughts.

(Roy & Giriraj, 2008) Land use/cover information in the form of maps and statistical data is critical for spatial planning, management, and land usage. Since the beginning of the economic revolution in the early 1990s, India's land-use and land-cover (LULC) situation has changed dramatically. These shifts are the result of a complex combination of biophysical and social factors. The detection and monitoring, carbon and biogeochemical cycles, ecosystems and biodiversity, water and energy cycles, predictive land use modelling, and climatic variability and change are all scientific issues that LULC follows. With the flow of time and the growing demand for information on land use/land cover, a standard

classification system, a precise definition of land use/land cover and its categories, and uniform data collection and mapping procedures on various scales across the Indian region have become necessary. As a result, the current assessment aims to concentrate on the formulation of a national objective for LULC change as a prerequisite for an interdisciplinary research programme combining climatic, ecological, and socioeconomic drivers, change processes, and change responses and consequences.

(Sanoj Kumar Patel, 2019) The district of Varanasi is divided into eight administrative units. It has seen an upsurge in urban activity as a result of economic growth. Using remotely sensed data over a two-decade period, it was discovered that between 1993 and 2013, the built-up area rose by 345 percent while vegetation dropped by 86%. Land use changes, contrary to popular belief, expanded not only the developed area but also the agricultural class as a result of urbanisation. In the last two decades, agricultural land has grown by 39%. The population density climbed from 1217 to 1806 people/km2, while the housing density increased from 152 to 273 homes/km2 between 1991- 2011. As demographic measures of land use and cover change, the land absorption coefficient (LAC) and land consumption ratio (LCR) were computed (LULC). In the years 1993 to 2013, the area of sparse vegetation rose from 40.2 to 90.1 km2, whereas thick vegetation declined from 28.4 to 1.7 km2. There was a clear trend away from agriculture as the major source of income and toward non-agricultural professions. This issue of rising urbanization surrounding cities must be investigated in order to create better plans for sustainable development and food security. This micro scale study can aid in the formulation of policy for urban regions in developing nations such as India, which rely largely on agriculture to support their people and economy.

(P Prabu, 2018) The goal of this study was to employ Landsat ETM+ and Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) data from 2003 to 2014 to explain land-use/cover changes in Coimbatore City Corporation. USGS Earth Explorer was used to obtain two Landsat photos from 2003 and 2014. The photos were divided into five categories using the maximum likelihood method: urban fabric, flora, aquatic bodies, agriculture fields, and desolate lands. For the years 2003 and 2014, the overall kappa accuracy measure was around 87.60 percent and 86.15 percent, respectively. Change detection analysis was carried out on post-classified photos from the years 2003 and 2014.

According to the findings of the study, Coimbatore City has seen fast changes in LULC, notably in terms of urban/built-up area. The size of urban/built-up areas has expanded by 94.5 km2 in the last 11 years, resulting in a considerable reduction in agricultural land and vegetation cover. It has been discovered that (1) Urban areas have grown by 200% as a result of population expansion and significant economic improvement. (2) Due to conversion into urban characteristics, vegetation cover fell by 38.76%. (3) Due to the removal of encroachment, the area's water bodies expanded by 15.78 %. (4) Demand for building operations has resulted in the loss of 1.89 % of agricultural areas. (5) About 85.24 % of barren lands were converted to other uses, with urban areas accounting for 57.33%. (6) Where national roads exist, urban expansion has intensified in the north-eastern, northern, and eastern sections of the country. Within a 5-kilometer radius of the city centre, the built-up areas were reduced from 85.32% to 22.28 %.

(Jian Gong, et al, 2017) The study of land use and land cover change (LULCC) in Tibet, as well as its effects on ecosystem services, is important for landscape and environmental conservation. In this work, we use empirical land use and land cover data from the Qinghai Lake region to conduct spatial analysis and simulate land cover trends for the years 1990, 2000, and 2010. Their findings show that the acreage of forest and grassland rose between 1990 and 2010, whereas the area of vacant land declined. For the period 2010-2020, simulation findings predict that the acreage of grassland and woodland will continue to grow while the area of agriculture and vacant land would shrink. In the study region, the ESV grew from 694.50 billion Yuan in 1990 to 714.28 billion Yuan in 2000 and 696.72 billion Yuan in 2020. The top two ecosystem services in this region are water control and waste treatment. The ESVs in the communities surrounding the Qinghai Lake are very high, especially in the north. The towns with the highest ESV sensitivity to LULCC are in the northwest, whereas the towns north of the Qinghai Lake saw a significant increase in sensitivity index from 2000 to 2010, particularly for three regulatory services and aesthetic landscape provision service.

(J S Rodrigues, 1998) In the power loom township of Bhiwandi, an epidemiological investigation of the incidence of dental caries and treatment needs indicated a prevalence rate of 56.93 %. The mean DMFT score was 1.25 +/- 1.34 overall. The majority of the reported

DMF teeth were decayed, followed by a nearly equal percentage of missing and filled teeth. The most common form of treatment required was single surface restorations, followed by two or more surface restorations, extractions, and pulp therapy.

(Partha Pratim Adhikary, et al, 2019) For sustainable natural resource management, continuous, historical, and accurate knowledge regarding land use and land cover (LULC) changes is very critical on the earth's surface. To present contemporary and historical LULC conditions in the Eastern Ghats Highlands of east India, researchers employed historical topographic sheets, IRS P6 LISS-III, and LANDSAT TM photos. Image enhancement and visual interpretation were used to improve the supervised classification results. The classification accuracy of the shifting cultivated area has increased thanks to the Ratio Vegetation Index and a fuzzy-based possibilistic c-means classification technique. The primary shift, according to post-classification analyses of the classified pictures, was barren terrain and forestland becoming agricultural land and scrubland. Forest cover fell from 52.75% of total land in 1931 to 29.6% in 2008. During the same time period, scrub land increased from 874 (10.4%) to 1269 km2 (15.2%), while agricultural land increased from 978 (11.7%) to 2864 km2 (34.2%). Reserve forest deforestation is 0.65 km2 per year, whereas mixed forest deforestation is 24.50 km2 per year. In 2004, the district's shifting cultivated area was 308.7 km2, but it has subsequently decreased to 186.4 km2 and is currently stable. Abandoned shifting agriculture covers roughly half of the 186.4 km2 area. During the last decade, the shifting cultivated area has shrunk at a rate of 0.15 percent every year. The cultivated lands were always on the move. The changing agricultural areas were mostly found at elevations of 580-810 and 810-907 m, with slopes of 20-30 and 30-40%. For shifting farming, slopes facing southeast and south were favoured. Policy proposals for the management of shifting cultivation were provided based on the recognised reasons of the transformation. At heights of 580-810 and 810-907 m, with slopes of 20-30 and 30-40%, the altering agricultural regions were predominantly identified. For shifting farming, slopes facing southeast and south were favoured. Policy proposals for the management of shifting cultivation were provided based on the recognised reasons of the transformation.

(Krishna Varevu, 2017) For the sustainable management of natural resources, environmental protection, air quality, agricultural planning, and food security, a better

understanding of land use/land cover changes (LULCC) and their interactions with the atmospheric environment is critical. The 15 papers in this special issue present a wide range of research on the causes and effects of LULCC and air pollution in various South/Southeast Asian (S/SEA) nations. This synthesis paper analyses the general links between population, LULCC, and air pollution, in addition to providing context for the studies in this focus issue. We also highlight knowledge gaps and research goals that are critical in tackling the region's air pollution problems. We conclude that identifying pollution causes, sources, and consequences by ground-based instruments, models, and integrated research techniques is required for successful pollution reduction in S/SEA nations. To address air pollution challenges in S/SEA nations, we also emphasise the need of developing sustainable technologies and strengthening the scientific and resource management communities via capacity building and training programmes.

(Sharad Kumar Gupta, 2016) Wetlands occupy 6% of the Earth's land surface and roughly 17% of the Hindu Kush Himalayan region. They are crucial linkages between terrestrial and aquatic ecosystems and are vital to climate dynamics. Despite the importance of paying close attention to the conservation and management of wetland resources, mapping them is a seldom done exercise. Using multi-sensor and multi-date images. This lake's area has shrunk due to changes in the region's hydro-meteorological circumstances. Because the lake's recharge is dependent on snowmelt, changes in climatic circumstances (reduced snowfall in winters) are partly to blame for the lake's decline in water level and water spread. The findings suggest that the lake area has shrunk by around 2 km2 in the previous 15 years, while farmland, grasslands, and vegetation cover have risen significantly. Climate change and anthropogenic activities have resulted in a two-fold rise in agricultural land and grasslands, as well as a six-fold increase in plant cover. The consequences of climate change in this region are confirmed by the temperature and precipitation trends.

1.3 RESEARCH OBJECTIVE

- To undertake Land Use/Land Cover analysis of the Bhiwandi.
- To understand the reasons for the obtained changes.
- To give applicable solutions for the negative changes.
- To undertake the demographic analysis of Thane district.

1.4 RESEARCH METHODOLODY

1.4.1 COVERAGE OF BHIWANDI

Bhiwandi Nizampur is a Municipal Corporation City which is located in district of Thane, Maharashtra. The Coordinates of Bhiwandi is 19°17'48"N 73°03'47"E and 19°.29'6664N 73°.06'3121E . Bhiwandi taluka consist of 14 towns and 213 Villages. The average elevation of Bhiwandi from mean sea level is 24m. The average rainfall which is received in Bhiwandi Taluka is about 3224mm. The climate over here is less humid because it lies in a tropical belt and also near to coast. Temperature in a day time is around 28° to 32° C and its 18° to 25° C at night time. Looking with a geographical aspect, Bhiwandi is lying in the Konkan coast lowland which is exactly between the Westerns Ghats to its East and Arabian Sea to its West.

The nearest airport from Bhiwandi is Chhatrapati Shivaji Maharaj International Airport which is 37 km away from it. There are many cities which surrounds Bhiwandi out of which Kalyan the closest one which is 9 km away from Bhiwandi like to the south-east of it. Dombivali is also close to Bhiwandi which is 10 km away. Thane which is also known as city of Lake lies to the west of Bhiwandi which is 15 km away from it. Mumbai which is the financial capital of India and capital of Maharashtra lies to the South Western part of Bhiwandi but it is divided by the river Ulhas which originates in Kondhana, Raigad district. It flows to the north and West where its splits Vasai Creek and Thane Creek respectively. The length of the river is 122 km and it finally meets the Arabian Sea through the Vasai creek and Thane creek. The distance

from Mumbai to Bhiwandi is 53 km. Mumbai is a major City neighboring to Bhiwandi. It acts as a link to many other cities by which transport is very well accessible. Vasai, Virar lies to the North Western part of Bhiwandi, also major cities of Maharashtra like Pune, Nashik are accessible through Bhiwandi. Because of Mumbai Agra National Highway passes through this region it has the great importance.

1.4.2 LOCATION OF THE STUDY AREA

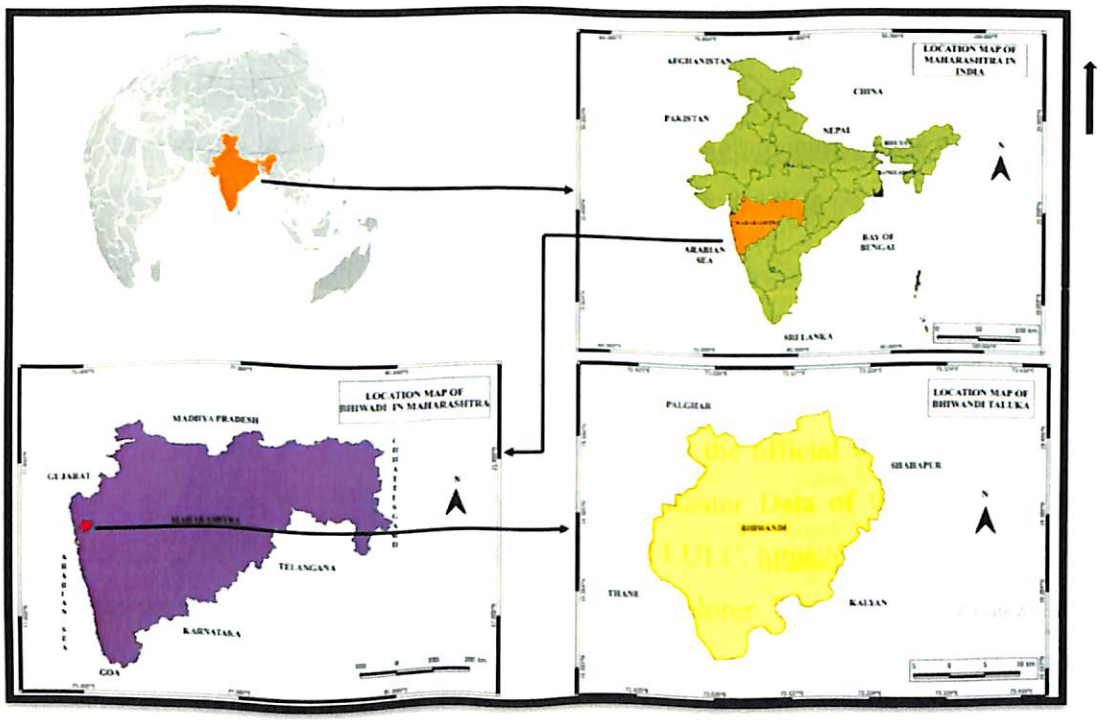

Figure 1.1: *Source: Base maps - www.pngwing.com, www.geographicalanalysis.com and www.google.com; Maps - Created by Researcher

1.4.3 DATA COLLECTION

Data collection is a process of gathering information, collecting, measuring, and analyzing the collected data for the research work to be done. The data which is collected is from a secondary sources. So the collected data is secondary data. The information and a data for writing literature review is collected through online mode from different educational

and authentic websites. For collecting a data various secondary data methods were used to collect it from authentic websites, online journal articles, books, research article, research papers, etc. Field visit is performed by the researcher for the purpose of Ground truthing.

To study the demographic data of Thane district from the year 1991, 2001 and 2011, the data has been collected from the official website of Government of India. Census of India is the Primary source of the data collection. www.censusindia.gov.in and https://censusindia.gov.in/DigitalLibrary/MFTableSeries.aspx are the website from which the data is collected in the form of excel sheet. Also district census handbook was used to collect the data.

The Collection of the base map of India used in the research work is being collected from the website of Geographical analysis, https://geographicalanalysis.com and the base map of Maharashtra is being downloaded through online geodata portal called as www.diva-gis.org .

The Thane district base map was created using OSM Standard in QGIS software. All the maps are created and made in QGIS software version 3.20.0 Odense.

The Landsat 8 data is being downloaded from the official website of United States Geological Survey (USGS) Earth Explorer. The Raster Data of the Bhiwandi is being downloaded from here for the study and analysis of LULC. https://earthexplorer.usgs.gov/ is the official website which directs us to the earth explorer. The data is Landsat > Landsat Collection 1 > Level-1 collection data is being used. For downloading the data, we need to login in the USGS Earth Explorer.

1.4.4 DATA ANALYSIS AND PROCESSING

Land use Land Cover

- Open the QGIS software and then input the collected Landsat 8 imagery in the software with adding Raster layer.
- Then go to Semi-Automatic Classification Plugin and click on Band sets.

- Click on the refresh button or input the images by giving the path file name where data has been stored.
- Then select all the data and click on plus sign. The data will get added in the second column as the name of Band sets.
- Then go to Processing and click on clip multiple raster. If you have the shape file of the specific area, add that vector layer which will be visible on the main screen. After adding it come back to the clip multiple raster option and click on refresh button.
- Otherwise click on the plus sign then go to the main screen select the area of which you have to do clipping. The co-ordinates of he selected area will get inserted automatically. Then click on Run and save the file. Then the clipping process will start and the output will be visible on the main screen as well as on the layer panel.
- Then delete the input data from the layer panel and go to SCP and then Band sets, click on refresh button and the new clip data will get appear and then also the delete data from the second table. Then again select all and click on plus sign the new clipped data will get uploaded in it.
- Go to Wavelengths options and select Landsat 8 OLI (1 to 7).
- Then again go to processing and then go to Landsat
- Give the path file of the clipped imageries and give the path file of the MTL file.
- Enable the DOS 1 and click on Run and save the file. Then the process will start and the output will be visible on the main screen as well as on the layer panel.
- Delete the clipped data from the layer panel.
- Then go to SCP Dock Panel and in the RGB section add the values of the band combinations and the output will be displayed
- GO to SCP Panel click on the Training inputs and give the path file for the training inputs.

  Then create the training inputs by giving the MCID and CID and also insert the various classes name in the MC names and C names. Then click on create a ROI polygon and create the polygon of classification names. And click on save Temporary ROI files in training inputs which is available on the bottom of the training input panel. And if you want you can change the colors of the classes

- Add the other classification names and do the same process. The output will get displayed.
- For the final output of the LULC go to SCP menu, then click on Band Processing and select Classification.
- Select the MID, then select the Maximum Likelihood option in the Algorithm section. Select use lcs and algorithm. Click on run and save the tiff file. Then final output will get start.
- The output will get displayed, with various classes in the layer panel.
- Then go to create print layout and the create the proper map by inserting the grids, title, sub title, north arrow, legend, scale and also the surrounding areas.
- Your LULC map will be ready.

Demographic Analysis

- Open the Excel and input data of the particular parameter and save the file in CSV format.
- Open the QGIS software. Go to Layer, add vector layer, add the shape file of the study area and click on add. The shapefile will get open.
- Then again go to Layer, add Delimited Text Layer, and add the Excel file which is in the csv file format. Click on Add. The csv file we get displayed in the layer panel.
- Then go to the properties of the vector layer of the study area. Go to Joins and click on Plus sign and select the join layer, target field and the join field. Then click Ok. One message will display on the screen and click apply. Go to Attribute table, and check it.
- Then go to properties, select labels and add the labels.
- Go to properties, Select Symbology and select graduated.
- Select the values and click on classify and also you can change the color scheme and click on apply.
- Layer will get updated and class interval will get display on layer panel.
- Then go to properties, select Diagrams and select Pie chart.
- Click on the attributes and click on Plus sign,
- The layer will get updated with pie chart and also in the layer panel.
- Go to project, go to create new print layout and give the name to it.

- Then start creating the map, insert the map, insert the grids to it, insert the title and subtitle, insert the north arrow, insert the legend, insert the scale to it, and the surrounding area and export as image. Save it in the folder.
- Your Choropleth map of Demographic analysis will be ready.

1.5 LIMITATIONS

- Sometimes the data may be inaccurate of the study area where the researcher cannot get the perfect data.
- Using of very small or large data of the study area is not proper.
- The primary data cannot be used for the collection of maps and satellite imageries of the study area, so we are limited to the secondary data.
- There might be the lack of information and previous researches of the study area.
- We can do the analysis of a large area also. But sometimes use for the large area is also limited.
- The access to the data is very limited. Hence we can't get the data from everywhere. Few authentic websites only provide the needful.
- Sometimes if the data is less accurate it may affect the maps which are created in the software by the researcher and may not get the desired output of the study area.

1.6 SCOPE OF THE STUDY AREA

- LULC has became one of the most important and vast subject in recent years.
- The LULC analysis helps the researcher to study the past and present development of the region and also to analyze the future development.
- Demographic analysis gives the wide range and scope in the changes of the population pattern.
- We can do the analysis to get to know the economic, social, cultural, administrative and infrastructural development of the area.

CHAPTER II

2.1 HISTORICAL BACKGROUND

Bhiwandi Nizampur City Municipal Corporation which is located in the district of Thane Maharashtra. Bhiwandi is a commercial city which is in western Maharashtra. Bhiwandi lies in the beautiful open coastal lowland with Hills and water streams. Bhiwandi is also known as Manchester of India as it consists of many textile industries. Bhiwandi is also well known as a major trade Centre in Maharashtra. In the early 20th century Bhiwandi was just a small town which was inhabited mainly by the Maharashtrian people. During that time agriculture, fishing and handloom was the main occupation of people living over there. After the emergence of electricity in Bhiwandi, Handlooms were replaced by power looms and it became a major hub of the textile industry in the 1930's. During the 16th century there was a port on the river which Bhiwandi was having and that area was known as Bandar mohalla. Woods and spices traded the most from this port. as the export and import to this city has witnessed many merchants who frequently travelled there. In this era merchants were called as Saudagar and the area was known as Saudagar mohalla. The labourers in the shipping industries there home were known as Sutar vada and hamalwada. During the time of Mughal dynasty Bhiwandi was also known as Islamabad. There is a mosque which is named as Islamabad Masjid and Eidgah at Idgah Road. First as we see Bhiwandi was just land where only a few people reside but after the trade and textile industry was set up the face of adversity was changed in a tremendous way and as a purpose of business and job opportunities people started coming to Bhiwandi and settling down there from all over India.After the development begins in Mumbai there was a decline of textile industries due to which it become major industrial attraction due to its transport facility which allowed 24 hours of accessible and also electricity. As there is a great importance in the textile Industries in Bhiwandi is the second largest power after Surat. Bhiwandi is one of the most leading cities in India which produces and transports Most of the power loom for textile industries all over India. Bhiwandi is the most prominent place for trade since the time of Mughal Empire. History of Bhiwandi in India's industrial growth is always remarkable.

2.2 GEOGRAPHICAL BACKGROUND

Bhiwandi is a city which is located in the district of Thane. Bhiwandi is a taluka among the 7 talukas in Thane District. Total area of Bhiwandi is 698.72 sq.km, Density is 1634 per sq.km. Out of Total population of Bhiwandi, 24.33% population lives in urban areas and 75.67% population lives in rural areas. According to the 2011 Census, there are 14 towns and 213 villages in Bhiwandi. As it is near the coastal region, the temperature here is 28°C - 32°C in day and it decreases to 18°C - 25°C at night. Humidity is 62.5% a day. Maharashtra coastline 720 km long and Konkan coastal region is around 50 km wide, where Konkan region has a variety of combination of several geographical features, it has many hills which are very steep and narrow, plateaus which have medium to high elevation, also many river valleys which are broad. Bhiwandi is in the middle part surrounded by Arabian Sea towards west and Western Ghats in the East. Western Ghat starts from Gujarat where Sahyadri mountain range begins. It passes from Maharashtra and Karnataka ending it at Kanyakumari.

If we see the Geographic aspect of Bhiwandi it consists of major three features. The Eastern range, slopes of the Hills which are plain and western coastal regions. Areas of Thane District is covered by Sahyadri mountain over it. It has a dense forest which became home to many species of flora and fauna and also many endangered species are also found here. As water is the main source of life Ulhas river and Vaitarna river are the major two rivers of Thane district which flows from Bhiwandi. River Ulhas starts from Kondhana village of Raigad district which passes from Bhiwandi and deposits in the Arabian Sea as a Vasai creek in the west. The distance of Ulhas river from its origin to the mouth is 122 km. It is splitted as Thane creek and Vasai creek in the Thane district. The highest point in Bhiwandi is Kaman Durg which has 644m elevation above mean sea level. Rivers like Tansa, Bhatsa are the rivers which flow from bhiwandi and its border. As Bhiwandi is situated in the Sahyadri's plain slope land, a forest consists of many flora and fauna and also many Hills. Mahuli Hills, Verdant and Mandagiri are few names of the hills in Bhiwandi. Tansa lake and Varaldevi are the artificial Lakes which are known for their hot water springs. The location is at Akaloli - Vajreshwari Road which is on the bed of Tansa river. Due to the presence of volcanoes in that region the strings are hot. About agriculture, Rice is a primary crop which is consumed by people. Also, the main occupation of people over here is dependent on power loom

industries. Another main occupation apart from power loom is stone quarrying and sand quarrying carried out in some areas.

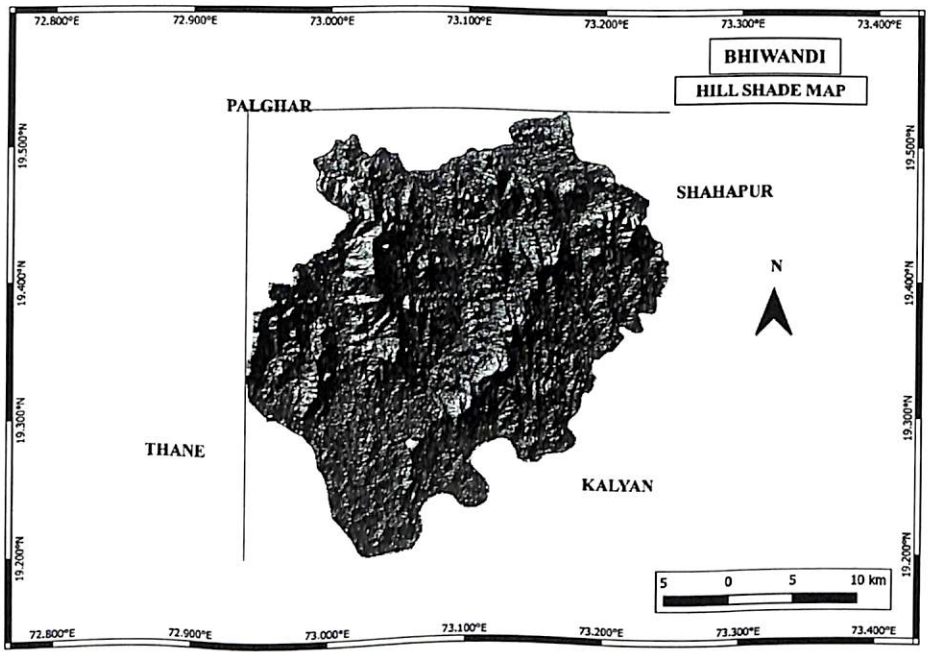

Figure 2.1: *Source: Base map – bhuvan.nrsc.gov.in; Maps - Created by Researcher

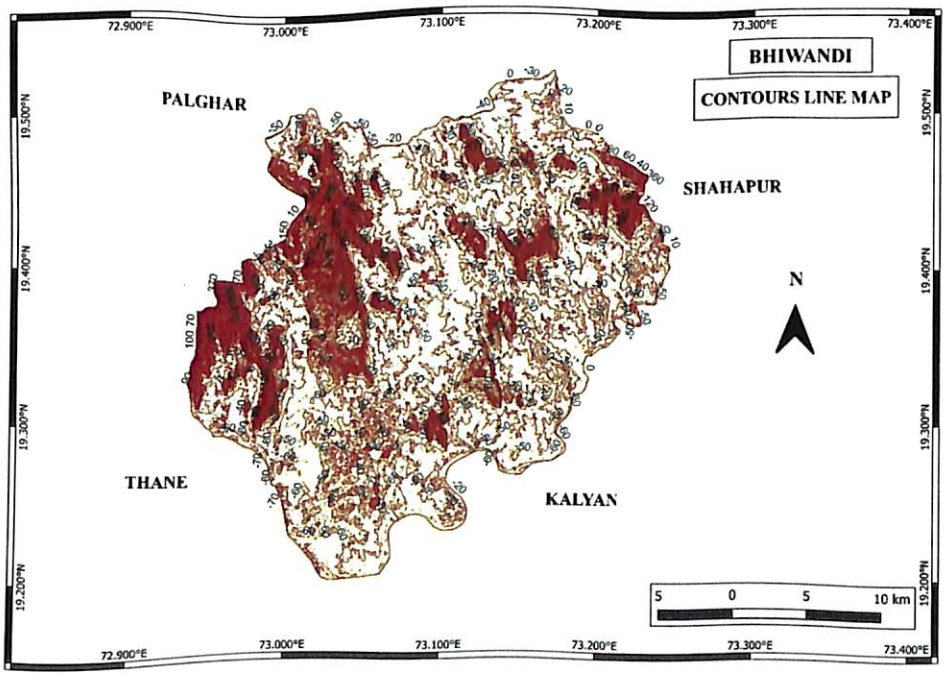

Figure 2.2: *Source: Base map – bhuvan.nrsc.gov.in; Maps - Created by Researcher

2.3 ADMINISTRATIVE BACKGROUND

The Bhiwandi- Nizampur City Municipal Corporation is a Governmental body in a city of Bhiwandi which looks after the administration of a city. The abbreviation is BNCMC for Bhiwandi – Nizampur City Municipal Corporation. The Municipal office is in middle of a city of Bhiwandi. It was established in the year 2002. The office of Sub Divisional Officer and Sub Divisional Magistrate Office is situated near walkable distance from Bhiwandi ST Bus depot. The Sub Divisional Magistrate (SDM) is appointed through Civil Services after clearing a exams and completing a training from Lal Bahadur Shastri National Academy of Administration (LBSNAA). Civil and Judicial Magistrate's Court of Bhiwandi is just 2 minutes away from SDM Office. Also to control the crime in the city and a taluka, the Assistant Police Commissioners Office and Narpoli Police Station is set up in the city which comes under Thane Police Commissionerate. Tehsildar office and many administrative offices are in the Bhiwandi City only. The overall administration is of the city is good.

2.4 ECONOMIC BACKGROUND

Bhiwandi has a great access to almost all kinds of transport. As it is neighboring Mumbai and is India's second largest power looms producer, it has a great connectivity of transportation. Due to power looms industries and textile industries the population over here is very high. Many of the people from all over Maharashtra and India come to Bhiwandi in search of job opportunities and settle here itself. Bhiwandi is a major trading center located near Mumbai, the financial capital of India. Bhiwandi contributes majorly in the economic growth of India. Textile industries and power looms industries are two main industries in Bhiwandi which are the main reason of the development of Bhiwandi.

Textile Industry: The textile industries are the main reason that makes Bhiwandi to get a great importance in the field of textile market and makes Bhiwandi as a high in compare to all other cities in India. In the initial stage the power loom industries in the city was not of great importance. Bhiwandi was a city which explored the power loom in India. Millions of livelihood are dependent on the mills which are present largely in the city. More than four

million people in the city are dependent on textile industry. Bhiwandi is also known as Manchester of India. Many large textile mills are there in a city which are the main reason of high production of many metric of fabric every day. Export takes place in a large scale and it's a big revenue earnings. Textile industry is a backbone of the city.

Accessory Industries: Many small several other accessory industries are present apart from textile industries. Many logistics workers are the key component of handling transport and managing the goods. The godowns are very huge as it again requires a large amount of manpower and machine operational work. Ceramics, Ply, wood cuttings and many small industries and export, import works are done on large scale.

2.5 INFRASTRUCTURAL BACKGROUND

Bhiwandi is one of the most busy and populated city in Maharashtra. It is a hub for many textiles and power looms industries. It is also called as Manchester of India. The infrastructure of Bhiwandi is very good. Industries over here produces millions of metric fabric which is then export throughout India. Due to Mumbai – Agra National highway it has a great importance in India for textile and power looms. The Roadways gives the major advantage for the transport of goods and services. As Mumbai – Agra national highway works as an important corridor for transport. It connects many cities with Mumbai also internal and local transportation is very cheap. TMT, NMMT and KDMT are the governmental bodies of which transport public Buses are available to travel in the city which connects Kalyan, Dombivali, Thane, Navi Mumbai, and Mira Bhayander as well. Maharashtra State Road Transport Corporation, MSRTC (ST) buses have a good frequency from Bhiwandi to other place. ST depot is 15 minutes away from Bhiwandi station.

The city is well connected with all the interiors of the City. The P.W.D. department is an authority which looks after the maintenance of the roads in Bhiwandi. Many Flyover Bridges are there in Bhiwandi. Share auto rickshaw and meter rickshaw are the public transport which people use to prefer as well after public buses. The fare is quite reasonable and it is quick accessible to any area. The roads here are quite narrow and traffic can be seen at many places in the peak hours from Monday to Saturday. Bhiwandi has a railway station

which is served under Indian Railways network. The local train are not much frequent in this way. But it connected with Mumbai, Kalyan, Palghar with railway line. Being a major city near Mumbai it serves as a main stop for many important trains. Airport is almost 60 km away from it. Chhatrapati Shivaji Maharaj International Airport, Vile Parle. Overall if we see the Infrastructure it is lacking the road maintenance in some areas of it. Also in infrastructure, Government and public Banks, Colleges, Schools, Post Office, Religious Places and Hospitals are also well built. Playgrounds and Recreational land is also being used by the people in the city. Many shopping stores, super markets, and all the city amenities are there in Bhiwandi city. But the bhiwandi taluka is rural as is consist of 213 Villages and only 14 towns in it which shows that the development is still not progressive.

CHAPTER III

LAND USE LAND COVER ANALYSIS

3.1 INTRODUCTION

The usage of land by the human being for the better living of people in which the land is used for the recreation, commercial, residential, and also for the transportation and may several reasons where the land is going to be useful for their convenience is called as land use.

The natural cover on the land which covers the area on the surface of the earth is called as Land cover. Land cover consist of vegetation cover, water, bare soil,etc. Land cover is a cover which is naturally formed without any human interference. We can use the technology for identifying the land cover, mapping of the land cover is the very important aspect for the planning the activities for the particular area, and resource management.

3.2 MAJOR LAND USE CLASSES

The land use and land cover classification have further been divided into sixteen major classes as explained below:

3.2.1 AGRICULTURAL LAND

This includes all the land parcels that are cultivable and crop fields. Agriculture land is the source of food – fruits and vegetables and many other agriculture products. It helps shape the socio – economic development of a region. Due to ever increasing population, the agricultural land is being exploited and decreasing in size.

3.2.2 BEACH

A beach is a coastal strip of land which is covered with lose particles. These particles are made up of weathered rocks and form sand, pebbles, shingles, gravels etc. A beach is mostly used for recreation purpose, however the changes in the area covered under a beach signifies the changes in the local ecological process.

3.2.3 BUILT-UP AREA WITH VEGETATION

All the man – made structure are considered as built – up area. It is dense in urban areas and scattered in rural areas. If there is vegetation in between the built structures it is called built – up with vegetation.

3.2.4 BUILT-UP AREA WITHOUT VEGETATION

All the man-made structure is considered as built-up area. It is dense in urban areas and scattered in urban areas. If vegetation is absent in between the built – up structures, it is called built-up without vegetation.

3.2.5 FALLOW LAND

The arable land which is left unattended for one or more vegetative seasons is called fallow land. It is a technique of cropping used to regain the fertility of land by keeping it bare for some time. The presence of fallow land implies that the land is agriculture but has lost it's fertility to a certain extent which can be regained.

3.2.6 HIGHLAND WITH VEGETATION

The area which is high like the plateau, the mountain and other hills are considered highlands. If they are vegetated, they are called highland with vegetation.

3.2.7 HIGHLAND WITH SPARSE VEGETATION

The area which is high like a plateau, the mountains and other hills are considered to be highlands. If they are sparsely vegetated, they are called highland with sparse vegetation.

3.2.8 INDUSTRIAL AREA

The land parcels which have been used to construct industries and allied activities, are called as industrial area. It is a common feature in urban areas. It signifies the change in land use because most of the case, vegetation and agriculture are replaced by industries.

3.2.9 OPEN SPACE

It includes all those land parcels which are either left empty without any human intervention, or are barren lands, or are parks, grounds and other open areas which are accessible to public.

3.2.10 WATER BODY

Any water body on the surface of the earth, in any shape size and depth of any origin is called as water body. It is a collective term for any type of water on the earth like lake, pond, river, sea, ocean, stream and alike.

3.2.11 RIVER

A river is a linear water body. It originates in the high mountains and drains down into a large water body i.e. sea or ocean. They are an important part of the ecosystem and a change in their existence can alter the ecosystem and the environment.

3.2.12 SEA

It is a large water body of salt water. A sea can be a landlocked water body or it can be a part of the ocean. It plays an important role in the local ecosystem of a place as it provides for the marine ecosystem, wetland ecosystem and scope for disposal of treated sewage. A change in the area under sea represents the impact of climate change and impact of human activities.

3.2.13 BUILT – UP AREA WITHOUT AGRICULTURE LAND

All the man – made structures are considered as built – up area. It is dense in urban areas and scattered in rural areas. If there is absence of agricultural land amidst built structures, it is called built – up without agricultural land. It is common occurrence in the urban areas.

3.2.14 SLUM

The Registrar General of India has adopted the following definitions of slum for the purpose of census of India. 2001(http://mohua.gov.in):

3.2.15 VEGETATION

It encompasses the trees either individually or in forest. It also includes gardens. It is the total green cover of the area under study. The area under vegetation helps us to understand the health of the environment.

3.2.16 WETLANDS

The United Nations Environment protection agency defines wetland as 'areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.' In short it can be understood as land with marshes and swamps.

3.3 LAND USE LAND COVER ANALYSIS

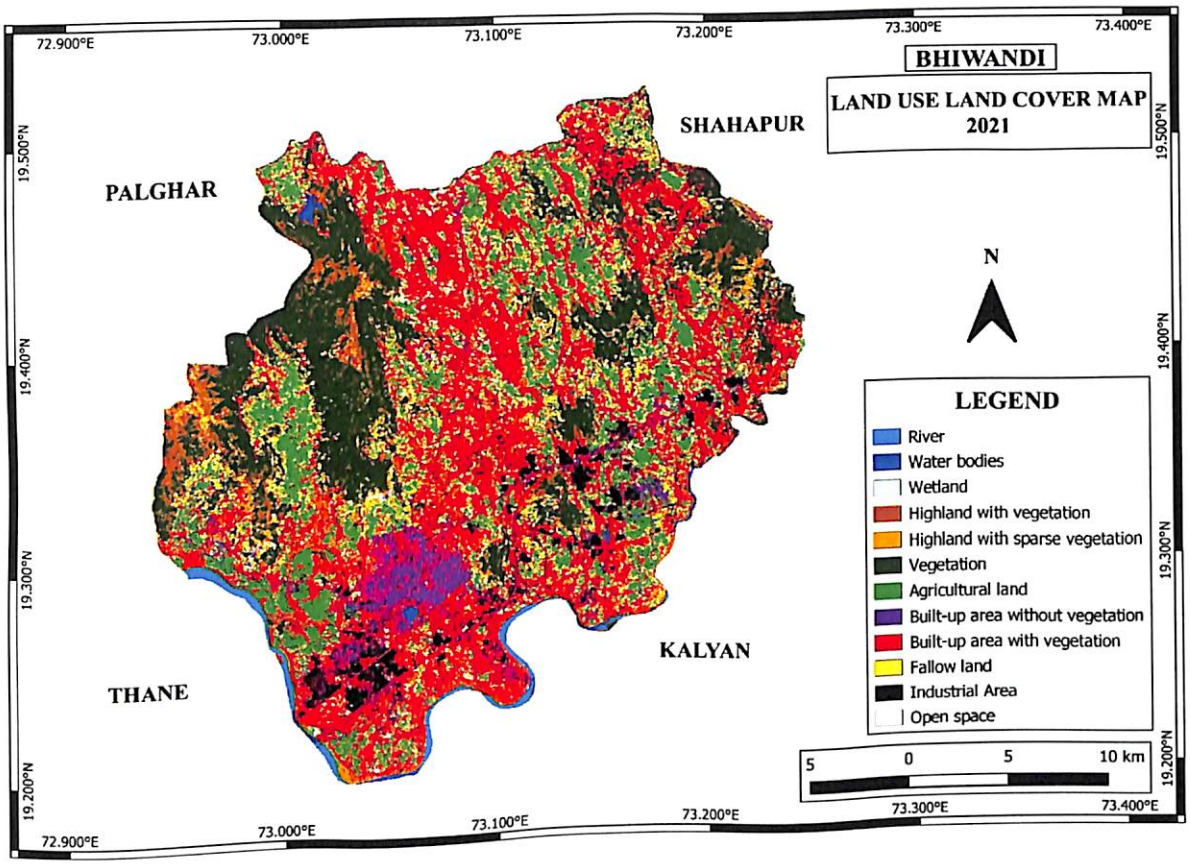

Figure 3.1: *Source: Base map - https://earthexplorer.usgs.gov/; Map – Created by Researcher

The title of the above map is Bhiwandi, Land Use Land Cover map 2021. The scale of the map is 5 km on the map. The above map depicts the Land Use Land Cover (LULC) of the Year 2021, Bhiwandi taluka. Bhiwandi is a vast taluka with 213 villages and 14 towns. Bhiwandi is located between the Arabian Sea and the Western Ghats. To the North of Bhiwandi, Palghar district lies, Thane taluka lies to the West, Kalyan taluka to the South and South-East and Shahapur taluka to the East. As we interpret the LULC map of Bhiwandi, we will start the interpretation from the north of the map. There are a total 16 LULC classes which are commonly accepted everywhere. The northern region can be seen as consisting of most of the classes. Built-up area with vegetation represents the red color in the map.

It is seen that almost 20% of the northern region can be seen with settlement with vegetation. It means that the rural area has been seen over here. Going to the best from the

center of the north, the northwest region has a water body. It is seen that it is a big lake which is a water reservoir which provides water for agriculture and for the people's survival. As water is a basic need of every living being on the earth, it is necessary for everyone. So this water from the lake is being used for household purposes by the people living around it. Also we can see that to the north of a lake there is agricultural land. The settlements over here consist of vegetation, also surrounding to lake we can see a hilly terrain. It is a vegetation and vegetation on the highlands. Small patches of fallow lands are observed in the Northern region. Many small patches of Open spaces are also seen in the same region, while the Northeastern part has a frequent vegetation cover also a built-up with vegetation is seen clearly.

As we start moving downwards from North to slightly southwards, the central region consists of islands with sparse vegetation, highlands with vegetation and vegetation cover. This vegetation cover and highlands covers almost the north in the Northwest part of Bhiwandi. On the top of highland we can see some little patches of fallow land. Built-up area with vegetation shows that the region is a village or rural settlement. Agricultural land is able to classify in the west of the map, it is just to the west of highlands with vegetation, vegetation and to its west of agricultural land the highlands with sparse vegetation and highlands with vegetation is seen clearly. We can also identify the open spaces, small patches in between and very small patches of agricultural land as well.

The extreme west border of Bhiwandi has vegetation and highlands with vegetation. To the west and South West region, the river flows towards the west. Also we can see many small agricultural patches near a river as the soil is fertile and gets enough water. People over here do the farming and agricultural practices crop production over here. Small settlements, built-up with vegetation, have been observed as well. Also many small water bodies are there in between the agricultural land. Little fallow land patches are visible in the South Western region. Moving just east, we can see that there is a great variation which shows that it is a major City consisting of built-up without vegetation, very few parts are seen with vegetation in built-up and it's a major city called Bhiwandi. Region has built up without vegetation. It is clearly observed that a water body is located near a settlement. It is usually in the city of Bhiwandi. Coming down to the south, many black patches are seen that black color represents the industrial area. These are the majorly textile and Handloom industries. The

export and import is carried out here. Also the industrial area is seen on a large scale. South of the border, the river is flowing and on its bank we can see the wetland near it and is also being observed on a big patch. Agricultural land is visible in the southern region, Industrial area, built-up area without vegetation and built-up with vegetation is identified.

Moving towards south east of Bhiwandi taluka, we can observe the hilly areas that have Highland with vegetation and Highlands with sparse vegetation. Around it we can see that small patches of settlements, many black patches show that there is availability of industrial area. Surrounding it agricultural land is seen in a small scale, the industrial area is seen throughout the Southeastern region moving towards it. It is in the interior as well as narrow to the settlement areas. Fallow land and open space is also observed on a small scale.

To the east of Bhiwandi taluka we can see a huge vegetation cover consisting of hilly regions which have highlands with vegetation and also highlands with sparse vegetation. To the East, we can see more small industrial areas where industrial activities are done. Open space and fallow land is clearly seen in small amounts. Agricultural land is almost there in the Eastern region, amount of settlement is observed where built-up area with vegetation is more in numbers. Built-up areas without vegetation are also seen around the region which depicts that there might be a road network due to which the vegetation cover over there is less in amount. Many small water bodies are also visible, like very small patches which show the presence of any small lake, ponds, etc. The river is flowing and also a very small piece of land is seen to be a wetland. Vegetation covers most of the region where Highlands with vegetation and highlands with sparse vegetation are seen. Small patches of open space are clearly visible in the region.

Looking at the Land Use Land Cover (LULC) map of Bhiwandi taluka, we can say that all the major classes of LULC are clearly visible in the map on a large scale. The river is flowing through the border where it flows towards west from east going down through south. A few large water bodies show a big lake and others are small ponds, lakes are also seen in the many small interior regions. Built-up area without vegetation shows the presence of city and urban population, and industrial areas are near the settlement. Vegetation is covering many places with highlands with vegetation and highlands with sparse vegetation. Agricultural land in Bhiwandi taluka shows that the people in the rural areas are dependent on the farming occupation. Farming is the main occupation for the rural people living over

here. Open spaces and fallow lands are also seen in many areas of Bhiwandi taluka. The river is flowing in the region, it is seen in some places that the wetlands are near rivers.

CHAPTER IV

DEMOGRAPHIC ANALYSIS OF THANE DISTRICT

4.1 INTRODUCTION

Demographic analysis is a study of the population in which it includes the information related to the population and many other aspect related to it and the study area. In the present analysis, we can find out the demographic changes in the past three decades i.e. 1991, 2001 and 2011. By doing this study, a researcher can get to know about the urbanization and also the development of the study area.

4.2 TALUKA WISE DEMOGRAPHIC STUDY OF THANE DISTRICT

4.2.1 TOTAL NUMBER OF POPULATION AND SEX RATIO:

According to Census of India, "Sex ratio is defined as the number of females per 1000 males in the population." The given maps give the information about the total population and the sex ratio in the talukas of Thane district for the years of 1991, 2001 and 2011.

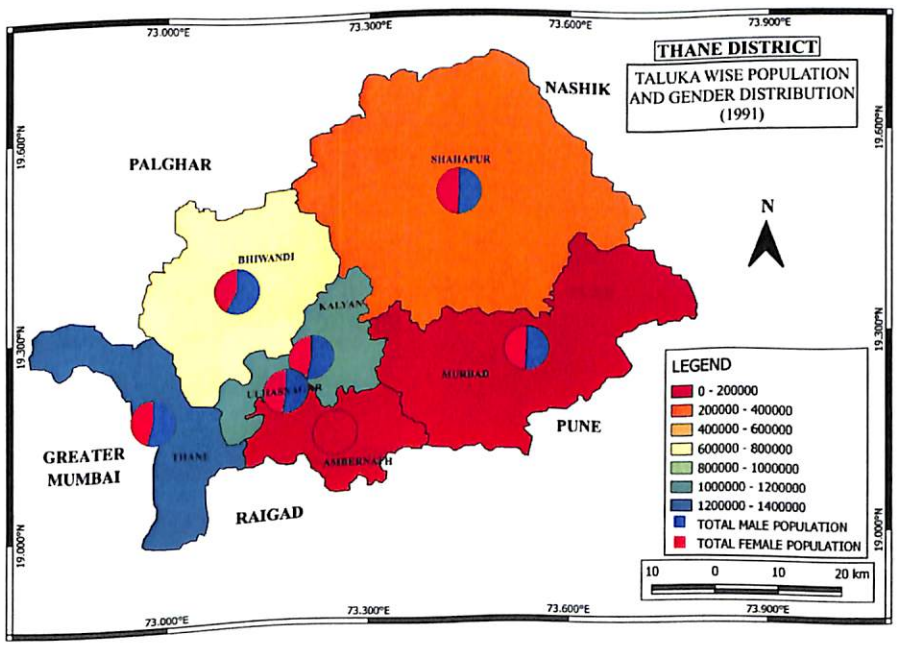

Figure 4.1 a: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

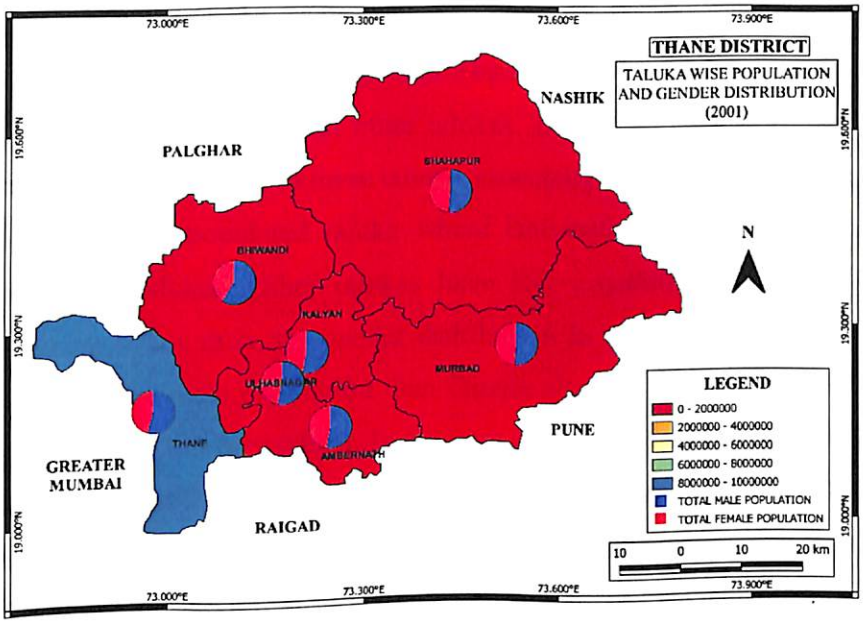

Figure 4.1 b: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

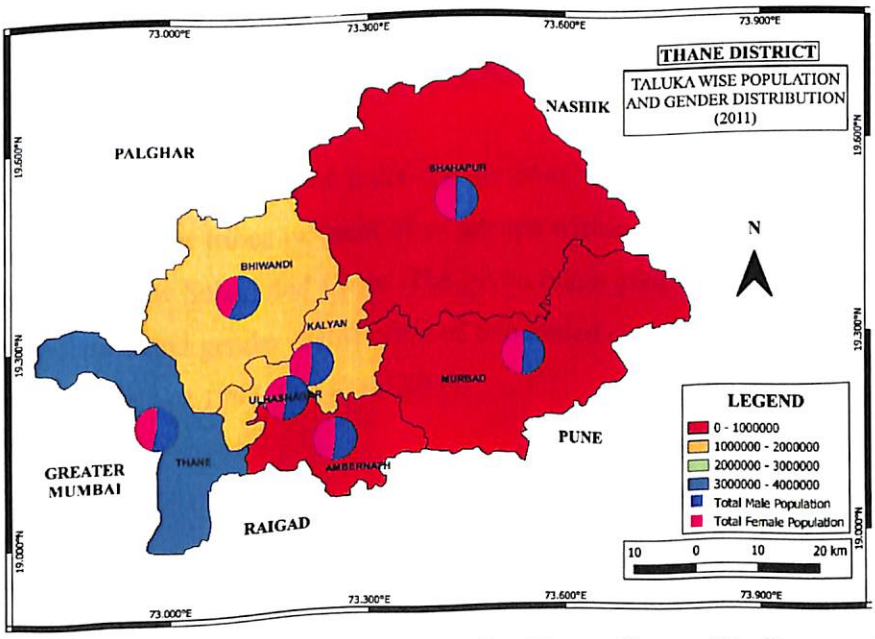

Figure 4.1 c: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

Thane District consists of seven taluka and as shown in the above map, It is observed that in the year 1991, Thane has the highest population followed by Kalyan and Bhiwandi. UlhasNagar and Shahapur are the two talukas having the average population, Murbad is the lowest populated Taluka. In the year 1991, Ambernath does

not have any data because it was formed in 2001 due to which it does not consisted in 1991 census. 2001 we can see that Thane is the only taluka which has the highest population followed by all other talukas. Due to urbanization people started their movement and settled in these talukas especially in Thane. In the year 2011, Thane is again a most populated taluka where Bhiwandi and Kalyan are second highest populated talukas. Other talukas have less population compared to these three. Looking to sex ratio, the gender distribution In the year 1991 Bhiwandi and Thane having more male population than female also we can see that male population is slightly high in every taluka. In the year 2001 and 2011 the same result is seen that Bhiwandi and Thane taluka is having high population consisting of all other talukas having slightly more male population than female population as seen in the pie diagram. Blue color in the pie diagram represents male population and the pink color represents the female population.

4.2.2 TOTAL SCHEDULED CASTE POPULATION AND GENDER DISTRIBUTION:

The Constitution of India Article 366(24) defined Scheduled Caste as, "such castes, races or tribes or parts of or groups within such castes, races or tribes as are deemed to be Scheduled Caste. The given maps give the information about the total population and gender distribution of Scheduled caste in the talukas of Thane district for the years of 1991, 2001 and 2011.

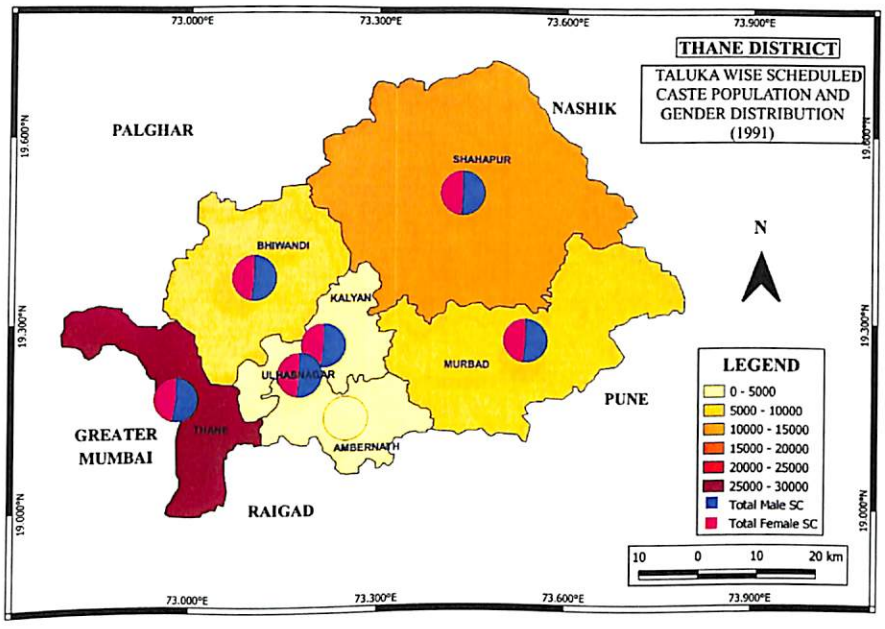

Figure 4.2 a: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

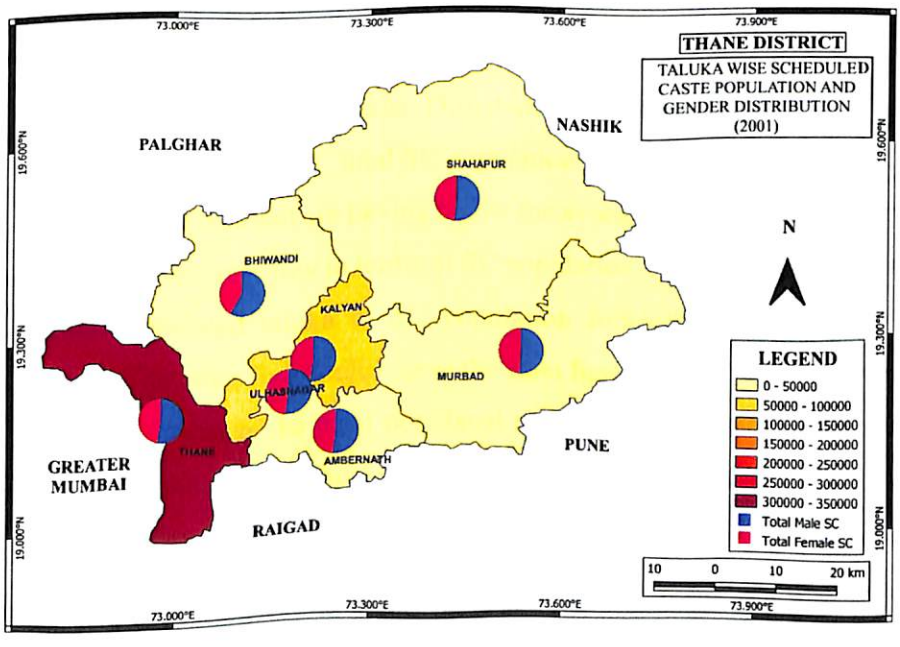

Figure 4.2b: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

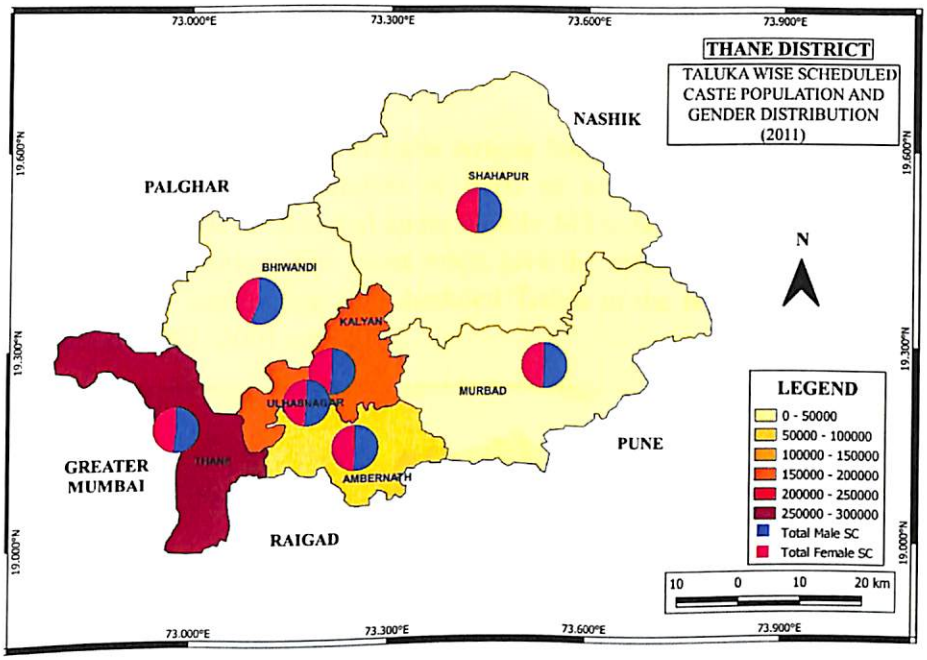

Figure 4.2 c: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

As seen in the above maps, it depicts the Total Scheduled Caste population of Thane District and the Gender Distribution of Thane district which include seven talukas. In the year 1991, total SC population in Thane is high followed by Shahapur. Bhiwandi and Murbad are having below the average SC population where Kalyan and Ulhasnagar are very low in terms of SC population. In the year 2001, Thane is the only highest populated taluka of SC population followed by Kalyan with the second highest. The other five talukas have the least figure in the SC population. While in the year 2011 Thane is the most populated taluka of SC population followed by Kalyan and Ambernath. Due to increasing job opportunities and development in the cities and the infrastructure and many amenities, the population is more in cities in 2011. Gender wise distribution of Male SC and Female SC population, all the talukas have more male population than female population except Ambernath which was not formed in 1991 but in 2001. 2001 and 2011 Thane and Bhiwandi have more than half of its population where males are more than females due to the high requirement of labour male population is more.

4.2.3. TOTAL SCHEDULED TRIBE POPULATION AND GENDER DISTRIBUTION:

The Constitution of India Article 366(24) defined Scheduled Tribes as, "such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this constitution. The given maps give the information about the total population and gender distribution of Scheduled Tribes in the talukas of Thane district for the years of 1991, 2001 and 2011.

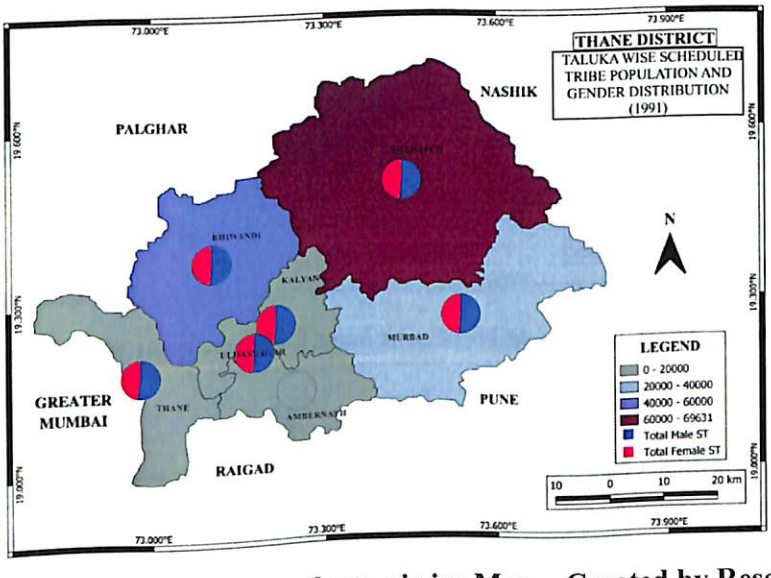

Figure 4.3 a: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

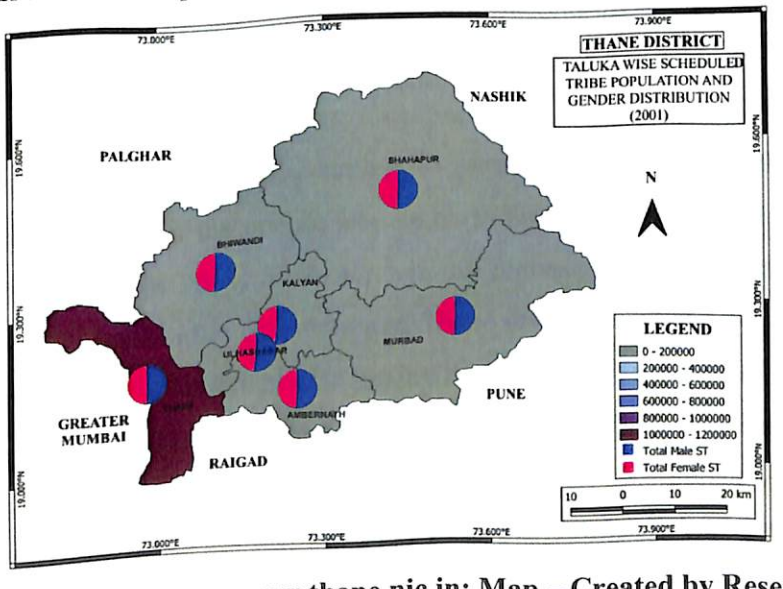

Figure 4.3 b: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

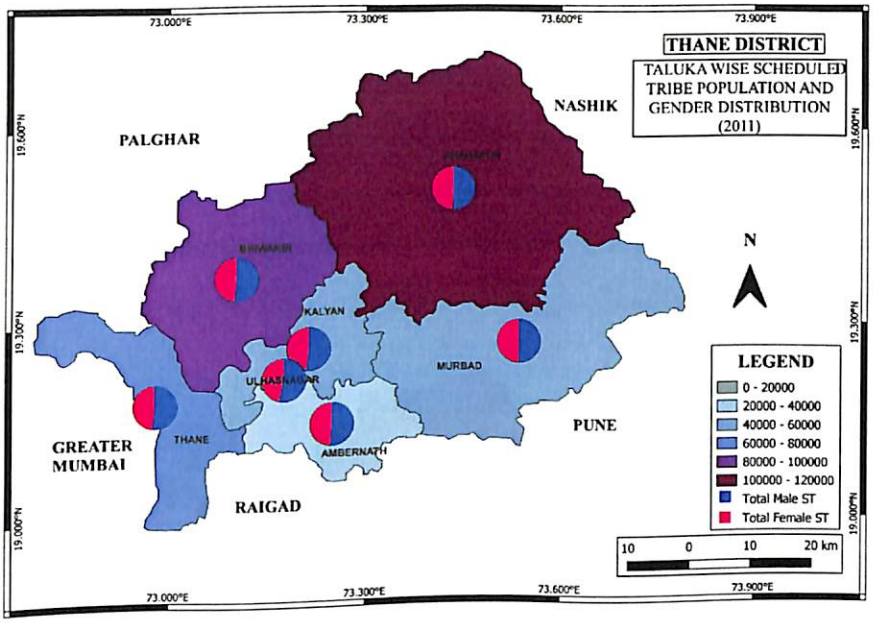

Figure 4.3 c: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

The above map shows the Scheduled Tribe (ST) taluka wise total population and gender distribution of Scheduled Tribe in Thane district. In 1991, only six talukas were included in Thane district where Shahapur taluka shows the highest number of ST population followed by Bhiwandi with second highest population. Murbad is at third place after Shahapur and Bhiwandi respectively. Other three talukas have the least number of ST population. Ambernath taluka was formed in the year 2001. But in 2001 Thane is having the highest ST population followed by all other six talukas. Which means that the people who came to the Thane district were settled in Thane taluka. While in 2011, Shahapur has the highest ST population of Thane district. Bhiwandi comes after Shahapur and Thane is the third highest ST populated taluka. Kalyan and Murbad are almost having the least figure compared to all other talukas. Comparing all the pie diagrams shown in the map which shows us about the gender distribution in a Thane district that consist of Male ST population and Female ST population, we can see that the Male ST population is slightly more than the Female population in Thane District. It is seen that the Male population is more than the Female population.

4.2.4 TOTAL NUMBER OF CHILDREN POPULATION LESS THAN 6 YEARS AND GENDER DISTRIBUTION.

Child Population in regard to Census of India described as the population of children in the age-group 0-6 years. The given maps give the information about the total population and gender distribution of Children population less than 6 years in the talukas of Thane district for the years of 1991, 2001, 2011.

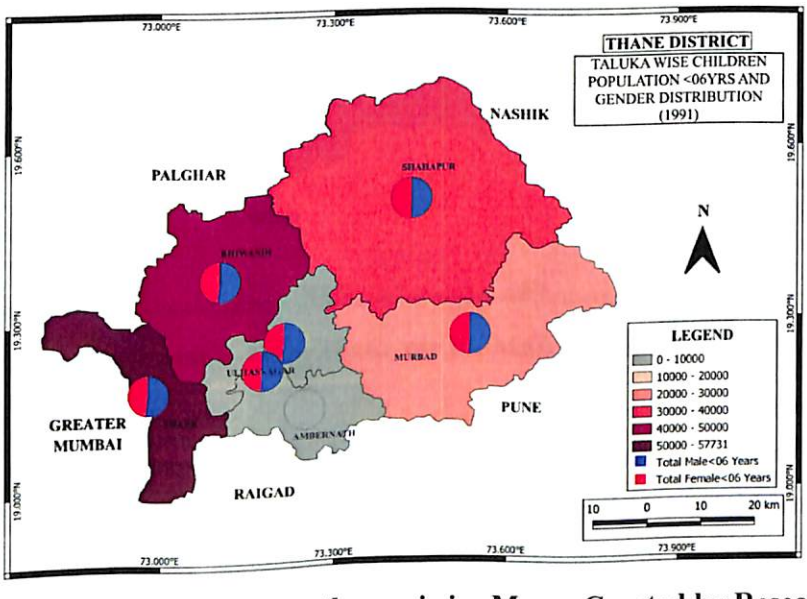

Figure 4.4 a: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

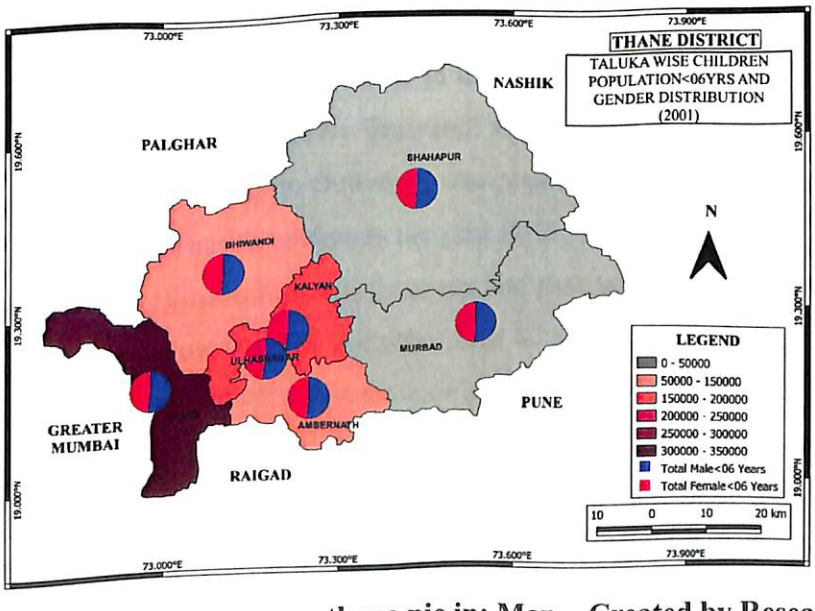

Figure 4.4 b: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

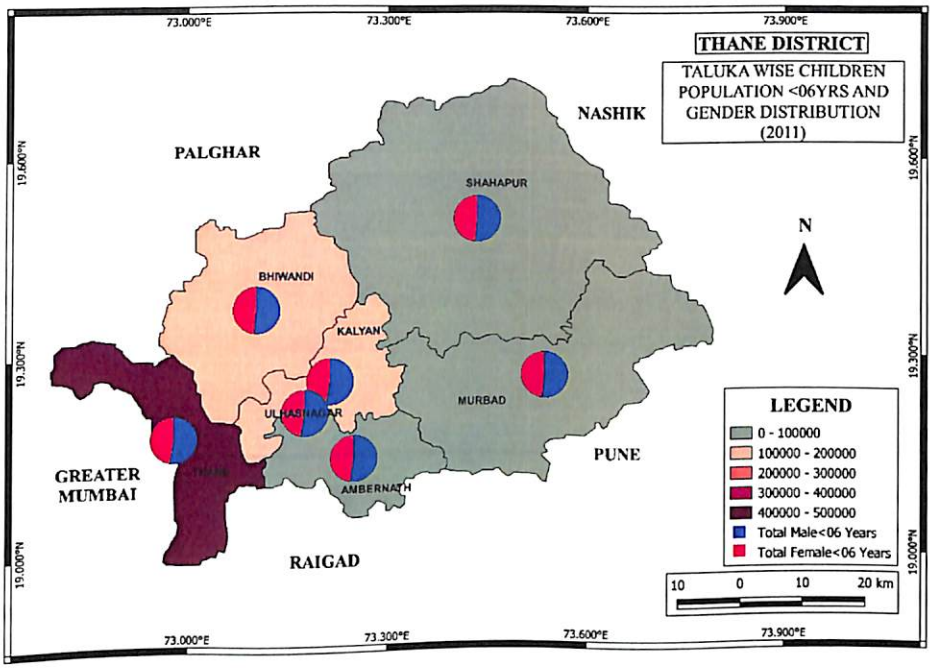

Figure 4.4 c: *Source: Base map – www.thane.nic.in; Map – Created by Researcher

In the above map we can see the total population of children below 6 years in seven different talukas of Thane District and also the gender distribution of the year 1991, 2001 and 2011. Thane district has maximum number of population in the year 1991 followed by Bhiwandi, Shahapur and Murbad. Whereas, Kalyan and Ulhasnagar have the lowest population. Ambernath is not included in the 1991 census data as it was formed in 2001. In the year 2001, Thane taluka is recorded with the highest children population below 6 years. Kalyan is at second rank followed by Bhiwandi and Ambernath. UlhasNagar, Shahapur and Murbad have the lowest figure in chilled current population below 6 years while figure goes on increasing for all the seven talukas in the year 2011 where Thane has a greater number of children population. Bhiwandi and Kalyan are the two talukas which have second largest children population below 6 years. All other four talukas have the least figure compared to the first three. Male population is just more or equal to that of the female population. We can see that the ratio is around more than half i.e. 55 males to 45 females in the total of 100 children below 6 years. Thane, Ulhasnagar and Bhiwandi have the highest male population throughout the three years comparison. Due to the increasing population and also the opportunities available in Thane district, people started coming and settling down for jobs.

CHAPTER V

MAJOR FINDINGS, RECOMMENDATION AND CONCLUSION

5.1 MAJOR FINDINGS

- Demographic analysis plays a vital role in the development of the study area.
- The study of Demographic analysis has become vast in recent years.
- From the three decades the population has increased and there is also increase in the number of migrants every year.
- The urban infrastructure and the economic opportunities in the area leads to the rise in the population.
- The infrastructural facilities are one of the factors for the change in population.
- Causes of demographic analysis for the change in population of the study area of three decades.
- Effects of demographic analysis for the change in population of the study area of three decades.
- Demographic analysis plays an important role in the development of the urbanization of the study area.
- Through Demographic analysis we get the past results and future predictions of the population of study area.
- The detailed analysis of the Total population, scheduled caste, Scheduled Tribe and Children population less than 6 years in three decades.
- The Comparative analysis of the study area by using the demographic analysis.
- Land Use and Land Cover analysis plays a vital role in the development of the study area.
- The study of Land Use Land Cover analysis has become vast in recent years.
- Helps the GIS analyst to find the various classes and study them thoroughly.
- We get to know how the built up area is planned and the area is congested for the people.
- In the present scenario of the area the natural cover such as vegetation cover and agriculture is declining.
- As the Built up area is spread all over the area there are indications of degradation of forested area.

- As the built up area is vast and due to the congestion of the roads and area there is a problem of traffic management.
- The areas of water bodies such as rivers and creeks are started declining due to improper management of the sewage disposal.
- The work of Land Use Land Cover is different from each other but both are useful for the development.
- The analysis of Land Use Land Cover has the role in the development of the urbanization as well as the conservation of the natural cover of the study area.
- Due to the increase in Built up area, sudden climate changes this are the indications of soil degradation in the area.
- By using the Land Use Land Cover analysis, we get to know what are changes happened in the study area.
- By LULC, we get to know that due to the congestion of the area there are very less open spaces left.
- Through Land Use Land Cover analysis, we get the past and present scenarios of the study area.
- Through Land Use Land Cover analysis, we can predict the future development of the study area.
- Land Use Land Cover technology is used worldwide for the development purpose and the Conservation purpose.

5.2 RECOMMENDATIONS

- The Government should implement the schemes and policies regarding the family planning for controlling the population.
- Government should make a better infrastructure for better accessibility.
- Government can use LULC maps for the study of the region and make the future plans for the development without harming the environment.
- Because of deforestation activities, the trees are getting cutted down, for this reason many NGO and Governmental body should take the initiative for the awareness of saving the environment.

- Also government should apply some schemes which will give the equal opportunity for everyone in the region regarding the job.
- The emergency services should be provided in the interiors of the study area where only the cities, towns are getting a proper healthcare facility. It should reach in the rural areas as well.
- NGOs as well as the private organizations also should do public awareness or start the campaigns for the conservation of the ecosystem
- Urban planning should be properly done by the Government to decrease the traffic issues in the region. So by less congested area the traffic will be much more suitable and very easier for a traffic management.
- Also proper infrastructural planning to be undertaken by the government for the development in the future and upcoming decades.
- Government should keep an eye on the migrants coming to the taluka in search of job every year.
- They should make a proper fare system for the public vehicles like Rickshaw, Buses,etc.
- Use of technology should be used in the analyzing demographic studies.

5.3 CONCLUSION

It is conclude that the Bhiwandi taluka is one of the most populated taluka in the Thane district. The handloom and textiles industries in Bhiwandi are one of the most prominent factor that gives a lot of importance to Bhiwandi. In the upcoming years Bhiwandi will become the most populated taluka and also became a prime city in the near future. The Demographic analysis plays a vital role in the development of the area by the population point of view. The Land Use Land Cover analysis also helps to know the past and present condition of the region with the help of satellite image by processing it into a software for the LULC analysis. It plays a vital role in the process of urbanization in the coming future. Many Government plans take place in the development of a region. At that time the Land Use Land Cover analysis helps to improve the planning of the region and make a better execution of the plans.

The Land Use Land Cover has become a vast subject and a major area of study in the recent years due to the emergence of advanced technology. Apart from India, this technology

is used world widely by many nations. Also this thing will helps to classify the forested area and make it as an ecosystem protected region where the human entry will be prohibited. Government can implement the future policies and plan accordingly to the betterment of the region. Need to maintain the environmental and human balance and also for the conservation of the area and its natural habitat, it has to maintain the balance between the natural cover and man-made factors. The Demographic and Land Use Land Cover Analysis will gets a more importance in the future as the new trends in this field will come. Also the new generation will be a part of this new technologies where the advanced and multi-dimensional things will take place.

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ANNEXURES

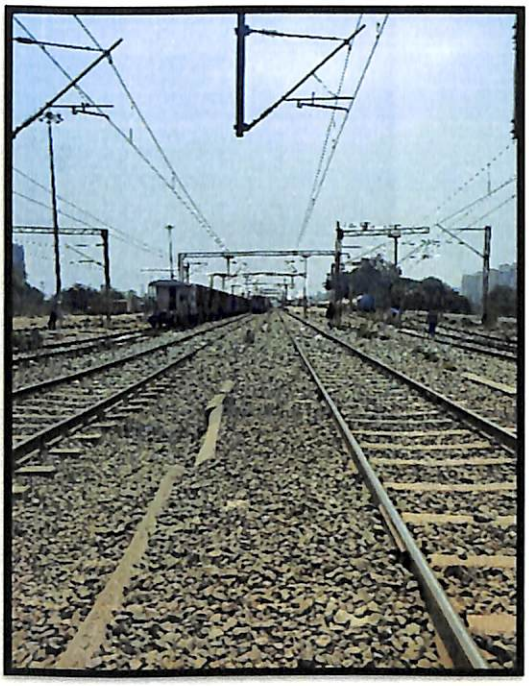

Plate No. 1.1: Bhiwandi Road Railway Station *Source: Clicked by Researcher

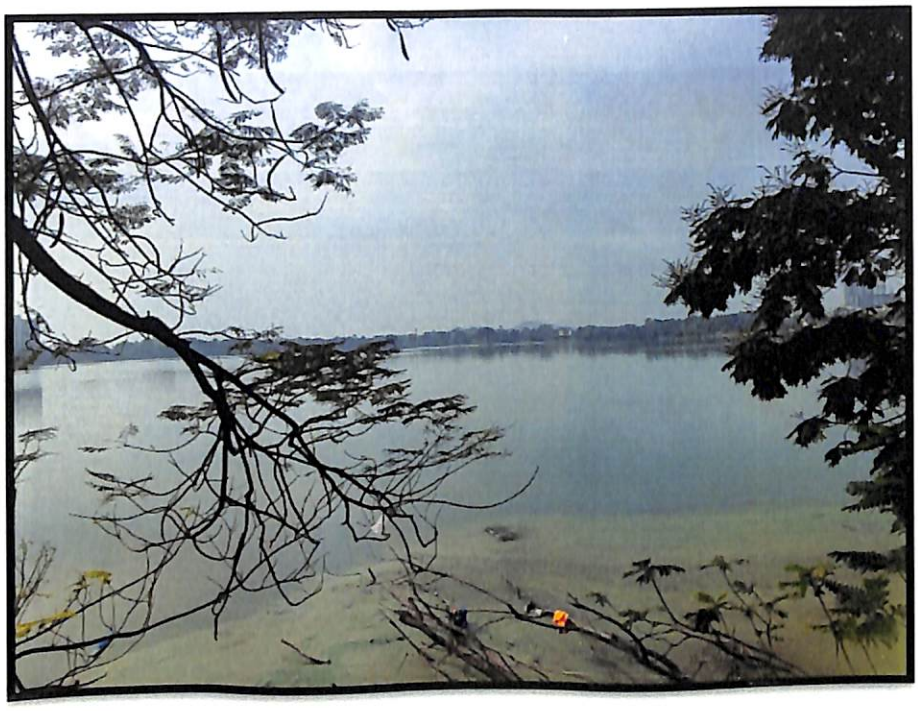

Plate No. 1.2: Varaldevi Lake *Source: Clicked by Researcher

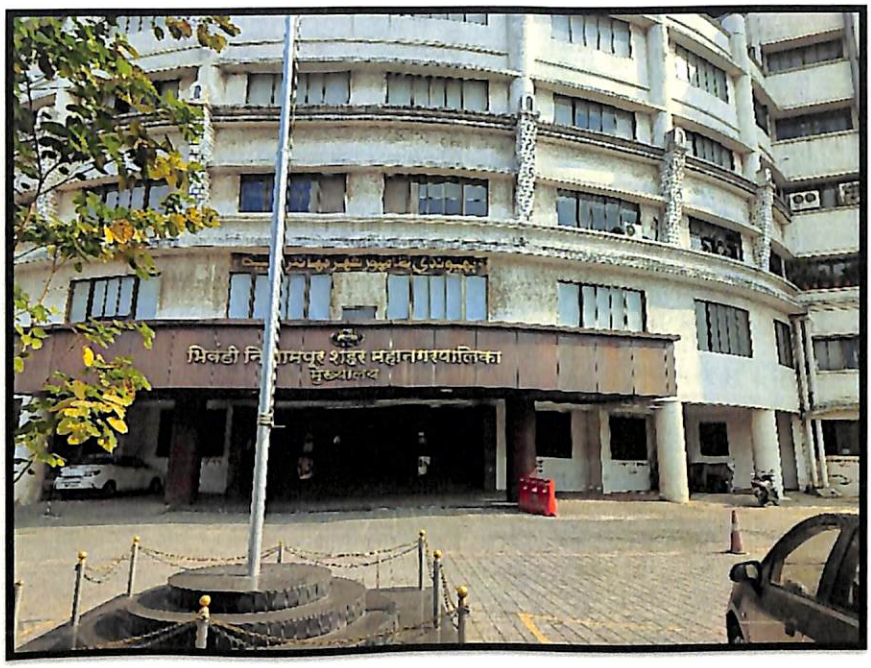

Plate No. 1.3: Bhiwandi Nizampur City Municipal Corporation (BNCMC) *Source: Clicked by Researcher

Plate No. 1.4: Ulhas River *Source: Clicked by Researcher

Plate No. 1.5: Sub Divisional Officer and Sub Divisional Magistrate Office, Bhiwandi *Source: Clicked by Researcher

Plate No. 1.6: Civil & Judicial Magistrate's Court of Bhiwandi *Source: Clicked by Researcher

Plate No. 1.7: Office of Assistant Commissioner of Police West Zone, Bhiwandi *Source: Clicked by Researcher

Plate No. 1.8: Narpoli Police Station, Bhiwandi *Source: Clicked by Researcher

Plate No. 1.9: Overhead Water Tanks *Source: Clicked by Researcher

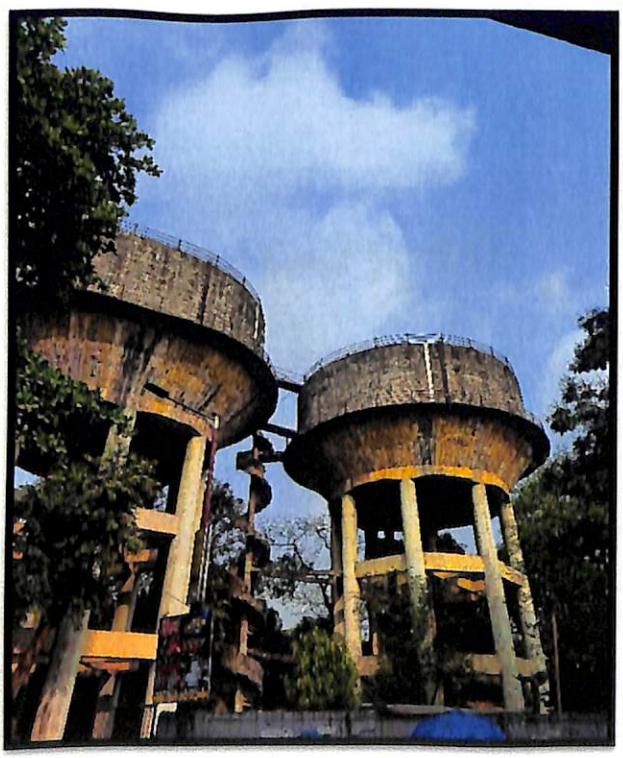

Plate No. 1.10: Seth Jugilal Poddar English Medium School and Jr. College *Source: Clicked by Rescarcher

Plate No. 1.11: B.N.N. College, Bhiwandi *Source: Clicked by Researcher

Plate No. 1.12: Bhiwandi ST Depot *Source: Clicked by Researcher

Plate No. 1.13: Rickshaw stand at Bhiwandi ST Depot *Source: Clicked by Researcher

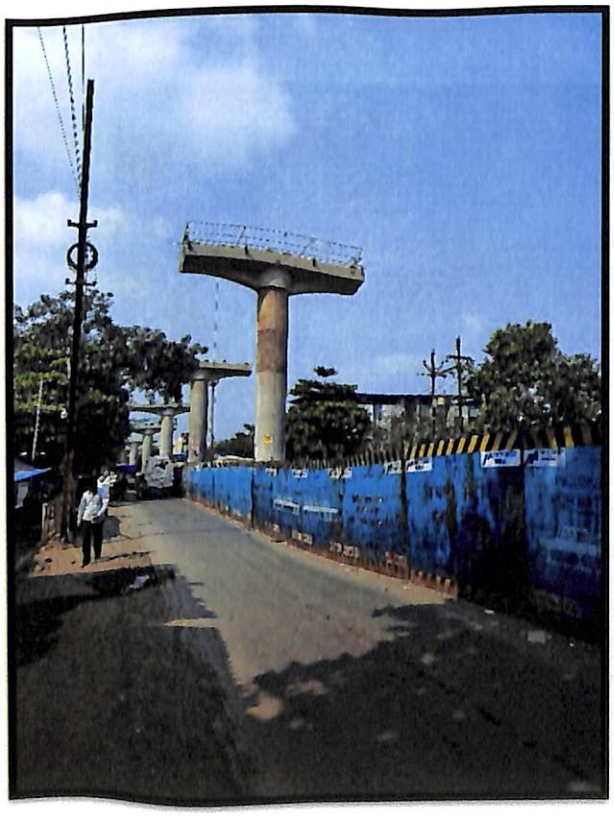

Plate No. 1.14: Metro Rail Project Under Progress *Source: Clicked by Researcher

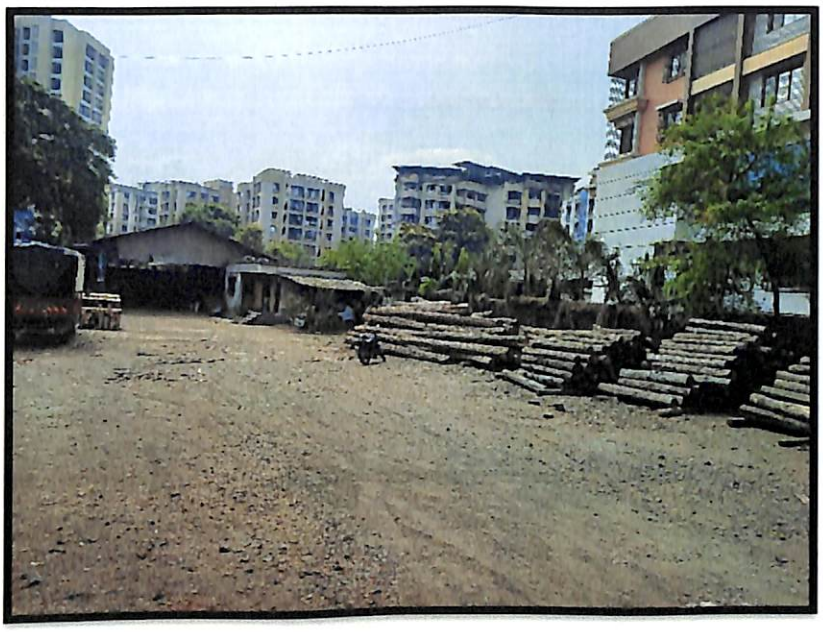

Plate No. 1.15: Wood Cutting Factory *Source: Clicked by Researcher

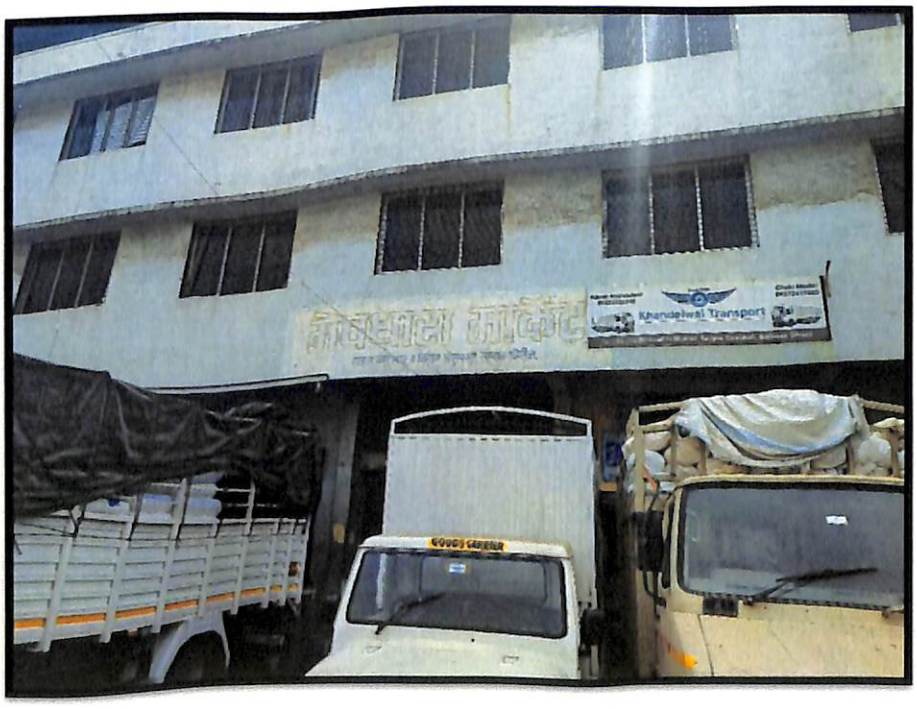

Plate No. 1.16: Bhiwandi Textile Meghdhara Market *Source: Clicked by Researcher

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