Population Dynamics of Dhaka Megacity

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Department of Geography and Environment

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Examination Roll no: 06

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DECLARATION

The work contained in this thesis is entirely that of author. Materials from the published work of others, which are referred to in this thesis, are credited to the authors in the text. No part of this work has been submitted for any other degree in this or any other university.

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Certificate of Approval

This M. Phil. Thesis titled "*Population Dynamics of Dhaka Megacity*" conducted by Quor Aisha Begum, Examination Roll no: 06, Registration no: 225, Session: 2011-2012 has been accepted as satisfactory in partial fulfillment of requirements for the Masters of Philosophy degree at the Department of Geography and Environment, under the Faculty of Earth and Environmental Sciences, University of Dhaka.

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ABSTRACT

Bangladesh is a developing country with a very high population density. The country has 160 million populations with a small area of only 147, 570 km^2. Currently, the population density is around 1200 persons per km^2 which is 50 times higher than the global average density of population, 3 times that of our neighbor India, 7 times that of China and 35 times that of the United States of America. The density in urban areas, particularly within Dhaka Megacity remains very high. The average density within the 1500 km^2 DMC region was over 10,000 persons per km^2. in 2011 Census. However, within the urban built up area the density mostly varied from 20,000 to 75,000 persons per km^2. In some parts of the city, mostly at the older part, the density was found as high as over 200,000 inhabitants per km^2.and in slum areas of the city it was well over 200,000 people per km^2. This thesis mainly deals with the population dynamics of Dhaka Megacity (DMC), more particularly the distribution and variation of population density and growth within the DMC region in recent decades (i.e. 2001 and 2011 censuses).

Based on census data collected by the BBS, the study found that the DMC is one of the super high densely populated mega urban regions in the world. The average density of inhabitants within the north and south city corporation areas was recorded over 48,000 and 68,000 people per km^2. in 2011 Census year. However, the density over the two city corporation areas was mostly found to be varied from less than 20,000 persons to over 200,000 persons per km^2. Within the vast fringe areas of DMC the density varied quite significantly from 700 persons to over 20,000 persons per km^2.

The growth of urban population within DMC for the last two census years (2001 and 2011) also recorded very high (3.85% per annum) and within the vast areas (i.e. within wards and unions) growth rates were found to be varied from - 5.5% to 16.4%. High growth rate areas were mostly located at the fringe areas, particularly

at the north-western and eastern fringe areas where industrial and commercial activities are highly concentrated. On the other hand, most of the low growth areas were located within the core areas or older parts of the city. The average growth rates recorded for DSCC and DNCC were found to be 1.29% and 3.22% respectively. DSCC where the older parts of DMC is located recorded relatively low growth (- 3.31 to 5.25 percent per annum). Areas having over 10% growth rates per annum were located mostly at the periphery areas, particularly at around Savar Paurashava, Tongi, Konabari, Siddirganj Paurashava, Vatara, Golakandail, Tarabo Paurashava etc. These are the areas where industrial and commercial activities along with construction works have been concentrated in the recent decades or so. It should be noted here that high growth rates are usually found in the areas where the density of population appeared to be low.

Based on the study findings some relevant recommendations were made for healthy urbanization within the DMC region as well as to save Dhaka City from massive in-migration of rural people which in turn put acute pressure to costly build urban utilities/services developed in this capital city during the last couple of decades.

Abbreviation and Acronyms

ADB	Asian Development Bank
BANBEIS	Bangladesh Bureau of Educational Information and Statistics
BBS	Bangladesh Bureau of Statistics
BCAS	Bangladesh Centre for Advance Studies
BUET	Bangladesh University of Engineering and Technology
CUS	Centre for Urban Studies
DCC	Dhaka City Corporation
DEM	Digital Elevation Model
DESA	Dhaka Electric Supply Authority
DIT	Dhaka Improvement Trust
DMA	Dhaka Metropolitan Area
DMAIUDP	Dhaka Metropolitan Area Integrated Urban Development Project
DMC	Dhaka Megacity
DMDP	Dhaka Metropolitan Development Plan
DNCC	Dhaka North City Corporation
DSCC	Dhaka South City Corporation
DSMA	Dhaka Statistical Metropolitan Area
DU	Dhaka University
DWASA	Dhaka Water Supply & Sewerage Authority
ESCAP	Economic and Social Commission for Asia and The Pacific

ESRI	Environmental Systems Research Institute.
EXCEL	Experiential Curriculum for the Enhancement of Learning
GDP	Gross Domestic Product
GIS	Geographic Information System
HQs	headquarters
ESRI	Environmental Systems Research Institute
IATSS	International Association of Traffic and Safety Sciences
ISRT	Institute of Statistical Research and Training
LGED	Local Government Engineering Department
LGRD	Local Government and Rural Development
NGO	Non Government Organization
NICAR	National Implementation Committee for Administrative Reforms
NIPORT	National Institute of Population Research and Training
PSA	Paurashava
RAJUK	Rajdhani Unnayan Kartripakkha
RDP	Regional Development Plan
RMG	Ready Made Garments
SMA	Statistical Metropolitan Area
SMEs	Small and Medium-sized Enterprises
Sq. Km	Square Kilometer
SR	Sex Ratio
STP	Strategic Transport Plan
TFR	Total Fertility Rate

TITAS	Titas Gas Transmission and Distribution
UGC	University Grand Commission
UN	United Nations
UNDP	United Nations Development Program
UNFPA	United Nations Population Fund
UN HABITAT	United Nations Human Settlements Programme
WHO	World Health Organization
D.I.T	Dhaka Improvement Trust
RDP	Regional Development Planning
STP	Strategic Transport Plan

Terms and Measurements

One Lakh	=100,000
One Million	= 1,000,000
One Crore	= 10,000,000
One Katha	= 66.9 Square Meters/720 Square Feet
One Bigha	= 20 Katha/1338 Square Meters
One Hectare	= 2.47 Acres/7.5 Bigha/150 Katha/10,000 Square Meters
One Acre	= 3 Bigha/60 Katha/4048 Square Meters
One Meter	= 3.28 Feet
One mile	= 1.609kms
One Square Kilometer	= 100 Hectares/247 Acres/0.3861 sq mile
One Square Mile	= 2.59 Square Kilometer

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CHAPTER 01

Introduction

1.1 Introduction

Bangladesh is the world's 8th largest populated country with an area of 147570 sq. km. Due to highly favorable geographical conditions; the country exhibits a very high density of population. Bangladesh is a country having numerous rives which, in fact, formed the sedimentary deltaic landmass and vast floodplain. People of this floodplain frequently have long been facing natural disasters like-flood, cyclone associated with storm surge, riverbank erosion, drought, tornado etc. Dhaka Megacity is the capital of Bangladesh and located in the center of the country. The city is situated at the eastern bank of the river Buriganga. Buriganga and Dhaleshwari rivers connect Dhaka City to Sitalakhya, Brahmaputra, Meghna and Padma rivers. Dhaka is a vital town because of its sprawling nature and vastness. As this city is connected with all the districts in a well manner, people from all over the country can migrate here. Given this situation, Dhaka is called the city of migrants (CUS, 1989). Every year more than 5 *lakhs* people come to Dhaka as migrants. Population growth in Dhaka City during the period 2001 to 2011 was 3.96% per year. During this period natural increase i.e. natural growth rate was 1.47% and migration rate was (3.96% − 1.47%) 2.49% per year. So the majority of the people live in this capital city are migrants coming from the vast rural areas. From 1961 to 2001, in each of the four decades, about 73%, 77%, 73% and 57% of the total growth of population of the respective decades have been due to in-migration respectively (RAJUK-July, 2015). In recent times, because of global climate stress, migration seems to be more prominent. River erosion victims from Rangpur, Gaibandha, Nilphamari, and Aila and Sidr affected people from Barisal, Barguna, Patuakhali, Bagerhat and Satkhira, migrated to Dhaka City for earning their living (RAJUK-July, 2015).

In 2011 Census, Dhaka Megacity had 14171567 inhabitants (BBS, 2011) within an area of 1459 sq. km. In 1991, it had an area of 1353 sq. km. with 65 *lakh* population; while in 2001 the city expanded to 1459 sq. km. with more than 90 *lakh* people. From 1951 to 1988, population of Dhaka rose 15 times. During 1960 to 1970, Dhaka had a population growth of 10% (Islam, 1990). After the independence of the country, Dhaka had/has been exhibited a rapid growth of

population (on average over 7% per annum). If this trend continues, within 2025 Dhaka will have a population around 33 million (Islam, 2013). Of the total urban population of the country, over one-third lives in Dhaka and every year at least half a million people are added to this capital city. People from the vast rural regions of the country migrate to Dhaka mainly due to a bunch of push factors such as growing landlessness, lack of employment, quality school education and health services as well as ample opportunities of employment, education, health and other services available at this capital city. Unlike many cities and towns in Bangladesh, Dhaka, in fact, attracts all walks of people from the vast countryside.

As population is rising in Dhaka, city keeps expanding in all directions to keep up with the inhabitant's number though largely in the north due to Geographic reasons (e.g. flood free lands). Dhaka expanded to present 1459 sq. km. from 1981's 509.62 sq. km.; which tells us the expanding speed of this city. Due to high rate of population growth of Dhaka Megacity, planned and environmentally sound development becomes a very difficult task in this densely populated capital city. Given this situation, the present study aims to analyze the demographic growth of Dhaka Megacity with a view to find out solutions for healthy urbanization in Bangladesh, particularly Dhaka Megacity within which the capital of the country is seated.

1.2 Statement of the Research Topic

The research topic undertaken here covers the dynamics of population within Dhaka Megacity population distribution, density, growth rate and density variation between 2001 and 2011 at ward and union level. There are plenty of studies on Dhaka City (mostly within DCC and DMA) but there exist a paucity of analytical researches or reports, particularly on Dhaka Megacity which is 4 times bigger than that of DMA (Dhaka Metropolitan Area). Previous studies on Dhaka focuses on mainly on aspects like population, economic activity, slum dwellers, land use, water bodies, industry, transport, urbanization etc. Dhaka is a fast growing city which is creating opportunities for employments,

investments and living for millions of people. The administrative structure of the city is also dynamic in the sense that it changes its *thanas*, wards and unions every now and then. Very recently (June 2016), the administrative area of North DCC and South DCC had expanded making it almost double from 166 sq. km. to over 360 sq. km. (09 June 2016, Prothom Alo). Changing definitions and administrative boundaries makes it difficult to compare the parameters that researchers look for. Given this situation, the present study tries to find out the present status of Dhaka Megacity population and make a comparison with the last two census years (2001 and 2011) and thereby to draw a comprehensive picture. This research will be an important one as this kind of study is hard to conduct and the insights will surely shed some light in the dynamics of population within Dhaka Megacity region.

1.2.1 Megacity

A megacity is usually defined as a metropolitan area with a total population in excess of ten million people. A megacity can be a single metropolitan area or two or more metropolitan areas together. Sometimes big urban conurbation is also termed as metropolis. Megacities provide some of the best opportunities for specialization in and interaction between socio-economic, education, research, and technology activities. Megacities often provide the best location for the dissemination of information as hubs of knowledge economy, which is likely to become important with the impact of the global economy in the Asian region (Clarke, 1996).

Megacities have more in common with each other than with their rural hinterlands whether they are located in developed or developing countries. This makes for easier comparability in an analysis of their economic, social and welfare conditions. Though, it is still true that, most megacities development is rooted in the specific economic, social and cultural conditions in the country or region the Megacity is in (Laquian, 2008). A megalopolis, also known as a mega region, is a clustered network of cities. Gottmann (Gottmann, Jean, 1989) defined its population as 25 million. The US city Planner Constantinos Doxiadis defined a small megalopolis a similar cluster with a

population of about 10 million (Time magazine, November 4, 1966). In the year 1990 Dhaka was ranked as the 24th largest mega city in the world. According to World Urbanization Prospects 2014 published by the United Nations, Dhaka was listed as the 11th largest megacity in terms of total volume of population. It also forecasted that Dhaka will be the 6th largest megacity of the world with a population of 27.37 million in 2030 (RAJUK, July, 2015).

1.2.2 Metro Region

A metropolitan region or a metro region usually refers to a densely populated core city and surrounding territories strongly influenced by the core city in terms of industry, infrastructure and housing. It usually comprises multiple jurisdictions and municipalities as well as satellite cities, small towns and intervening rural areas that are socio-economically tied to the urban core, typically measured by commuting patterns. A metropolitan combines an urban agglomeration (the contiguous, built-up area) with zones not necessarily urban in character, but closely bound to the center by employment or other commerce. A polycentric metropolitan area (like Dhaka) is one not connected by continuous development or conurbation, which requires urban contiguity. It is sufficient that a city or cities form a nucleus that other areas have a high degree of integration with. Because of this interdependency, the whole region has to be considered as an intertwined system. Only then can it be planned and managed to keep its functionality high and its balance intact (RAJUK, July, 2015).

1.2.3 Population

Population is the number of inhabitants in a place belonging to a specific social, cultural, socioeconomic, ethnic, or racial subgroup. Population is a summation of all the organisms of the same group or species, which live in a particular geographical area, and have the capability of interbreeding. To generalize the definition it can be said that human population refers to the number of people living in a particular area, from a village to the world as a whole.

1.2.4 Population Dynamics

There are some processes of population dynamics, such as birth rate, death rate, in and out migration rates etc. Births, deaths and migration drive population changes and influence age structure and population distribution, urbanization and population density. Rapid population growth increases the proportion of young people. As birth rates decline and longevity increases, with the proportion of older people in the population increases. This process is the demographic transition: the changes that take place as countries move from high mortality and fertility to low mortality and fertility along with few pull factors of in migration. During this transition, population growth and movement occur, including internal, rural to urban and international migration.

The world's population doubled between 1965 and 2010, reaching 7 billion in 2011. According to the UN's medium variant, it will reach 9.3 billion by 2050 and 10 billion by 2085. In contrast, the UN's high projection variant, (with fertility just half a child above that in the medium variant), projects a world population of 10.6 billion in 2050 and 15.8 billion in 2100. The rate of growth and size at which the world population ultimately stabilizes significantly affects the world's potential to reach its development goals. Growth is driven by increasing longevity, an above replacement birth rate and increases in the number of people reaching reproductive age as a result of past population growth (population momentum). Global average life expectancy at birth has increased from under 50 in the 1950s to around 70 today and is projected to reach 80 before the end of the century. The global average fertility rate has fallen, from just under 5 children per woman in the 1950s to around 2.5 today, varying from under 2 for more developed countries to around 4 for the least developed countries. Future population growth is also related to future fertility levels, which depend on access to family planning, the reproductive choices of present and future generations and economic, social, educational and political factors.

1.2.5 Migration

Migration of human population in developing countries is a very common social phenomenon (Mahbub, 1997). In 2011, just fewer than 10 percent of the Bangladesh population were living in a *zila* (district) other than where they were born, suggesting a very low level of internal migration. However, this proportion varied widely from only a few percent in many *zila* to as high as 51 percent in Dhaka *Zila*, 41 percent in Gazipur, 24 percent in Narayanganj *zila*s respectively (both of them located within the Dhaka Megacity), 14 percent in Khulna *Zila* and 12 percent in Chittagong *Zila*. Dhaka has attracted the lion's share of lifetime migrants - Dhaka District alone attracted over 4 migrants out of 10 (42 percent) and Dhaka Megacity region attracted at least 5.6 migrants out of 10 (Jones, G. Mahbub, AQM and Huq, Izazul, 2015).

The 2001 Population Census revealed rural-urban population distribution was 77:23. In recent years, rural-urban migration has increased steadily. Expert opinion is that current rural – urban population distribution is 72:28. Almost 85% of the rural migrants are absorbed in four main cities namely, Dhaka, Chittagong, Khulna and Rajshahi and thus overcrowding these cities, threatening the ecology and complicating the task of managing the urban life and governance (Mabub, 2008).

1.2.6 Fertility

Fertility is normally measured in terms of women of childbearing age, defined as 15 - 49 years, although births to women outside this age range can, and do, occur. Fertility should not be confused with fecundity, which is the biological capacity of a population to bear children. The term fertility refers to the frequency with which births occur within groups or subgroups of humans who are of an age to procreate. As applied to the results rather than the ability to procreate, the words fertility and infertility are used to denote, respectively, that procreation has or has not taken place. Fertility rates are generally expressed as the number of live births per 1000 population in a given time (usually mid-year population).

1.2.7 Mortality

Generally, mortality is the number of deaths occurring among a given population in a geographical area during a given year, per 1000 populations. Mortality is the term used for the number of people who died within a population. Mortality refers to the incidence of death or the number of deaths in a population. Mortality rates are generally expressed as the number of deaths per 1000 individuals per year.

1.2.8 Population Density

Population density is a measurement of the number of people in an area relative to its spatial or territorial size. In geographical concepts, it's not an exact number rather an average or even an estimate. The number of people per square kilometer most often calculates population density. Population density indicates the number of people in a unit area such per square kilometer or mile. It shows the concentration of population over an administrative area or country. Population density is measured through the number of inhabitants per square kilometer (BBS, 2011).

1.2.9 Population Density Variation

For the last 50 years, world population multiplied more rapidly than ever before, and more rapidly than it is projected to grow in the future. In 1950, the world had 2.5 billion people; and in 2005, the world had 6.5 billion people. By 2050, this number could rise to more than 9 billion. Anthropologists believe the human species dates back at least 3 million years. For most of our history, these distant ancestors lived a precarious existence as hunters and gatherers. This way of life kept their total numbers small, probably less than 10 million. However, as agriculture was introduced, communities evolved that could support more people. World population expanded to about 300 million by A.D. 1 and continued to grow at a moderate rate. But after the start of the Industrial Revolution in the 18th century living standards rose and widespread famines and epidemics diminished in some regions. The population climbed to about 760 million in 1750 and reached 1 billion around 1800. Bangladesh is the face

of population explosion where density is higher than many other megacities of the world. The rising trend depicts a very high rate of density variation, especially in Dhaka city the variation density from 2001 to 2011 is very high. The speed with which population is growing, and the pervasive consequences of this growth, poses a serious challenge to Bangladesh.

1.2.10 Population Growth

The average annual percent change in the population, resulting from a surplus (or deficit) of births over deaths and the balance of migrants entering and leaving an area or a country. The rate may be positive or negative. The growth rate is a factor in determining how great a burden would be imposed on a country by the changing needs of its people for infrastructure (e.g., schools, hospitals, housing, roads), resources (e.g., food, water, electricity), and jobs. Rapid population growth can be seen as threatening to sustainable economic development as well as physical environment of a region or country. Population growth directly refers to the adding of population with the existing population in an area in a given period of time. Since the independence of Bangladesh in 1971, Dhaka as a capital city had/has been recording a high growth rate of population.

1.2.11 Sex Ratio

Sex ratio of an administrative area or a country indicates the number of males per 100 (or 1000) females for a particular time. Sex ratio at birth has recently emerged as an indicator of certain kinds of sex discrimination in some countries. For instance, high sex ratios at birth in some Asian countries are now attributed to sex-selective abortion and infanticide due to a strong preference for sons. This will affect future marriage patterns and fertility patterns. Eventually, it could cause unrest among young adult males who are unable to find partners. Moreover imbalance sex ratio can create a number of social problems like sex crime, child prostitutes, perverted sex behavior, etc. When economic in migration become prominent in a city, usually create imbalance sex ratio.

1.2.12 Census Period

Census includes the total process of collecting, compiling, analyzing, evaluating, publishing and disseminating statistical data regarding the population and housing and their geographical location. Population characteristics include demographic, social and economic data and are provided as of a particular date. A census is the procedure of systematically acquiring and recording information about the members of a household in a particular administrative area. Based on de facto method, BBS (Bangladesh Bureau of Statistics) usually conducts census survey in ten years interval. The latest census conducted by the BBS was 15-19 March 2011.

1.3. Justification of the Research

Population study is concerned with the population variables as well as with the relationship between population variables such as social, economic, political, biological, genetic, and geographical interrelationship between those variables. It includes both qualitative and quantities aspects of human population. The three fundamental processes determining population growth, change and distribution are fertility, mortality, and migration. All these three processes are likely to affect and be affected by global social and economic changes. Since the independence of Bangladesh in 1971, the country recorded a tremendous change in various aspects of demography like fertility, mortality, migration, age composition and rural-urban distribution of the inhabitants. The country is now passing through the demographic dividend period.

In 2010, when Dhaka was all set to celebrate its 400 years anniversary as capital, the United Nations Human Settlements Programme (UN-HABITAT) ranked Dhaka as the 9th largest megacity of the world in terms of the size of its population. UN-HABITAT has also projected that Dhaka would become the 4th largest megacity of the world with a staggering population of 22015000 by 2025 (Khan, 2011).

The current area of Dhaka Megacity is 1459 sq. kilometers. In this big urban agglomeration, a lot of urban land uses like setting up of plants, roads and highways, different institutions, business, industries, parks and other type of

non-agricultural activities have taken place in the last few decades. As part of this, the low lands, water bodies, rivers, canals etc. are fast being filled in to make space for habitat and other urban amenities. As a result, Dhaka has been expanding very fast, while it is further attracting people from different the vast rural hinterlands. Following the territorial expansion, city's population has also been increased very fast over the years. Over 18 million people are now living in this burgeoning megacity. It is estimated that by the year 2020, the city may become 6th or 7th most populated city in the world. By 2050, it may rank as the 3rd or 4th. This megacity currently generates over one-third of the country's total GDP. Being located almost at the centre of the country and having good networks of road, rails and waterways, rural out-migrants are flocking towards this megacity from all districts and regions. Good location with high degree of socio-economic opportunities, Dhaka Megacity attracts over 1500 new migrants every day.

High density of people along with massive migration obviously put tremendous pressure to city's poor and inadequate utility services and facilities and these in turn severely disrupting city's healthy growth and conserving physical environment. In addition, the utility services and facilities including housing facilities are highly unequally distributed. Given these situation, Dhaka Megacity exhibits a myriad problems - from acute traffic jam, air pollution, water pollution, sound pollution, proliferation of slums, water logging, severe drainage congestion, mounting unmanaged garbage (7000 metric ton/day) etc. all causing havoc with the health and wellbeing of the citizens. The root cause of all those problems of the city is definitely linked with the city's rapid growth of population and demographic changes. Keeping this in mind, the current research is aimed to focus on the dynamics of population of the city, particularly its distribution, density, growth and migration characteristics.

1.4 Aims and Objectives of the Study

The main theme of this research is to present an in-depth analysis of census data with a view to reveal the population dynamics of Dhaka Megacity over the last couple of census decades, particularly 2001 and 2011 census period.

The study didn't focus on all the parameters of population dynamics due to time limit. However, the specific objectives of this study are as follows:

1. Spatio-temporal analysis of population distribution and density within Dhaka Megacity area between 2001 and 2011 census period;

2. Spatial analysis of population variation of Dhaka Megacity from 2001-2011;

3. Spatial analysis of population growth rate for Dhaka Megacity from 2001 to 2011 census period; and

4. Based on the analysis of census data and study findings, prescribe some relevant policies for harmonious growth of Dhaka Megacity.

1.5 Data Sources

The study is mainly based on secondary data collected by Bangladesh Bureau of Statistics during census survey. In this research 2001 and 2011 census data were compiled, processed and then analyzed using standard statistical techniques and GIS software. However, in some cases, population data from 1961 Census to 1991 Census were also compiled and analyzed for understanding the trends of population dynamics of Dhaka Megacity. In addition to national census data, post census sample survey data, especially for migration analysis were also analyzed in this study. For spatial analysis of urban data, BBS collected and published population data on word, union, *thana* and *paurashava* basis. Therefore, the spatial or areal variations of population dynamics within Dhaka Megacity were mapped and analyzed using BBS areal units.

Besides BBS, population statistics for DMC produced and reported by other organizations such as WHO, ESCAP, UNDP, UNFPA, ISRT, RAJUK, CUS, BUET, LGED, DCC etc. and from relevant journals and books were also used and verified in connection to produce an authentic study.

1.6 Study Methodology

The study is based on secondary data compiled mostly from census surveys. The detailed methodology for collecting statistics, base GIS maps, data entry and analysis etc. are given below:

1.6.1 Data Collection Method

As stated before that this study is mainly based on secondary statistics or data collected mainly from BBS census and post census sample surveys. These statistics were collected from hard copies of BBS reports or in some cases downloaded from BBS website. The base shape file for GIS data entry are collected from CUS (Centre for Urban Studies, Dhaka), RAJUK (Rajdhani Unnayan Kartripakkha). In some minor cases spatial units such as word, union, *thana* etc. were adjusted by the researcher to accommodate correct and updated data accordingly. As in many occasions the boundaries or maps of spatial units have changed from previous census period.

1.6.2 Data Entry Method

Data entry needs to follow a procedure for entering the information and keeping track of it until its ready to do a complete data analysis. Researchers have differing techniques how they keep track of incoming data. Simply, it needs to be arranged in such a way that enables to assess at any time and use the data to the requirements. In this research, data entry procedure was aided with computing. The printed outputs were scrutinized and adjusted where they went wrong to put them back rightly in the main dataset.

1.6.3 Data Processing and Analysis

Proper decision-making, comparative analysis largely depends on the attempts to arrange datasets orderly. The gathering of data is not a simple task; it needs expertise and care for a healthy research as the outcomes may offer diverse applications. For the purpose of better analysis this study tried to organize the

data in proper manner and processed them as any good decision in research requires the above mentioned criterion.

1.6.4 Collaborating the Data of two Different Census Years

Representation of population dynamics through maps mainly follows the administrative division of an area as BBS published report on the basis of administrative units. In this research population dynamics of Dhaka Megacity are shown and described to the union and ward level. As Dhaka Megacity is changing administrative arrangement and area frequently, it is hard to present the population dynamics to the lower administrative level in two different census years. While representing and comparing the population aspects for analysis in census year of 2001 and 2011, researcher found a large number of administrative reformations in local level from 2001 to 2011. This changes of administrative identity or territory leads to a complex situation for comparison and analysis of population dynamics. To overcome this complex situation, standard administrative areas are defined for both census year and that is the union and ward level administrative are of 2011. Based on the defined administrative area of 2011 Census the population data of 2001 are assigned to respective union or ward levels. The BBS community series were used to extract the data of 2001 where *mouzas* are defined for specific union or ward in 2011 and the data are collaborating for 2001 on the basis of that *mouzas* under specific union and ward under 2001. This is how the two census year population data are collaborating on same administrative identity.

1.6.5 Coding and Tabulation

Present study included coding of collected data for giving them numeric stature, such as- original ward numbers were used to input numerous data under them and rather than union names coding was followed. A unique code was defined to the specific union and ward in order to data input and presentation. This unique code also collaborates and synchronized with spatial information of union/ward of Dhaka Megacity. Collected information's were minimized and

appropriately entered in tables. While the BBS community series data are inputted into excel where the defined code is present for individual union/ward, the excel data are joined with base spatial shape file of Dhaka Megacity. After that the tabulation and mapping got a platform for presentation and maps of different parameters were presented with codes, shades and symbols. And finally through the aid of Microsoft Excel data were presented according to the administrative units by various mathematical and statistical structures like variation, range, ratio and percentages.

1.6.6 Calculation and Equations

Population dynamics is the representation of population factors and demographic characteristics over the year. This research aims to analyze the inter census demographic data of Dhaka Megacity of 2001 and 2011, which requires different calculations and specific equations. The parameter/dynamics like population density, growth rate, sex ratio, density variation are calculated from the BBS data at union/ward level of Dhaka Megacity. Inter census density variation index is used for calculating the density variation in the study area between 2001 and 2011. The equations for calculation of population dynamics used in this research are shown below:

- ❖ Density = Population/ Area
- ❖ Growth Rate = (((Population 2011/ Population 2001)^0.1)-1)*100
- ❖ Density Variation = ((Density 2011- Density 2001)*100)/ Density 2001

1.6.7 Cartographic Process with GIS Software

In Geography related studies maps bear a significant part in presenting the data and interpreting them in literatures. According to International Cartographic Association, "Cartography is the discipline dealing with the conception, production, dissemination and study of maps". Cartography is the whole process of mapping; these same mapping themes were followed for this study to spatially represent the population scenarios of Dhaka Megacity. Maps

were given layout where needed in this study with Geographic Information System (GIS) and their attributes were utilized as data tables for further technical analysis. The software's that aided the task were Arc View 3.3 and Arc Map 10.2.1 version by ESRI (Environmental Systems Research Institute).

Different types of map are depicted in this research based on the objective of the research and nature of data. Thematic, choropleth, dot, chart and image maps are mainly used in this research. The specific map types for specific map are tabulated below:

Table-1.1: Map Types used in the Research

Maps Type	Maps Used in this Research
Thematic Maps	Study Area, Flood Prone, Digital Elevation Model, Historical Extent.
Choropleth Maps	Population Density, Population Growth Rate, Density Variation.
Dot Maps	Population Distributions.

1.7 Research Design

The research follows step by step analytical and scientific methods with the goal of achieving the objectives. The data sources, data collection methods and analysis methodology are presented in the research design. The complete research design shows the whole picture of the research from problem identification, define aim and objectives and necessary steps to successfully reach the result which achieve the aim and objectives of this research. The present research directed by following diagram:
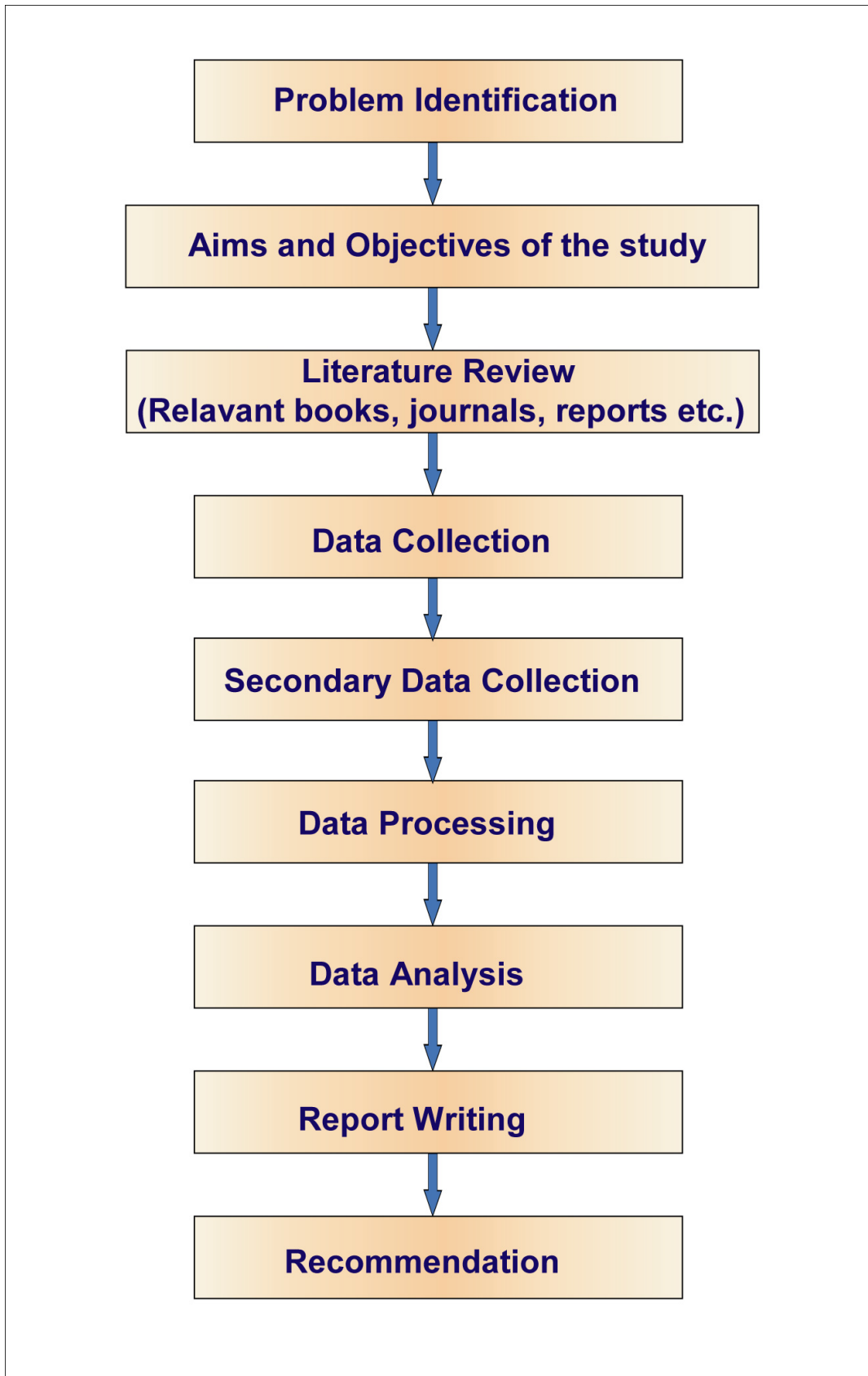
Figure 1.1: Simple Flow Diagram of Different Major Steps in this Study

1.8 Literature Review

Dhaka, the capital city of Bangladesh is over 400 years old and within this period a large number of literatures covering a wide range of aspects have been published. A good number of authors or researchers published on various aspects of population dynamics of the city. In this part of the thesis some important literatures published recently and relevant to this thesis were reviewed here with a view to get a background of demographic picture of the city as well as to justify the present study undertaken by the researcher:

1. Islam (2001) included 27 topics in his book on Dhaka City. Here it is discussed about the research of the present situation and future of Dhaka City. Sabita Saha and Sajid Hossain meant - namely 'indigenous' (i.e. the old city), 'formal' (i.e. planned part of the city) and 'informal' (i.e. unplanned part of the new city) about Dhaka city's physical structures three clear pattern. Moreover, Dhaka City has grown very fast because a rapid growth of the city's population. It is said that Dhaka is already among the most populated 30 cities of the world today. There was a very gross male dominated sex ratio for Dhaka with over 140 in the 80s. In that book, we have shown diversified employment in Dhaka. It also talks about the major planning problems and their possible solution of Dhaka, rapidly growth of population and area is increasing, reasons for migration etc. Urban development is in north but there is a physical barrier in south. The book reveals flood problem, Dhaka flood control scheme and managing the future of Dhaka. He showed the contribution of DCC, RAJUK, DWASA, DESA, TITAS, Ministry of Industry and Commerce for Dhaka Megacity.

2. Hossain (2013) studied Dhaka City in perspective of migration, urbanization and poverty. His research reveals that the issues of rural-urban migration and urban transformation form an essential part in an analysis of urban poverty as they are creating severe pressure on cities and sustaining the urban absorptive capacities, thereby aggravating urban poverty. Massive changes are taking

place in patterns of urbanization on a global scale. However, the south is urbanizing very rapidly despite the fact that its various regions differ markedly in the level of urbanization they have attained.

3. Khan (2010) focused on the livelihood of the urban poor. In Dhaka City, urban poor are those residents who are mainly rural migrants living in the slum and squatter settlements. It has been estimated that nearly 50 per cent of the city's poor population live in slum and squatter areas (CUS, 2005). Slums are high-density areas (over 300 people per acre), characterized by overcrowding (three or more adults per room), and poor-quality housing such as *kutcha* (mud homes), semi-*pucca* (semi-concrete) or other dilapidated buildings, either rented or owner occupied. The slum areas have inadequate water supplies, poor sewerage and drainage facilities, and hardly any paved streets or lanes. The squatter settlement areas are where the urban poor keep rising the growing population even more as they are less aware and have minimum education to take the advantage of modern day facilities.

4. Islam and Nabi (1990) concentrated on historical aspects of Dhaka City and said the most important phase of prosperity in Dhaka started in the latter half of the seventeenth century when Mir Jumla was appointed as viceroy in 1660. Mir Jumla did not add much to the city, but he paved the way for great developments, which took place under the long and peaceful rule of Shaista Khan from 1663 to 1679. This was Dhaka's golden age. Industry and trade flourished. People flocked to the city from the surrounding areas and the population of the city reached its maximum level. The population of the city is said to have reached 900,000 and the built-up area extended for twelve miles along the riverbank and eight miles inland.

5. Mohit (1990) focused on the migration issues mainly and mentioned spatial distribution of population through rural-urban migration is considered an important aspect in the process of economic growth and development. Its impact is wide ranging which changes the trend of economic activity in regions,

affects employment, income distribution and poverty. Migration is usually considered a selective process and resulting from the interaction of many forces-social, economic, cultural and demographic. While most migrants are destined to the big cities, they however originate from different district. It can be said that majority of the migrants of Dhaka, Chittagong, Khulna and Rajshahi have come from the districts of Dhaka, Comilla, Faridpur, Barisal, Noakhali and Mymensingh.

6. Hossain (2008) reveals that the historical process of urban development of Dhaka City presents various trends based on its political development. The rapid urbanization of the city since its emergence as the capital of an independent state is due mainly to massive migration of rural population. He also reveals that significant portions of the city dwellers are settled mostly in slums and squatter settlements and are living below the poverty lines, as the rapid urban growth of the city is not commensurate with its overall development. Hossain argues that the experience of poverty in the city of Dhaka follows the pattern of urbanization without development, the opposite of the expectations and aspirations of the poor there.

7. Ameen (1998), concentrated on the growth and its unplanned manner of development for Dhaka City largely. He said, the city of Dhaka has grown from a population of half a million to seven million in 35 years. The phenomenal growth of the metropolis is set against the paucity of resources: land, financial and municipal to provide housing, employment opportunities and infrastructure. Issues related to the inexorable growth of the city has always been inaccurately identified and miscalculated.

8. Amin (2010) in his book represents the scenario of women for the last 400 years in Dhaka City including social, cultural, economic development, empowerment and their changes. Professor Nazrul Islam and Mehedi Hasan analyzed the aspects of women in the city considering the boundaries geographically along with census from 1972 and 1964. Their research explains

population issues like age, education, procreation, occupation, sex ratio, etc. within 1610 to 2001. Then in 1872 Dhaka had a population of 69212, which rose to 9672763 in 2001, and largely increased women population of 44 percent.

9. Ahmed (2010) described the rejuvenation of Dhaka City's lost glory from the diminishing phase of the British rule, though it once was a developed and enriched Mughal capital before the British Empire. This book shows a lot of information on development related to administration, education center, business and economy. He also mentioned changes in boundary and population throughout time and discussed growth rate, density, religious differences, Hindu-Muslim ratio.

10. Islam (2013) reviewed all his previous 40 years study and research to enlighten past, present and future of Dhaka City. The historical aspects of Dhaka City that reached 400 years from 1608 are described in this book mainly focusing population problem and its future consequences. Dhaka covers 1500 sq. km. now with population of 13 million. This trend will make 25 million within next 50 years, which will be disastrous unless other cities are also developed. He mentioned the irregularities in planning, management, carelessness, dividing of city, water logging, traffic jam, environmental pollution etc. though the most important section is, he wrote about his dreams and plans about this city's future.

11. Yusuf (1996) focused on Dhaka's consequential population changes looks like the following 1901- number of population 128857, 1911- number of population 153609, 1921- number of population 168510, 1931 number of population -196111, 1941 - number of population 295735, 1951- number of population 339928, 1961- number of population 556712, 1974- number of population 1679572, 1981- number of population 3458602, 1991- number of population 3839483 & 2001- number of population 10712206. Population data produced by him didn't match the BBS dataset though it tells us the slowly

rising population trend from 1901. The city's population rose suddenly in 1951 and 1961 for rapid in-migration and fell in 1974 because of 1971's Liberation War.

12. Atiqullah and Khan (1965). This paper describes urban population and area related dynamics with the aid of previous data sets and studies. Historical population count from Pre-Mughal, Mughal, East India Company, British Rule and Pre-Independence (1947) is noted with sources and maps which gives a clear idea about the city's extent. The possibilities of growth through economy, technology, industry and education were mentioned with evidences. Male-female ratio, migration status, population projection from previous data with logarithms is also in the research. The study tried to explore the directional growth of Dhaka City and gave examples where they are mainly focused.

13. Khatun (2003) reveals that Dhaka is growing very rapidly since the last few decades, intra urban residential migration pattern of the *Dhakaiya* people towards new Dhaka. The relationship between residential mobility and the replacement of *Dhakiaya* people as there moves have some determinants and subsequent impacts on the areas at both origin and destination. She shows that some important factor at origin area in causing the relocation of *Dhakaiya* households such as high densely population, shortage of dwelling space, dreadful environment, physical environment is dirty and unhygienic, shortage of educational institution, lack of good shopping center, playground, social institution, medical facilities and lack of modern facilities etc. She also mentioned the reasons for selecting a destination in new Dhaka would be similar to the causal factors for relocation of a household such as good environment, good accessibility, open and clean neighborhood, secured area are considered as the neighborhood characteristics, low land price and within economic affordability are treated as the economic reason and comfortable to live etc.

14. Islam (1996) in his book consisting 13 chapters covered all major aspects of urbanization and urban development of Dhaka. Nevertheless, it had provided one urban observer's perspective on several of the important and critical issues of growth of contemporary Dhaka, from a very small city to a huge megacity. The book covers the people (such as the high-income groups, the poor, the migrants and the woman workers), places (such as the high-income areas, the urban fringe, as well as the slums), and some planning and development issues (including programs of an NGO). This volume represents Dhaka had emerged as one of the most populous cities of the world. It is largely a megacity of the poor and a megacity dominated by the informal sector. Islam also says on this book Dhaka will survive as a dynamic city and even prosper with time.

15. Mondol (2009) provided an overview of the major trends in demographic changes in Bangladesh and the population challenges it currently faces. In this thesis he mainly focused fertility pattern in Bangladesh and the factors affecting fertility reduction at the current level in Bangladesh. Fertility is a major catalyst for population growth, which affects the overall health conditions of Bangladesh's population. The focus of this in-depth discussion lies on the impact of national family planning programs and various socio economic factors on the total fertility rate (TFR).

16. Hasan (2011) stated the demographic changes of DCC from the declaration of the city as a capital in Mughal period after the independence of Bangladesh. The study is focused on the comparison of ward wise population density and growth rate in DCC area in 1981, 1991 and 2001 census periods. In this articles wards have been categorized based on different classes (very low, Low, medium, high, very high and extremely high) of total population, density and decadal growth rate. The study revealed that very high and extremely high population containing wards in the census in 2001 from 1991. Dhaka has experienced influx of population in several phases.

17. Khan (2011) described and analyzed the basic population growth trends of Dhaka City during 1610-1951 periods. The growth patterns of population, density, sex ratio, dynamics, fertility, mortality, migration, and religious composition context and population density of the city with comparative approach were analyzed in the context of population growth patterns. Push-pull aspects of migration played a major role to decrease or increase the population of Dhaka City respectively. The study mentioned, Dhaka had gone through three types of politico-administrative regimes of the Mughal, British and Pakistan administration. In this article, the demographic delineation of the population growth in Dhaka is presented through a descriptive-analytical approach.

18. Barkat-e-Khuda at el. (2015) contributed a chapter on Socio-Economic Development and the Demographic Transition commissioned by United Nations Population Fund (UNFPA). They described about Dhaka as central urban center and population growth phenomena of Dhaka Megacity. The report stated urban centers as well as population are becoming increasingly concentrated in the vicinity of the capital city, Dhaka, in the centre of the country. In 2011 Dhaka Megacity (DMC) with an area of over 1500 sq km had a population of 14.2 million or 34 percent of the country's total urban population. Its population is five times higher than Chittagong SMA, the country's second biggest urban agglomeration, and 2.6 times higher than the combined population of the next three largest SMAs (Chittagong, Khulna and Rajshahi). The level of primacy of Dhaka Megacity has been increasing over time: in the 1991 Census it held 28.9 percent of the country's urban population as against 34 percent in the 2011 Census. This report stated about massive in migration in Dhaka Megacity and now among the 32 megacities in the world, DMC has climbed to 11th rank because of its rapid population growth. The report mentioned about the demographic transition between1991 and 2011, it more than trebled in population.

19. Hayes, Geoffrey (2015) in Future Population Prospect and Their Policy Implications chapter of United Nations Population Fund (UNFPA) commissioned report discussed about population distribution and urbanization along with geographical distribution and zone wise concentration of urban population. He depicted that in the central region urban population concentration is very high where industrialization playing a role for more urban population in the Dhaka Megacity, central areas of Bangladesh. He depicted the urban primacy and projected the growth of urban population in Dhaka Megacity. In this chapter he mentioned Bangladesh is characterized by a high level of urban "primacy" with about 32 percent of the urban population residing in one Mega-City, Dhaka. According to the UN Population Division's projections, Dhaka will remain Bangladesh's primate city for the foreseeable future based on current trends. In absolute numbers, Dhaka is projected to reach 27.4 million by 2030, an increase of 86 percent over the population in 2010. This implies an average annual growth rate of 4.3 percent.

20. Corner R.J at el. (2014) described the spatiotemporal patterns of population distribution of Dhaka Megacity. The research shows the changes of urban density for different location in the city. The study analyzed the population data of last 3 census years (1991, 2001 and 2011) by using the census tract as the spatial unit of study. The changes in population over time raveled that most of the census tracts have experienced population growth in Dhaka Megacity. The result showed that the suburbanization process has started in a slow rate and population concentration is going to very high in the Dhaka Megacity.

1.9 Organization of the Study

Along with other necessary sections, the thesis is divided into seven chapters. **Chapter 1** dealt with introductory notes, statement of research topic, its objectives, importance of the study, data sources and methods of analysis, reviews of relevant literature and limitations of the study. It also includes the detailed methodology adopted for the study.

Chapter 2 focused on the study area particularly it's physical and historical backgrounds along with spatial expansion of DMC over the decades.

Chapter 3 mainly discussed the population distribution and density patterns within the DMC area.

Chapter 4 analyzed the population density variation in general and rural-urban density variation in particular.

Chapter 5 concentrated on population growth rate within DMC area by wards, unions and *thanas*.

Chapter 6 at conclusion summarized the results or major findings of the research and put forwarded some relevant recommendations. It also forwarded some suggestions for new researchers in the field of population dynamics.

1.10 Limitations of the Study

All research works are planned according to time, money, labor and off course by scope of the study. In fact, each thesis work generates some knowledge as well as questions for future researchers. In addition, at the time of research work, a researcher always has some academic (theoretical) or non-academic limitations. In this study, the researcher identified a number of limitations while handling with quantitative data or statistics on spatial context of the vast megacity- Dhaka. The most common constraint was the frequent changes of boundaries of ward, union, *thana* and even the boundary or area under DMC jurisdiction. Dhaka Megacity with its vast area and collecting information for wards, *thanas* and unions is a huge task. One single ward goes under a few unions/*thanas*; troubles like this were often faced during the compilation of data and correcting maps. There are some inconsistencies with regard to data published in different reports of BBS. It took time and labor to correct data anomalies. Maps for the study were created using GIS software. The study area is large and finding the total GIS dataset (Shape File) took tremendous labor, on the contrary the shapes keep changing from one census year to

another year. To prepare an accurate map sometimes digitization was necessary. Organizations that provide GIS data have their individual projection systems and naming conventions in Bangladesh. It causes terrific trouble to inter-relate the datasets in one platform. The above-mentioned facts caused a lot in comparing the datasets and verify them.
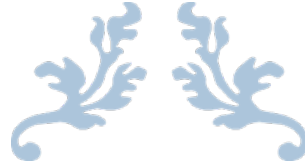
CHAPTER 2

Background Profile of Dhaka Megacity

2.1 Introduction

Dhaka is the capital of Bangladesh. With eye soothing greenery and breeze of lives, Dhaka was a small and beautiful city of only 3.5 million in the 1950s. The city is situated in the centre of this country. The origin of the name of Dhaka is still in confusion. Some said that the name comes from a tree named "DAK" (Buteafrondosa). Some said that the name of this city came from the "DHAKESWARY TEMPLE" built by Ballal Shen. Again some said that in 1610, when Islam Khan came to Dhaka, he decided the boundary of this Dhaka as the sound of "DHAK" (one kind of musical instrument) reach as far. That's why this is known as Dhaka. The city from its establishment situated on the left side of the Buriganga River.

Dhaka was founded in 1608 A.D. as the capital of the province by Islam Khan Chisti during the regime of Mughal Emperor Jahangir and it was at that time renamed Jahangirnagar. With the establishment of Mughal control over the region, Dhaka continued functioning as the capital of Bengal, Behar, and Orissa and retained the status till 1717. In 1905, Dhaka was made the capital of a new province comprising East Bengal and Assam. A great deal of construction took place to house the new administration. This was cut short by annulling the partition of Bengal in 1911. In 1947, the city emerged as the provincial capital to the then East Pakistan and embraced the historic movements and finally the victory in the war of liberation. After independence, Dhaka became the capital of Bangladesh in 1971. First and foremost, mention must be made of the fact that Dhaka since 1971 has flourished as the capital of a sovereign country, a country which took growth-strides in quite a recognizable way and a nature consequence of this has been the phenomenal growth of the population of the capital city. The increase in the area of the city and the vertical growth of the housing pattern- both can be understood in terms of this phenomenal growth of the population. The active private sector in the land development and vertical development took full advantage of this 5 times increase in the population in the span of about 30 years (Hasan and Chowdhury 2011).

After the liberation of Bangladesh, the development processes of Dhaka City rapidly increased. From 1974 to 1981 population more than doubled and this rising volume was marked by the physical expansion of the city as well as flows of migrants towards the city from the vast countryside. In 2011, the total population of Dhaka Megacity was 14543124 and the city limit is rapidly on the increase. The city now extends as far as Gazipur, Kaliganj, Sonargaon, Savar and Keraniganj.

2.2 Study Area

Dhaka Megacity (DMC) is the study area of this research. It is the number one hub of administration (capital city), commerce, education, industry, employment, culture, etc. of the country. Given these agglomerations DMC becomes the country's most highly populated urban region with an area of around 1459 sq. km. The city of Dhaka attracts a large segment of the migrant population coming from all walks of people. Dhaka's importance as a terminus for migrants received impetus in the early 1970s following the war of liberation in 1971 and deterioration of the social fabric of penurious rural societies of Bangladesh.

People were cognizant of the fact that Dhaka was the new capital and the abject lack of security, lack of momentum and productivity of the rural areas could not prevail in the centre. Dhaka could offer at least a modicum of security. Thus, many who were scarred and victimized through forgery and then exhortation, fearful of losing their lives, believed that personal safety lay in the anonymity of the city, and migrated to the city. River erosion, soil-salinity, medicare for old parents, exploitation by unruly elements etc., have forced distress migration to the city. More than one-third of the growth in large cities is accounted for by migration from rural to urban areas (Anwara 1999). Dhaka Megacity became the research focus because the city has recognized as one of the most densely populated capital city along with very high growth of population; both these factors are highly linked with the city's healthy growth and proper management or good governance. This research therefore aims to analyze the population dynamics of DMC with a view to find out possible

solutions to tackle adverse effects of rapid growth of the capital city. The study area i.e. (DMC) includes the following administrative zones/areas such as Dhaka City Corporations (DCC), Dhaka Metropolitan Area (DMA), seven *Paurshavas* and several unions attached to the core urban areas of DMC. These are shown in Map 2.1.
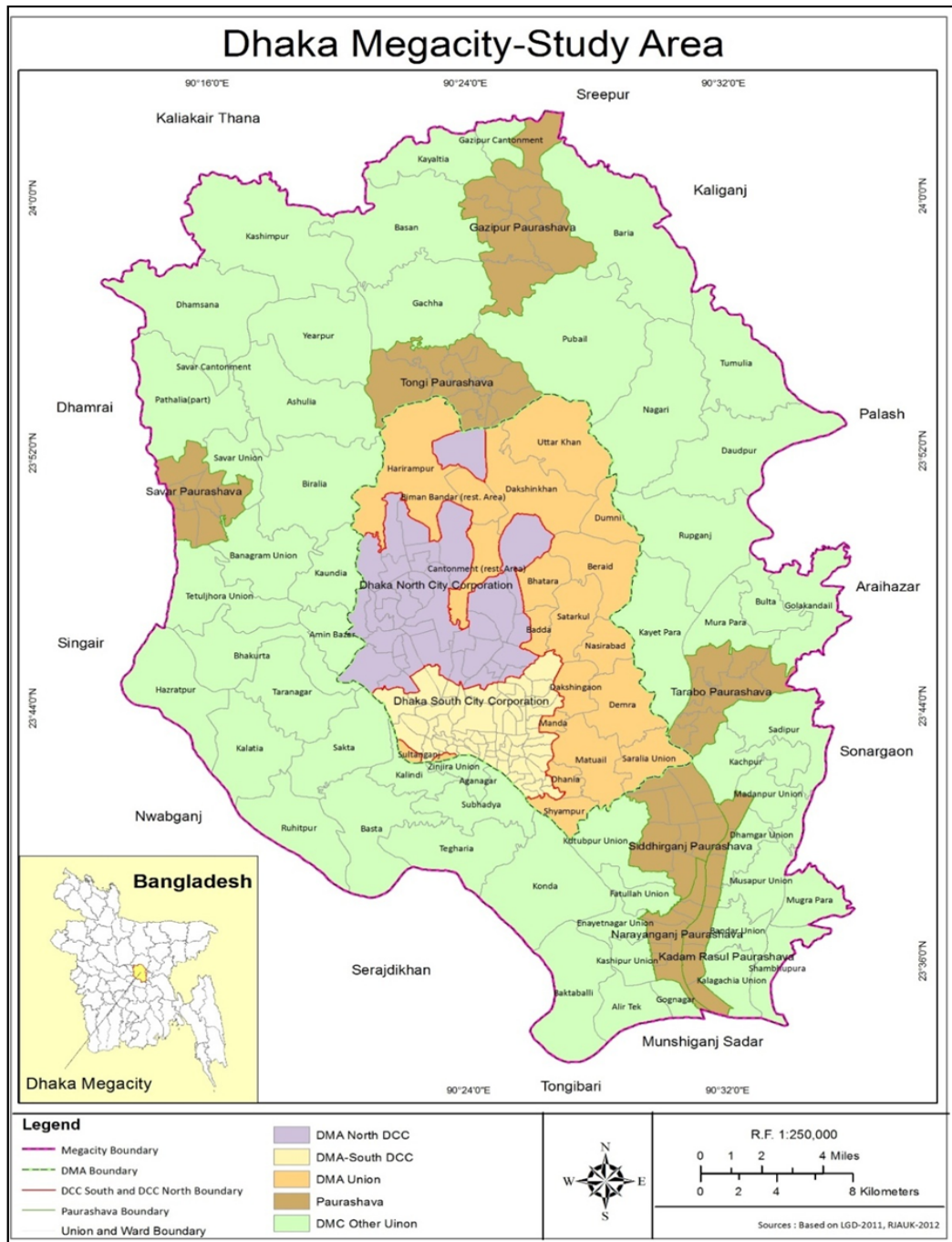
Map-2.1 The study Area

2.3 Historical Background

Though Dhaka is the capital for only 46 years after independence of Bangladesh, it has been developed as the capital by Mughal's 400 years ago. The incremental steady growth of Dhaka City can be narrated through five distinct historical periods.

2.3.1 Dhaka during Pre Mughal Rule (Before 1608)

Dhaka City originated in the early centuries of Christian era in a naturally suitable place like other great seats of civilizations of ancient period. Its topography (tract of Pleistocene terrace) was favorable for human habitation and commercial purposes (Khatun, 2003). Before the Mughal period Dhaka was a mid-level business city. This town developed on the bank of Buriganga River. Then this region was reined by Muslims based in Sonargaon and before that by Bikrampur based Hindu rulers. In the early centuries of the Christian era, Dhaka was under the Buddhist Kingdom of Kamrup (Allen, 1912). From about 9th century A.D. the Sen Kings of Bikrampur ruled it. Dhaka stretched to Babu Bazar on the west, DholaiKhal on the northeast Dhakeshwari temple (present Bakshi Bazar) on the east. Probably the core of Dhaka was Bangle Bazar and the areal extent was only 1 sq. km.

2.3.2 Dhaka during Mughal Rule (1608 - 1764)

The Mughal rule in Dhaka City was long, which lasted from 1610 to 1765. Mughal ruler Islam khan shifted the capital from Bihar Rajmahal to Dhaka because of strategic and Geographic location advantage in 1610 (Ahmed, 2010). Islam khan named the new capital as Jahangirnagar after the name of the ruling emperor Jahangir. Dhaka got the label of capital and lost it twice on each to western city Rajmahal. During 1662 to 1679, Dhaka rose to a height with development and growth that it became a pride of Indian Sub-continent. Dhaka developed around the fort of Islam khan presently known as Dhaka Central Jail. Considering the population Dhaka was one of the largest cities in

the world. During Eighteenth century Dhaka had the highest 200,000 people (Islam, 2013). The Government and commerce needs made Dhaka grow in area and population. Dhaka started expanding towards north and west from the old boundary of southern part of Dholaikhal. The entry point to the town was in the northern end during Mir Joomla's ruling. The city stretched for 7 to 10 miles along Buriganga River and 2.5 miles inside during Mughal period. It was Buriganga to Tejgaon and Tongi from south to north, while Gendaria to Turag river from east to west. The city expanded during Mughals because of the following three reasons mentioned below-

1. Mughal rulers administrative necessity

2. Local economic activities and

3. Foreign business and trading.

Different products including cloths would go around the globe from this place.

2.3.3 Dhaka during the British Rule (1764 - 1947)

When the Mughal Empire ended, Dhaka experienced for sixty years a period of disorder, unrest and political instability. During this period, the East India Company, and English trading company, gained political domination and took over control of Dhaka City in 1764. Under East India Company's rule (1764 - 1857), Dhaka came into the grips of several major calamities. There came a famine in 1769, 1770, another in 1784 and yet another during 1787 - 1788 followed by excessive floods. Dhaka suffered heavy casualties of life (Atikullah and Khan, 1965). Dhaka lost its importance in business and politics during the British ruling (1765 to 1947). In 1938 the population in the city under British ruling went down to her lowest in its 400 years of history. The population decreased from 200,000 in 1800 to 68,038 in 1838 (Khan and Islam, 1996). British administration had the boundary of Dhaka up to Buriganga in the south, Tongi to the north, Mirpur in its west and Postogola on the east during the end of Eighteenth Century. The abandoned Dhaka again got her life back through Muslim Nawabs and Local Jaminders. Different Citizen Charter's like-Hospital,

School & Colleges establishment, developed communication, city administration meaning paurashava establishment took the population to a rise yet again. Dhaka City functioned as a district headquarter, trade center and university town till 1947, when again it attained the status of the provincial capital of (East) Pakistan with a population of 0.25 million in an area of about 31 sq. Km. (Ahsan, 1991).

2.3.4 Dhaka during the Pakistan Rule (1947 - 1971)

Populated with four *crore* people (40 million) East Bengal had Dhaka as capital when India separated as a different country in 1947. Dhaka was the chief administrative and business center of the province. At that time Dhaka had 250,000 people and started getting importance for politics, administration and trade (Islam, 2013). Dhaka's population doubled in a decade from 1951 to 1961. The population of Dhaka City increased from 0.21 million in 1947 to 0.34 million in 1951 and reached 0.55 million in 1961.
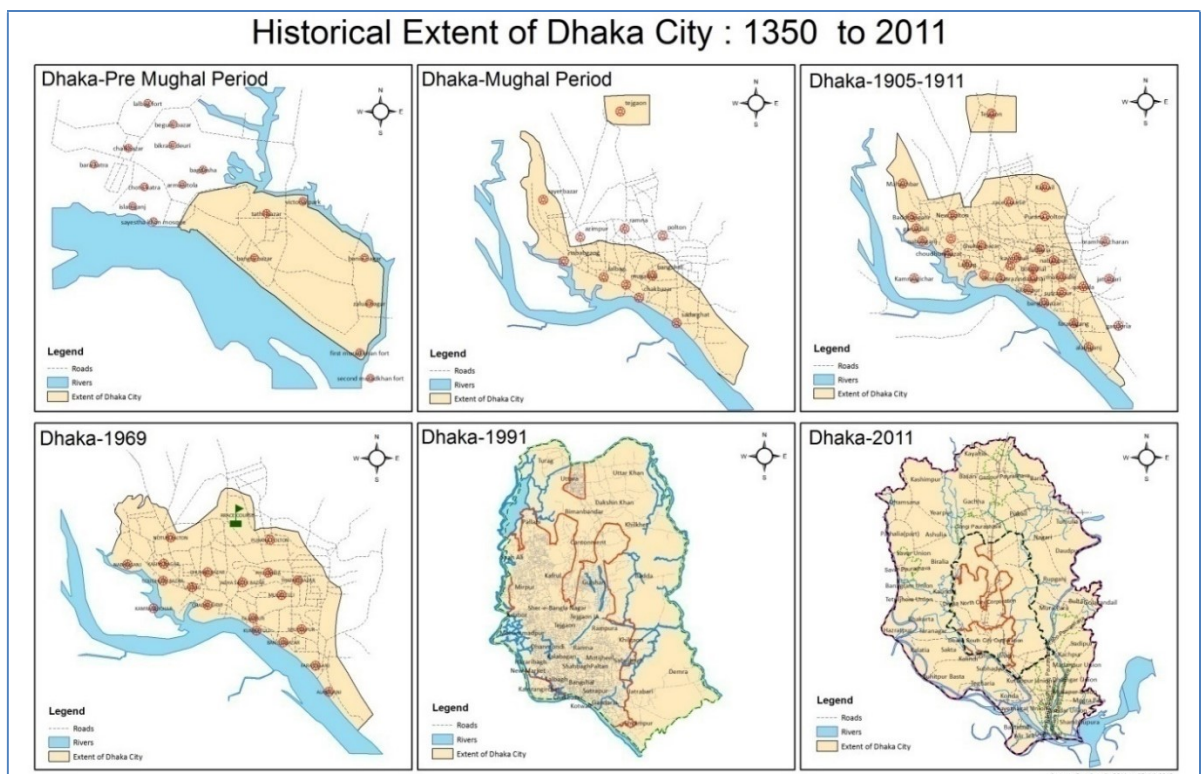
Map-2.2 Historical Extent of Dhaka Megacity

The area of Dhaka increased from about 31 sq. Km. in 1947 to about 73 sq. Km in 1961 (Ahsan, 1991). People from rural areas started migrating to Dhaka even from India and many left too. After all the migration, population yet rose high remarkably. Dhaka's heart expanded to Bangabandhu Avenue (Jinnah Avenue), Dhaka Stadium area, New Market, Shahbag Hotel area and Paltan Field.

2.3.5 Dhaka during Post-independence period (Since 1971)

The historical changes of Dhaka started when it became the country's capital from a state's capital in 1971. Since then the landscape of Dhaka City has been undergoing alteration along with the economic and political changes in the country. Being the capital city, Dhaka expanded very rapidly through development activities, industrial expansion as well as improvement of transport communication system. The remarkable growth of the city has actually progressed towards Joydebpur and Savar. In the process of development, some new residential and commercial areas and new roads were constructed (Khatun, 2003). From 1972 people came in large numbers to Dhaka and 1974's flood & famine accelerated the migration of poor rural and helpless families. Dhaka City saw a population rise of almost 300% to 2.07 million within 14 years from 1961 to 1974 (Jahan, 2007). The population explosion that took place in Dhaka from 1972 to 2010 (From 1 *lakh* to 30 *lakh*), 6% growth rate per year was remarkable and few other cities in the globe saw such increase (Islam, 2013). Considering the population Dhaka is a Megacity, which developed up to Tongi & Gazipur to the north, Savar to the west and Narayanganj to the south-east. The figure below gives the population explosion in Dhaka Megacity (Fig. 2.1).
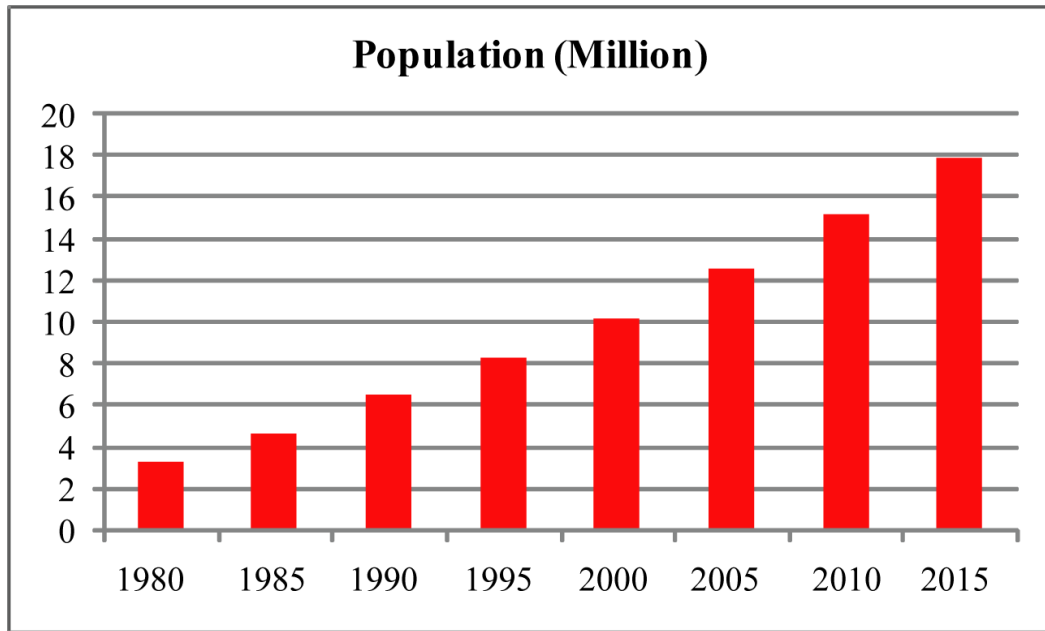
Figure-2.1 Changing Population Scenario of Dhaka Megacity

Source: United Nations Website

Estimated growths for Dhaka City were 4% and 2.75% for the periods of 1991 to 2001 and 2001 to 2011 correspondingly according to DMDP (Dhaka Metropolitan Development Plan), whereas the real growths were 3.71% (lower than estimated) and 3.96% (much higher) for the same periods. The rate in fact increased in the later stages, mainly due to migration (RAJUK, July, 2015). The authorities, researchers and concerned citizens of this city are anxious about the alarming condition that Dhaka Megacity will face in near future due to her rapid growth both population and physical expansion.

2.4 Territorial Identities of the Study Area

The area of Dhaka City today depends on what one understands by the name Dhaka. It has many connotations. Such as-

2.4.1 Dhaka City Corporation (DCC)

Dhaka City Corporation has a clear administrative boundary. It extends from the northern bank of the Buriganga River in the south to Tongi *Khal* in the north

and Gendaria, Jurain in the Southeast, Badda in the east to Rayerbazar/Turag in the west and Mirpur in the north-west. A detached part of DCC is Uttara, which extends north of Dhaka Cantonment. Now DCC divided into north and south as Dhaka North City Corporation and South city Corporation. Both city corporations have separate administrative office.
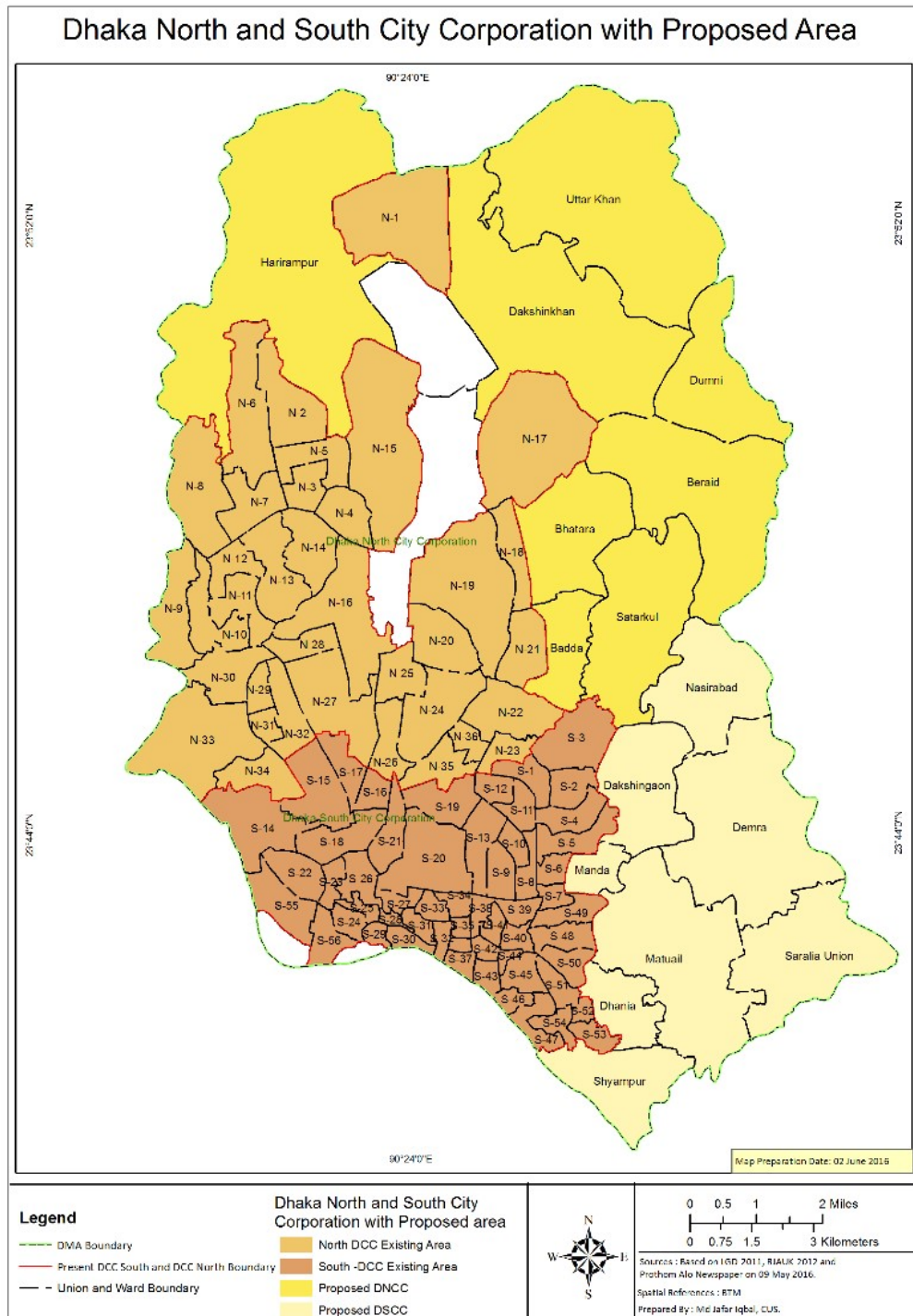
Map-2.3 Dhaka North and South City Corporation

At present DCC has an area of 360 Sq. km. National Implementation Committee for Administrative Reforms (NICAR) proposed 16 more unions into the two city corporations of Dhaka, expanding the area of the city by more than double on 08 May 2016. The LGRD ministry placed the proposal of including Beraid, Badda, Bhatara, Satarkul, Horirampur, Uttarkhan, Dakkhinkhan and Dumni unions would be included in the DNCC while DSCC would get Shyampur, Matuail, Demra, Dania, Sarulia, Dakkhingaon, Nasirabad and Manda unions (Map 2.3).

2.4.1.1 Evolution of Dhaka City Corporation in Dhaka Megacity

From this point of view for the urban development of the citizens of Dhaka, a core-designated organization has been established, which is Dhaka City Corporation. The establishment of institution like the municipality in Dhaka can be traced back to the year 1830 when it was known as the Dhaka Committee (BBS, 1997). The Committee was renamed as the Dhaka Municipality on 1 August 1864 under the District Municipal Improvement Act of 1864 (Rizvi, 1969).

The activities of the Dhaka Municipality were placed under the newly constituted Municipal Committee in the pursuance of Basic Democratic Order 1959. It was replaced by Dhaka *Paurashava* under the Bangladesh local Council and Municipal Order 1972. It was in 1960 major increase in the municipality area was done (Hasan, 2011).

In 1978, it gained status as Dhaka Municipality Corporation. In 1982, two adjoining municipalities, Mirpur and Gulshan, were merged with Dhaka Municipality. In 1983, it was renamed as Dhaka Municipal Corporation. Finally, in 1990, it was renamed as **Dhaka City Corporation**. Uttara were come under the jurisdiction of Dhaka City Corporation after 1981 census year. It was divided into 90 wards. Afterwards it was divided into 92 wards in 2011 (BBS, 2011).

The government on 29 November 2011 dissolved the Dhaka City Corporation by the Local Government (City Corporation) Amendment Bill 2011 passed by

the Parliament of Bangladesh after being placed in the Parliament on November 23. Now the City Corporation split into two corporations, North and South, with the 1 December 2011. Southern wing is holding more territory than the north. Each Corporation will be a self- governing entity.

Dhaka North City Corporation (DNCC), the northern part of Dhaka City Corporation, consists of 36 wards covering the *thana*s of Mirpur, Mohammadpur, Sher-E-Bangla Nagar, Pallabi, Adabor, Kafrul, Dhaka Cantonment, Gulshan, Banani, Badda, Uttara and some others. Dhaka South City Corporation (DSCC), the southern part of Dhaka City Corporation, consists of 56 wards covering the *thana*s of Dhaka Kotwali, Motijheel, Sutrapur, Ramna, Bangshal, Wari, Gendaria, Chwokbazar, Lalbag, Hazaribagh, Dhanmondi, Shahbagh, New Market, Khilgaon, Kamrangirchar and some others (Iqbal and Asikunnaby, 2014). Tables 2.1 and 2.2 provide a brief on the evolution of DCC.

Table-2.1 Evolution of DCC in the Year 1823 - 2011

Year	Status		No of Union/Ward
1823	Town Development Committee		-
1840	Dhaka Committee		-
1864	Dhaka Municipal Committee		7 commissioners
1960	Selected Commissioners. Dissolve municipal law		25 unions
1977	Ward Commissioners elected		50 wards
1978	Dhaka Municipal Corporation		50 wards
1982	Mirpur & Gulshan Paurashava merged		56 wards
1983	Dhaka Municipal Ordinance, 1983		75 wards
1990	Dhaka City Corporation (DCC)		90 wards
2011	Dhaka City Corporation (DCC)		92 wards
2011, November	Dhaka City Corporation Divide	Dhaka North City Corporation (DNCC)	36 wards
		Dhaka South City Corporation (DSCC)	56 wards

Source: Compiled by the researcher and (Hasan 2011), Population Distribution in Dhaka in the Post-independence Period: An Analysis at Ward Level

Table-2.2 Population of Dhaka City Corporation in 1951 to 2011

Year	Population	Male	Female	% of Male	% of Female	Sex Ratio
1951	276033	171884	104149	62.27	37.73	165
1961	368575	218146	150429	59.19	40.81	145
1974	1403259	818669	584590	58.34	41.65	140
1981	2475710	1449314	1026396	58.54	41.46	141
1991	3612850	2051760	1561090	56.79	43.21	131
2001	5327306	3021970	2305336	56.73	43.27	131
2011	6970105	3876586	3093519	55.62	44.38	125

Source: Compiled by researcher and Islam N. & Khan M. H. *Jonobinnas: Nari o Nagar*
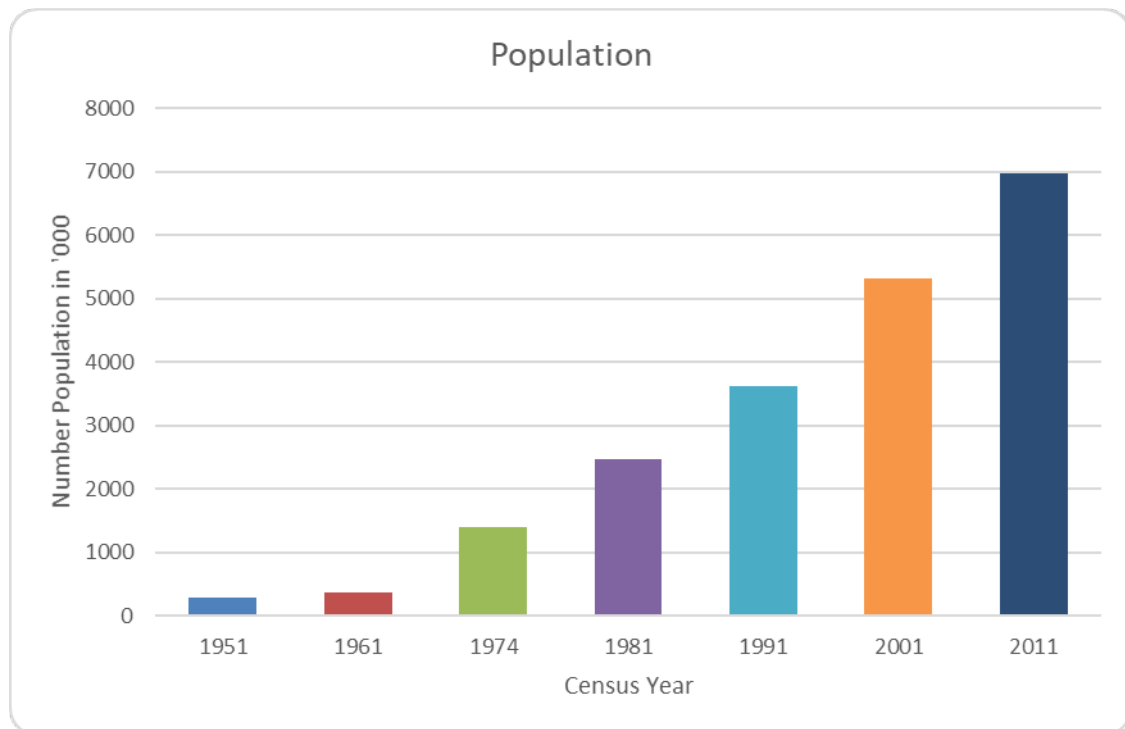
Figure-2.2 Population of Dhaka Municipality/ City Corporation by Census Year

2.4.2 Dhaka Metropolitan Police (DMA) Area

The second connotation of Dhaka is Dhaka Metropolitan Police Area, commonly referred to DMA. Is a police jurisdiction area embraces the entire DCC (DNCC and DSCC) and adjacent unions (eastern and northern fringe areas) with an area of 507 (with DCC) sq. km. There are 20 unions presently

within DMA. These unions are Beriad, Bhatara, Satarkul, Dakhingaon, Dakshinkhan, Uttarkhan, Matuail, Saralia, Demra, Harirampur, Shayampur, Sultanganj and some others. It is bounded by four rivers that are flowing in DMA, namely, the Buriganga to the south, Balu to the east, Turag to the west and north and Tongi Khal to the north.

2.4.3 Dhaka Statistical Metropolitan Area (DSMA)

The third connotation of Dhaka was the Dhaka Statistical Metropolitan Area (DSMA), which in 1981 had an area of 797 sq. km. The main objective of creating DSMA was to collect some important statistics to be required for the development of the metropolitan area. In 1991, the area of the DSMA region was increased to 1353 sq. km. DSMA extends from Narayanganj to Savar. It includes DCC, Narayanganj, Kadam Rasul, Tongi, Gazipur and Savar *Paurashavas* and Dhaka and Savar Cantonments. The area of Dhaka Statistical Metropolitan Area was 1353 square kilometers, of which Dhaka City Corporation occupied 276 square kilometers at 2001 Census. The Dhaka Statistical Metropolitan Area (SMA) covers Savar *Upazila*, Keraniganj *Upazila* of Dhaka District (note: only a portion of the district is part of the metropolitan area), Narayanganj Sadar *Upazila* and Bandar *Upazila* of Narayanganj District and parts of the Gazipur District. The Bangladesh Bureau of Statistics (BBS, 1993) was officially designated DSMA as a Megacity in 1991. In 2011 Census BBS didn't compile any statistics separately for DSMA.

2.4.4 Dhaka Megacity (DMC)

A megacity is usually defined as a metropolitan area with a total population in excess of ten million people. A megacity can be a single metropolitan area or two or more metropolitan areas that converge. The terms conurbation and metropolis are also applied to the latter. The concept of Dhaka Megacity is that of the capital development authority or Rajdhani Unnayan Kartripakkha (RAJUK) area. This area is called Dhaka Metropolitan Development Planning (DMDP) area by RAJUK. In this study, this DMDP is also considered as Dhaka Megacity. The present area of DMC is about 1460 sq. km. currently, the

megacity comprises seven municipalities (Kadam Rasul, Narayanganj, Siddirganj, Tarabo, Gazipur, Tongi and Savar), the entire area of Dhaka City Corporation, DMA, and 54 Unions are included in Dhaka Megacity.
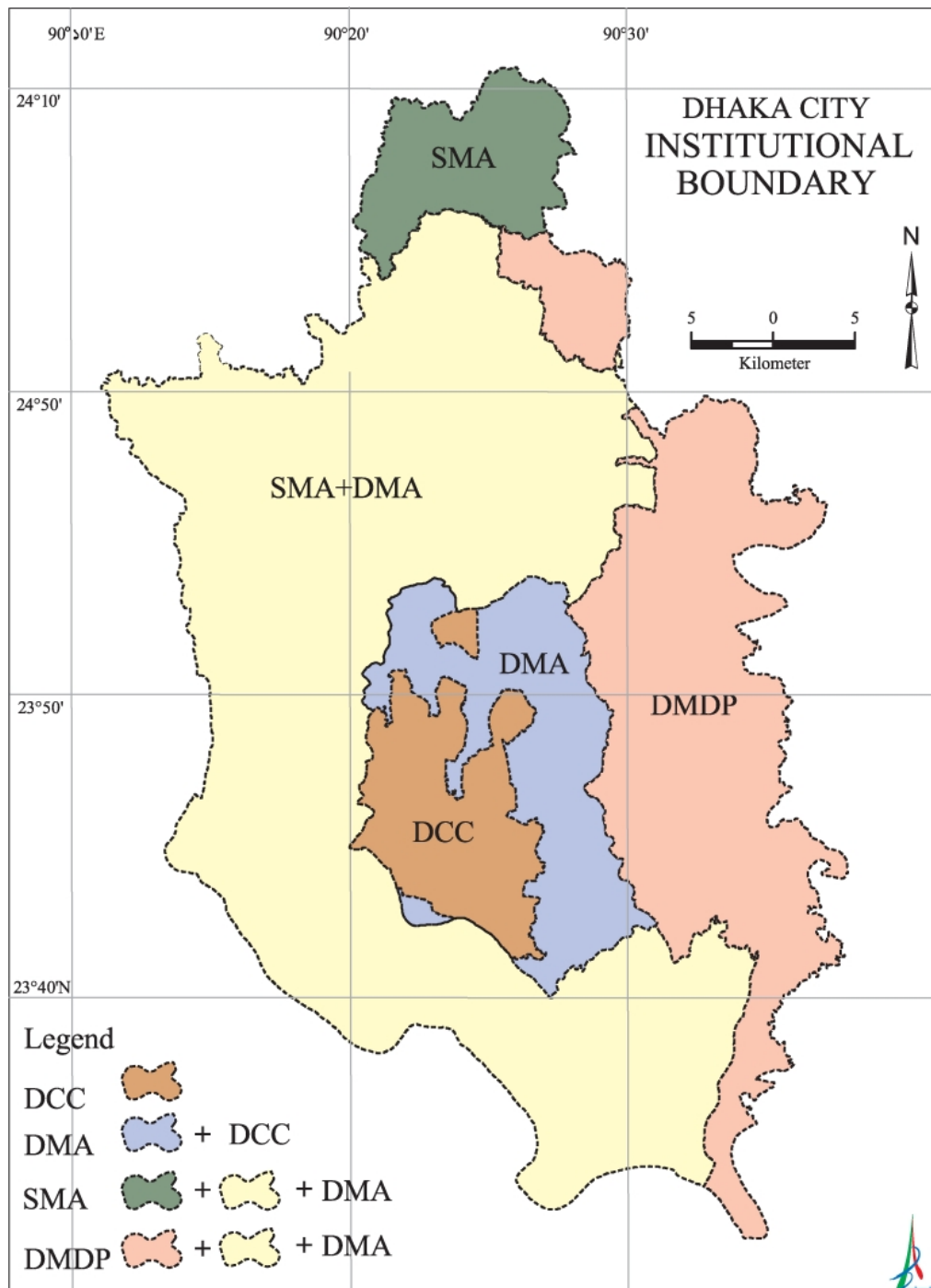
Map-2.4 Territorial Identity of Dhaka Megacity

Source: Banglapedia 2011

2.4.5 Dhaka Metro Region

A metropolitan region or a metro region usually refers to a densely populated core city and surrounding territories strongly influenced by the core city in terms of industry, infrastructure and housing. It usually comprises multiple jurisdictions and municipalities as well as satellite cities, small towns and intervening rural areas that are socio-economically tied to the urban core, typically measured by commuting patterns.

In order to develop a planning policy framework to promote a sustainable Regional Development Plan (RDP) for Dhaka Metro region an area of 1528 sq.km has been designated. The area is slightly larger than the DMDP area (existing RAJUK area). In DMDP area, the Kayaltia and Kashimpur unions of Gazipur *upazila* were partly included, and the Konabari Union was totally excluded and also the Dhamsona Union of Savar *Upazila* was partly included; but now these unions have been fully included in order to make it easy to develop the desired planning policy framework.

The metropolitan region is quite large and has varying settlement patterns and characteristics indifferent parts. For ease of planning and management, the entire region has been split into smaller functional areas called 'Regions'. These are not to be confused with any kind of zoning. The extents of these regions are as follows:
- **Central region:** Dhaka City & fringe
- **Eastern region:** Tarabo, Bhulta, Purbachal and Kaliganj
- **Northern region:** Tongi, Gazipur and vicinity
- **Southern region:** Narayanganj
- **Western region:** Savar, Dhamsona and surrounding
- **South-western region:** Keraniganj

[*Source:* Dhaka Structure Plan 2016-2035, RAJUK, July 2015].

2.4.6 Paurashava (Municipality)

Paurashava is an urban area, which is an also administrative unit. It includes *Paurashava* incorporated and administered by local government under *Paurashava* Ordinance 1977. There are seven *Paurashavas* within the Dhaka

Megacity. These are Gazipur, Tongi, Savar, Narayanganj, Kadam Rasul, Siddirganj and Tarabo.

2.4.7 Cantonment Area

There are three cantonments within the study area, such as Dhaka, Gazipur and Savar cantonments. These cantonments are an enclave and not a part of DCC or DMA, rather has its own administrative authority (Cantonment Board). The total area under cantonment board is 15.74 sq. km.

2.4.8 Union (within DMC)/Rural/ Non-Urbanized Areas

Smallest administrative unit usually within rural region is called union. It comprises of *mauzas* and villages and having union *parishad* institution. A significant part of Dhaka Megacity virtually looks like rural habitats and administratively these rural areas under union administration rather than ward. However, these rural areas are rapidly changing from rural to peri-urban character and these areas are adjacent to core urban areas or urban fringe zone.

2.4.9 Other Urban Area

These are non-municipal towns, which conform more or less to the urban characteristics by definition. It includes those *upazila, or thana* headquarters, which are not declared as *paurashava*. The only exception is the unions adjacent to Dhaka City Corporation under Dhaka Metropolitan Area. These unions are treated as other urban areas on the basis of their urban characteristics. Usually these are places of commercial, industrial, educational and tourist importance.

2.4.10 Thana (*Upazila)*

Thana is a police jurisdiction area, is a geographical region in Bangladesh used for administrative or other purposes. They function as sub-units of a district. The Local Government Ordinance of 1982 was amended a year later, re-designating and upgrading the existing *thana*s as *upazilas* with provisions for semi-autonomous local governance. *Upazila* is the second lowest tier of regional administration in Bangladesh. This system was reverted to the *thana*

system in 1992. Later in 1999 geographic regions under administrations of *thana*s were converted into *Upazilas*. All administrative terms in this level were renamed from *thana* to *Upazilla*.

2.5 Location and Area of Dhaka Megacity

Dhaka Megacity is located in a central position in Bangladesh. Geographically Dhaka Megacity lies between 23º 42' - 23º 54' north latitude and 90º 20' - 90º 24' East longitudes, stands on the northern bank of the Buriganga river. Thus, it is located exactly in the middle of the eastern hemisphere and on the line of the Tropic of Cancer in the northern hemisphere. Dhaka is the largest Megacity in Bangladesh. The city also lies on the lower reaches of the Ganges Delta and it spread over in 1460 sq. kilometer of land. There are five major river systems flowing across the megacity, namely, the Buriganga-Dhaleshwari system to the south, Bansi-Dhaleshwari system to the west, Turag-Lubundha rivers to the north and the Lakhya-Balu system to the east and southeast. This megacity is constituted by areas coming from three districts namely Dhaka, Narayaganj and Gazipur (Map 2.4).

Table-2.3 Area of Dhaka City at different Census Year (1951 - 2011)

Census Year	Area in sq.km.
1951	85.45
1961	124.45
1974	335.79
1981	509.62
1991	1352.87
2001	1459.56
2011	1460.00

Source: Compiled by researcher from BBS 2003.

Dhaka Megacity-Study Area at District Level

Bangladesh

Dhaka, Gazipur
and Narayanganj Districts

Mymensingh

Kishoregonj

Gazipur

Narsingdi

Gazipur Cantonment
Kayaltia
Basan Gazipur Paurashava Baria
Kashimpur
Dhamsana
Gachha
Yearpur
Pubail
Savar Cantonment
Tumulia
Bathalia(part) Ashulia
Tongi Paurashava
Nagari
Savar Union
Harirampur
Uttar Khan
Daudpur
Savar Paurashava Biralia
Biman Bandar (rest. Area) Dakshinkhan
Dumni
Rupganj
Banagram Union
Kaundia
Cantonment (rest. Area) Beraid
Tetuljhora Union
Dhaka North City Corporation
Bulta Golakandail
Amin Bazar
Satarkul
Mura Para
Bhakurta
Dhaka
Badda
Kayet Para
Nasirabad
Hazratpur
Taranagar
Dakshingaon
Tarabo Paurashava
Dhaka South City Corporation Demra
Sadipur Narayanganj
Kalatia
Sakta
Manda
Sultanganj
Matuail Saralia Union
Kachpur
Zinjira Union Aganagar
Dhania
Madanpur Union
Kalindi
Subhadya
Shyampur
Ruhitpur
Basta
Kotghaun Union
Dhamgar Union
Musapur Union
Tegharia
Siddhirganj Paurashava
Konda
Fatullah Union
Mugra Para
Enayetnagar Union Paurashava
Narayanganj Paurashava
Kashipur Union Kadam Rasul Paurashava
Shambhupura
Baktaballi
Kalagachia Union
Alir Tek Gognagar

Manikganj

Narayanganj

Comilla

Munshiganj

Faridpur

Chandpur

Legend

— Megacity Boundary
-- DMA Boundary
— District Boundary
— DCC South and DCC North Boundary
— Paurashava Boundary

District Covers Dhaka Megacity
Dhaka
Gazipur
Narayanganj

N
W E
S

R.F. 1:432,110

0 2 4   8 Miles
0 4 8   16 Kilometers

Sources : Based on SoB, LGED-2011 and RAJUK-2012.

Map-2.5 Location of Dhaka Megacity within three Districts

2.6 Physical and Geomorphologic Characteristics of DMC

Dhaka is situated about a hundred miles (160 km.) above the mouth of the Ganges in the very heart of a land, which is today the sovereign country of Bangladesh, 'one great wide-sweeping plain, low-lying and fertile, drained by some of the mightiest rivers of the east as they forge their impetuous way through many ever-changing channels to the sea, (its) trim rice field locked close in the embrace of countless streams and rivulets, luxuriant in every exquisite of green, like emeralds set in a silver sheen.' Dhaka stands on the northern bank of the Buriganga. About eight miles above its confluence with the Dhaleswari, and this river-side situation not only gives to Dhaka 'with its minarets and spacious buildings the appearance like that of Venice in the west, of a city rising from the surface of the water (Chowdhury and Faruqui, 2009). The selection of the site of Dhaka by the Mughals as the capital of Bengal was definitely a very intelligent one. Surrounded by a ring of rivers, the city was strategically located for protection against possible enemy attacks. It was also located in the center of a productive agricultural area, while the rivers also provided good communication to the hinterland. The initial site of Dhaka was also on reasonably higher grounds and the city expanded to the north following higher contours. The city is expanding not only to the higher lands in the north and the northwest, but also to the low lands in other directions (Islam, 2005).

The megacity and its adjoining areas are composed of alluvial terraces of the southern part of the Pleistocene 'uplands' known as the Madhupur Tract and low-lying areas around the junction of the Meghna and Lakhya rivers. In the course of time, this area has been merged with and dissected by the recent floodplains on its fringe to form the present landforms of Dhaka. The major geomorphic units of the area are the highlands (or the Dhaka Terrace), the lowlands or floodplains, depressions and abandoned channels (Miah and Bazlee 1968). The elevation of Dhaka Megacity ranges between 2 and 13 meters above the mean sea level (State of the World Cities 2008/09). With the exception of the Pleistocene terraces on the northern edge and further north, 71.5% of the land is 0 - 5 m above mean sea level. Around 26.7% of the land is 6 - 10m, and the rest of the land (1.4%) is 11 - 16 m above the mean sea level

(Dewan and Corner 2013). Maps 2.5 and 2.6 displayed the elevations of different areas of DMC.
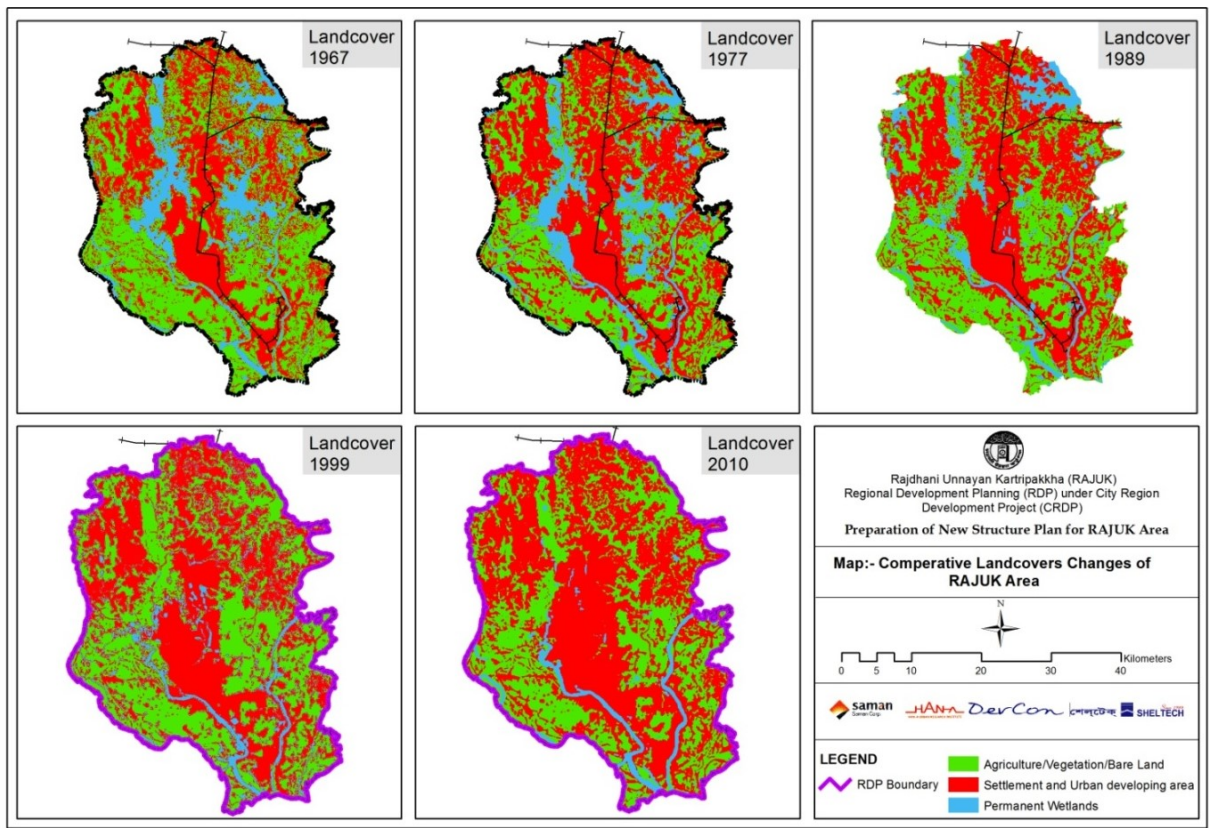
Map-2.6 Changing Land covers within DMC, 1967 - 2010

Source: Survey Report RDP, RAJUK, 2013

Dhaka Megacity-Digital Elevation Model

Legend:
- Megacity Boundary
- DMA Boundary
- DCC South and DCC North Boundary
- Paurashava Boundary
- Rivers

Elevation in Centimeter
- 80 - 227.3
- 227.3 - 374.7
- 374.7 - 522
- 522 - 669.3
- 669.3 - 816.7
- 816.7 - 964
- 964 - 1111.3
- 1111.3 - 1258.7
- 1258.7 - 1406

R.F. 1:250,000

0 1 2 4 Miles
0 2 4 8 Kilometers

Sources : Based on LGED-2011, RAJUK-2012 and ESRI.
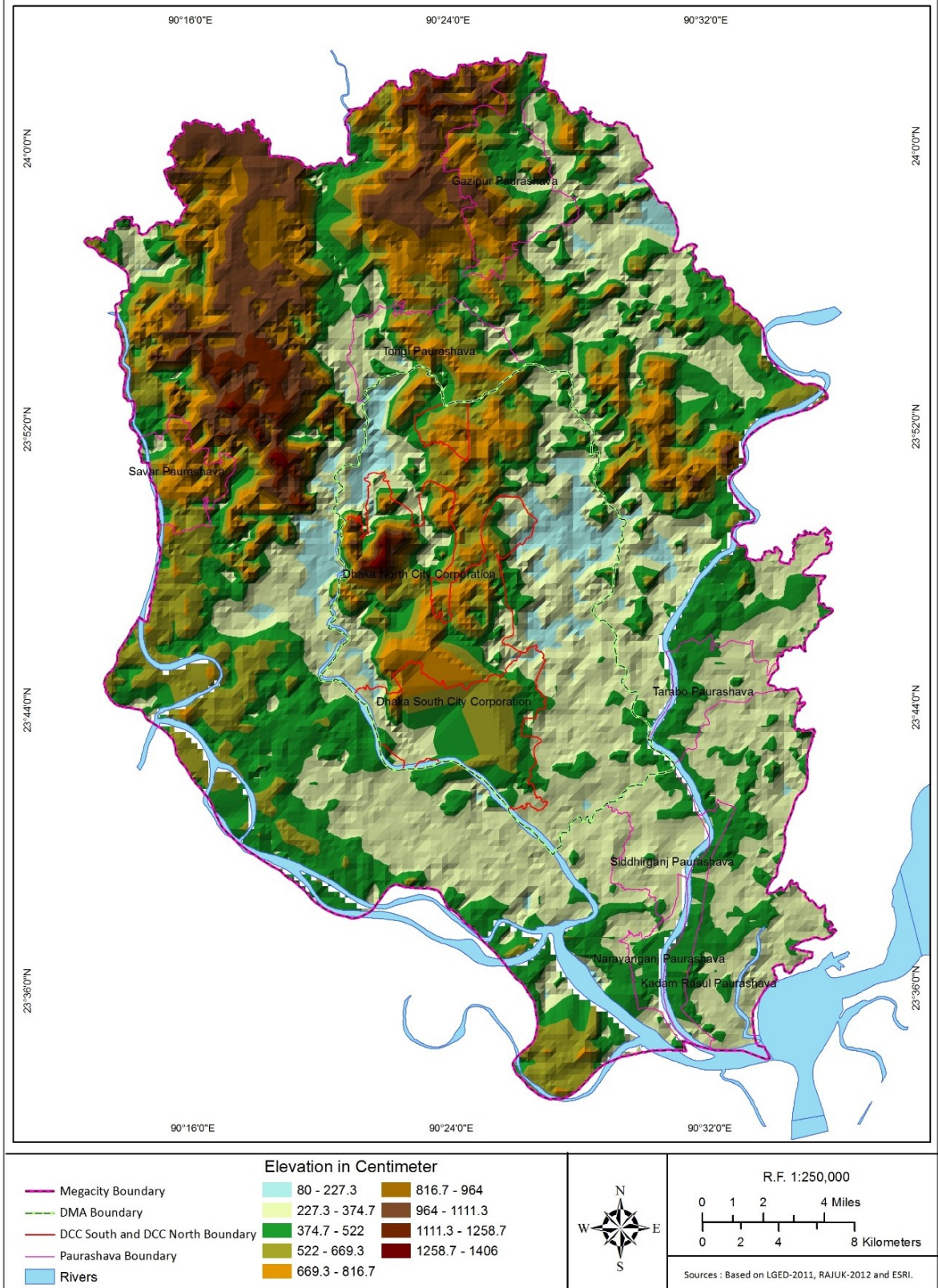
Map-2.7 Elevation of Dhaka Megacity

The region of Dhaka Megacity was once filled with green environment, rivers and other water bodies. Settlement was very much dispersed. With the increase of population due to rapid urbanization, low-lying agricultural lands, seasonal wetlands and parts of drainages were gradually being lost. During the last two decades the land filling activities within the megacity has rapidly been increased due to the availability of small scale dragger machine. As a result, city's built up area increased very fast destroying the green environment, wetlands and even natural drainages like rivers and *khals* (Map 2.7).
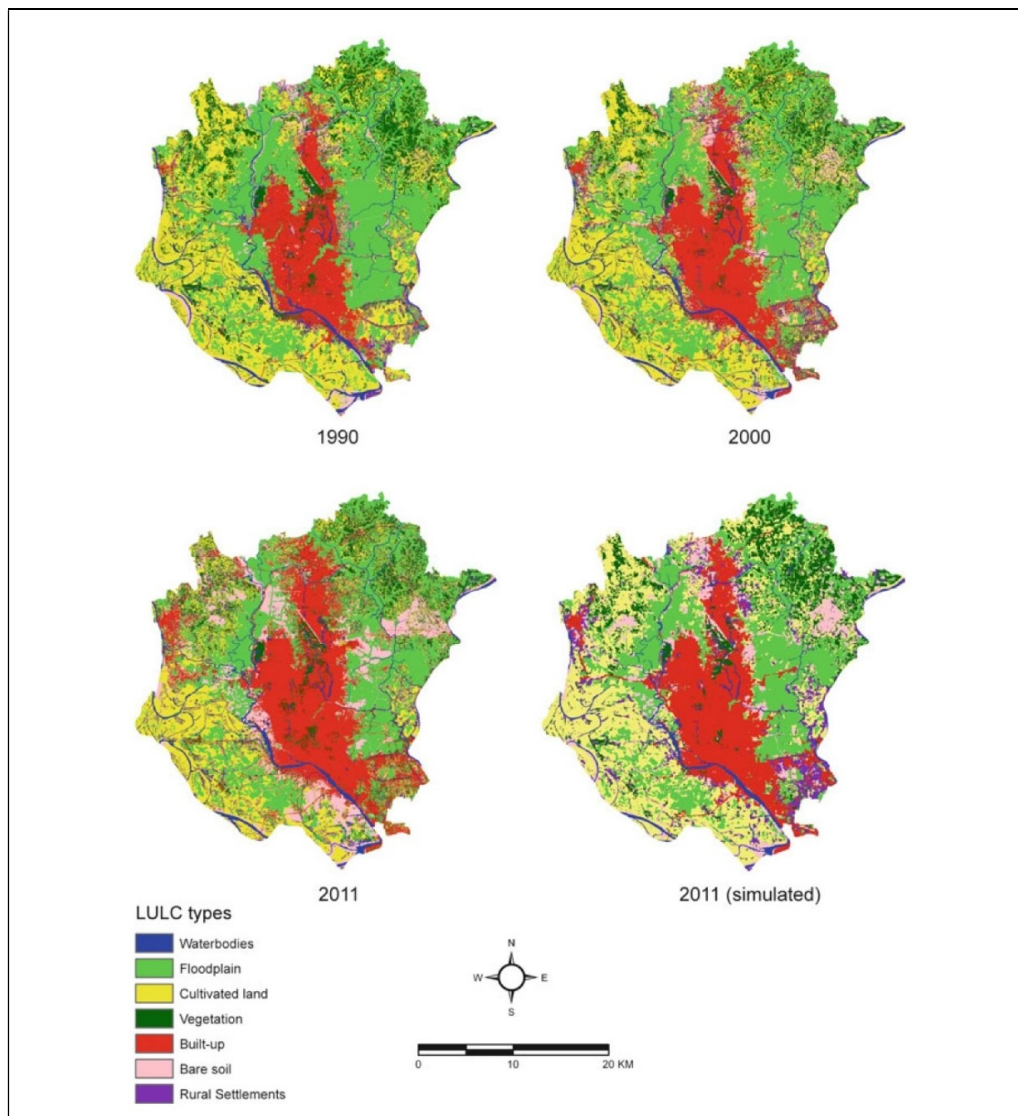
Map-2.8 Green Area Changes in RAJUK Area

Source: Observed and estimated LULC from 1990 to 2008, *R J. Corner et al (Editor-Ashraf Dewan. Springer Publication)*

2.7 Geology of Dhaka Megacity

The subsurface sedimentary sequence, up to the explored depth of 300m, shows three distinct entities: one is the Madhupur Clay of the Pleistocene age, characterized by reddish plastic clay with silt and very fine sand particles. This Madhupur Clay unconformable overlies the dupitila formation of the Pleistocene age, composed of medium to coarse yellowish brown sand and occasional gravel. The incised channels and depressions within the city are floored by recent alluvial floodplain deposits and are further subdivided into lowland alluvium and highland alluvium (Banglapedia, 2011). As the area of the city has expanded it now comprises both the Pleistocene Modhupur clay and red soil as well as increasingly of the alluvial deposits of recent age (Chowdhury, 2003). Seismically, Dhaka is situated on what is characterized locally as seismic Zone 2 or the medium risk/hazard zone (Maps 2.6 and 2.8).

2.8 Climate

Dhaka is located in the humid-tropic and monsoon region. Dhaka enjoys three distinct seasons, a mild winter (November - February), with temperature ranging between 10ºC to 20ºC occasionally recording as low as 8ºC. The pre-monsoon summer season (March - May) with some cyclonic and Nor'wester (*Kalboisakhi*) rain and hot temperature reaching up to 40ºC, and sometimes even higher, the monsoon (June - October), very wet and temperatures around 30ºC. Dhaka experiences about 2000 mm rain annually about 80 percent of which falls during the monsoon. Sometimes unusually heavy rainfall is recorded in a short period, such as the weeklong rains during 12 - 18 October 2004 causing serious problem of water logging and urban flooding in the city (CUS Report, 2004).

The weather is influences by its location in a sub-tropical region in Asia. A major part of the rainfall is received during March to September and the yearly average ranges from 1700 mm to 2000 mm. The temperature may range 32 to 35 degree Celsius in the summer. Dhaka experiences natural hazards, such as floods, cyclones, earthquake etc. (Hafiz, 2011).
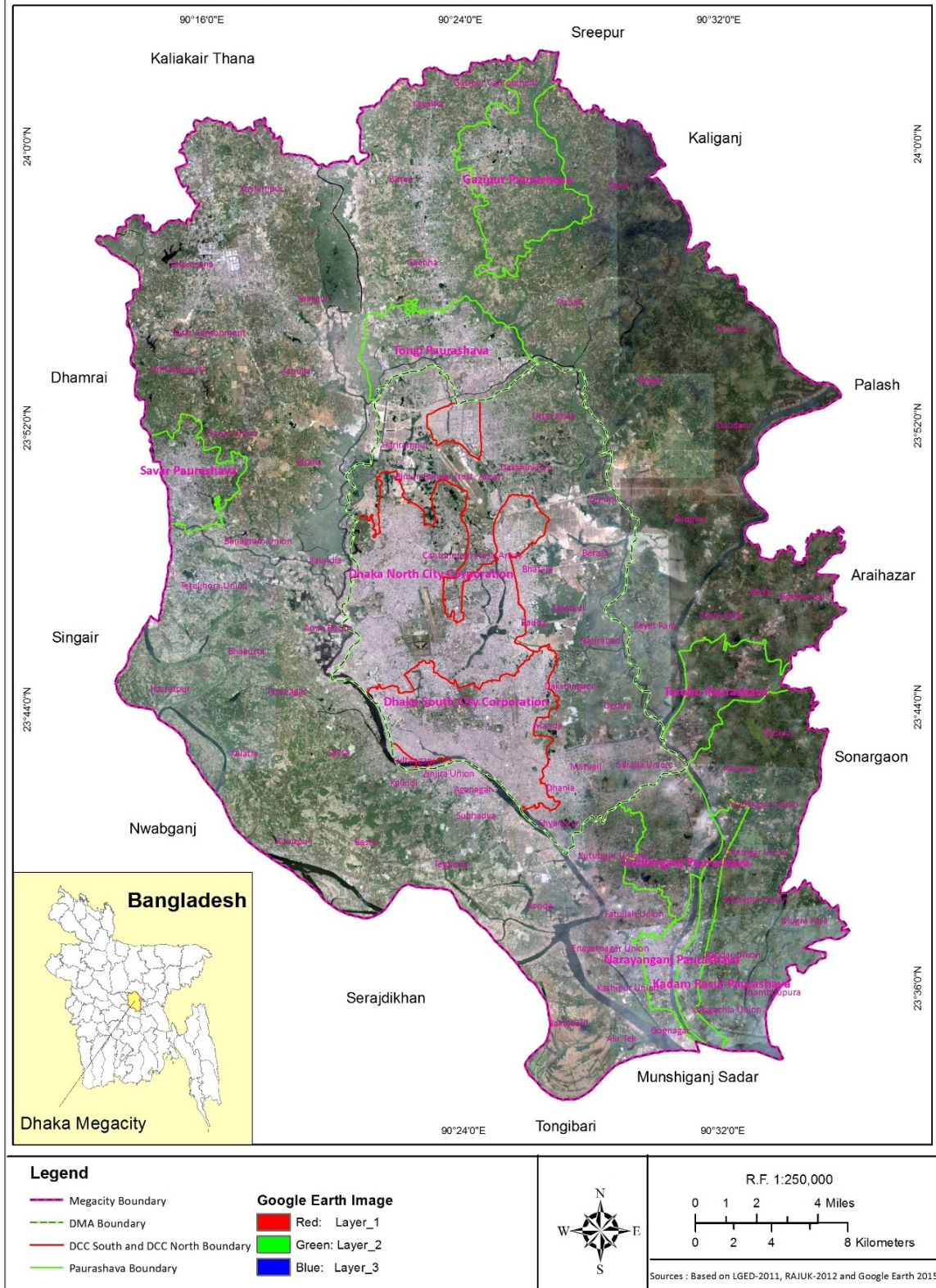
Map-2.9 Google Earth Image, Dhaka Megacity

Dhaka has a tropical climate with four meteorological seasons like, pre-monsoon (April to May), Monsoon (June to September), Post-monsoon (October to November) and Dry (December to March). Average annual rainfall ranges from 1700 mm to 2200 mm. About 70% rainfall occurs from June to September. Mean monthly rainfall during the period is between 300 mm to 450 mm. Temperature of the Dhaka City region ranges from 30ºC to 40ºC. The highest temperature generally occurs during April-May sometime it exceeds 40ºC. One study (Bangladesh Centre for Advance Studies, BCAS 2010) indicated an increase in maximum and minimum temperatures in Dhaka City, leading to hotter summers and cooler winters. In the last 100 years the average temperature in Dhaka has increased by 0.50ºC, and in the next 50 years it is expected to increase by 1.5 to 2 degree Celsius. Pre-monsoon rainfall will predominantly increase though the monsoon, post monsoon and dry season rainfall will show insignificant changes. The study also reveals that the average temperature in the metropolitan area is 2ºC hotter than in the sub-urban zones, turning the city into a ''heat island''. On the other hand, loss of urban open space also indicates the densification of built up zones that retain heat. As a result, Dhaka is gradually getting hotter. Traditionally, in Dhaka region, the rainy season (monsoon season) starts in mid-June and continues for two months, but now it is getting shorter but more intense. The change makes Dhaka's drainage system ineffective, while the wetlands that form the essential part of the drainage system are being gradually reduced. The existing climate change induced impacts in Dhaka City are, temperature variation, erratic rainfall, flood and water logging, cyclone, climate induced health outbreak. Furthermore, climate change has compounded problems of environmental degradation and has led to deterioration of ecosystems. However, Dhaka experiences a hot, wet and humid climate and is characterized by three distinct seasons: monsoon, summer and winter.

2.9 Flood Prone/ Flood Risk

It has been estimated that in Bangladesh 26,000 people per year are losing their land due to the effects of flooding associated with riverbank erosion and

those who lose their land either have to migrate to towns/cities or to *charlands* (river islands) and other marginal lands (Hayes, Geoffrey and Jones, Gavin UNFPA 2015). In 2011, about 92.3 million people (64% of the total population) were exposed to flood hazard to some degree (Map 2.10). More than two thirds of these were subject to low to moderate flooding, which are the processes by which the fertility of the soil has been maintained. However, about 10 percent of these (9.3 million) are exposed to severe flash flooding and river flooding with another 7.2 percent (10.4 million) exposed to severe tidal surge which produces salt water inundation, a form of flooding that can have long-lasting effects. Future population growth will increase the size of the vulnerable population, although rural urban migration and population re-distribution could mitigate these effects (UNFPA, 2015).

A dominant feature of Dhaka and its surrounding areas is its low proportion of high land (flood free land). To the west and south lies the flood plain of the river Buriganga, to the east lies the flood plain of river Balu. All these three sides are flooded up to 2 to 4 meters to the edge of the city for about 4 months in a year. Even within the city itself, which stands on comparatively higher land including the areas to the north of the city, urban development opportunities are constrained by a large number of re-entrant valleys. Thus the areal expansion of Dhaka has been dominated largely by the physical configuration of the landscape, particularly the river system and the height of land in relation to flood level (Asaduzzaman and Rob, 1999).

While the rivers are significant barriers to physical expansion of the city away from the central area, the variation in the land levels in the tract bounded by the first ring of rivers cause intermittent development within. The first urban development took place in the relatively higher tract with elevation between 6 and 8 meters above the mean sea level, which remains above normal flood level and experiences inundation up to 2 meters during abnormal flooding such as the ones in 1988, 1998 and 2004. Most part of this high land lies within a radius of 15 kms. of the city centre is already permanently built up, and occupied. However, there are patches of lower level lands or water bodies in between this high land, and being gradually brought under urban use through considerable earth filling. The second level of land with medium height, typically

of 3 to 4 meters above sea level, is susceptible to flooding for short periods annually. Much of these lands still remain outside urban use, but semi-permanent dwelling occupation has already taken place at many spots, mostly with earth filling and by raising the levels artificially. The third level of land is between 1 and 3 meters, which is flooded annually (Islam, 2005).

Dhaka City was particularly hit by severe floods in 1988 and 1998. During the 1998 flood about 56 percent of the city was inundated, including most of the eastern and 23 percent of the western parts of the city. Over 60 percent of area of this city can be demarcated as flood risk zone considering the flood history of Dhaka City. Flood in Dhaka is caused by high rainfall or by flooding from the surrounding rivers and canals. The western and most densely settled part of Dhaka is protected from river flooding by raised roads and an encircling embankment built after the 1988 flood. The eastern part of the city where most of the expansion taking place consists of low-lying floodplains that are submerged during the monsoon season. There exists a serious lack of enforcement of laws in protecting the low lying areas/wet lands in and around the City (RAJUK, July 2015).

2.9.1 Water Logging

Dhaka City has been experiencing a gradual increase in water-logging over the last decade or more. Moderate to heavy rain causes serious drainage problems in many parts of the city with knee-deep water on the streets. The process of rapid urbanization is not paying required attention for adequate drainage facilities causing water logging and temporary inundation in parts of the city for several days during monsoon. In the western part of the city river flooding has been protected by an embankment. During the monsoon water level in the river remains higher than the terrain inside the city area. This has brought the reality that, during the monsoon from May to October, the city drainage depends very much on the water levels of the peripheral river system. The situation worsens when monsoon runoff generated due to continuous rainfall coincides with high water level in the river systems. In the eastern side, the city is vulnerable from both rivers flooding as well as water logging by monsoon rain.
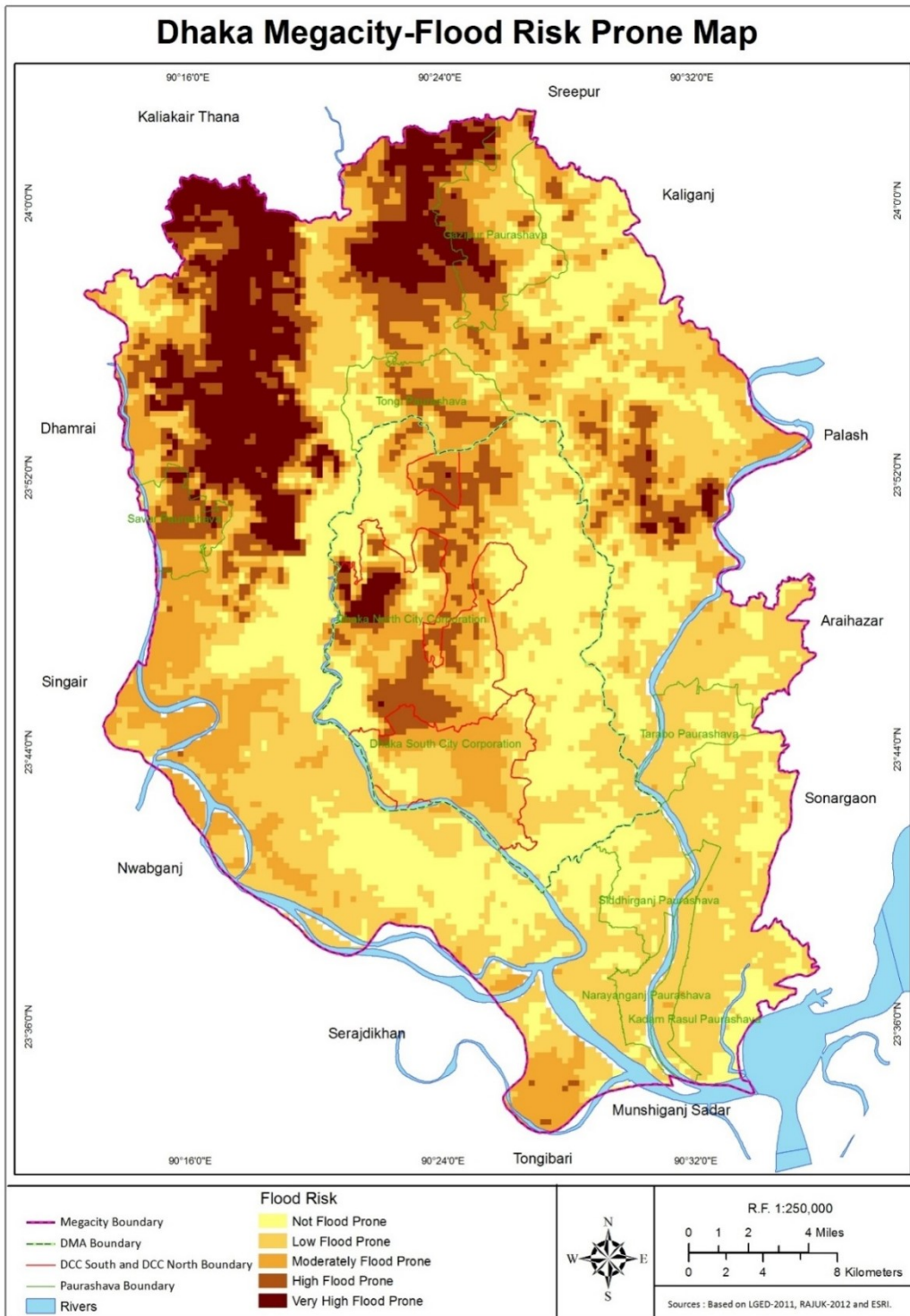
Map-2.10 Flood Risk Prone Map of Dhaka Megacity

Poor drainage systems in different parts of the city along with drainage blockage by garbage create regular water logging inside the city in monsoon season. Insufficient or inappropriate drainage facility that creates frequent

inundation occurs in the city causes immense problem to city dwellers. The major issues for Dhaka's water logging scenario are-

1. Construction of embankment can promote water logging in the inner city due to heavy rain in monsoon.
2. Encroachment of surface water bodies (canals, rivers and ponds) can aggravate the risk of water logging.
3. Micro-drainage system cannot carry out the load and they are not being upgraded, maintained and managed on a regular basis.
4. Poor, partial and overloaded sanitation can pose serious health hazard to the dwellers during water logging particularly in the low-lying areas (RAJUK, July 2015).
5. The Dhaka Metropolitan Area Integrated Urban Development Project (DMAIUDP) was the first urban development strategic plan in Bangladesh. The aim of the project was to prepare a long term development strategy for future Dhaka City with flood protection as the main focus (RAJUK, July 2015).

Dhaka City established in a plain land. At first, it stretched towards north, which was flood free, but the rise of population made Dhaka enlarge her area on all sides to accommodate everyone. Lowlands, water bodies, agricultural fields and canals started filling up. This unplanned diffusion created flood risk for most parts of the city. Adding to the flood risk fact is the filled up canals, which are often over floated by rainwater every now and then.

2.11 Transportation & Communication System

For most of its history, Dhaka's transport system has been dominated by two modes- pedestrians and boats. In Mughal times, Dhaka was a busy port, with water transport carrying passengers and goods. According to Dhaka District Gazetteer, the first surfaced road in Dhaka was constructed around 1679, under the governorship of Prince Muhammad Azam Shah. As well as initiating the Lalbagh Fort, Prince Azam ordered a brick road to be built, to facilitate movement people, horses and elephants in the wet season. After the East India Company gained control of Bengal, Dhaka declined as a trade centre. By the

early 19th century, Dhaka was about four miles in length and about a mile and a quarter wide. There were two main streets – one running from Lalbagh to the Dholai Khal, parallel to the river but a few hundred yards from it; the other running northwards along what is now Nawabpur Road. Dhaka's first rail line was built in 1885, between Narayanganj and Mymenshingh (Gallagher R. 2011). The rail line followed the alignment of Mughal major roads to some extent terminated at Fatulla, Narayanganj. The first planned residential area was Wari, which was developed in 1885 by Fredrick Wyer, the collector of Dhaka. The area had comparatively broader roads and proper drains (Chowdhury & Faruqui, 2009; Mamoon, 1995). A few planned residential areas followed starting with Dhanmondi in the 1950s (Mamoon, 1995). Dhaka Improvement Trust (DIT) was created in 1956. Residential areas were established in Gulshan, Banani, Uttara, and Baridhara at the initiative of DIT in 1961, 1964, 1965 and 1972 respectively (Chowdhury & Faruqui, 2009). As per DIT's master plan, a few new roads were built including North-South Road, Outer Circular Road, Inner Circular Road, New Elephant Road, Manik Mia Avenue, Tongi Diversion Road, and Rampura Road (Huq, 2010).The alignment of the railway track was changed in 1960s, as the line for Karwan Bazar to Fulbaria was snapped and was joined with the previous line at Swamibagh-Jatrabari running through Rajarbagh and Basabo to Kamalapur, where a new iconic station was built (Chowdhury and Faruqui, 2009). A few new links have been added to the road network, including Panthopath and Bijoy Sarani, in recent decades, their number is much less than what is required.

Dhaka City is very centrally located within the country, enjoying good accessibility with rail, road, water and air connections with all major towns and cities of Bangladesh. The rural hinterlands are also within relatively easy access. Rail links connect Dhaka with the east, northeast, north, north-west and southwestern parts of the country. Roads radiate in all these directions plus the south. Waterways offer strong connections to the south, east, south-west, west and north. There is concentration of a large number of medium and small towns within the zone of daily influence (or commuting distance) of Dhaka. This has turned Dhaka into a metropolitan region stretching for over

100 - 150 miles from Narayanganj in the south-east to Mirzapur - Taingail in the north-west or Mymensing in the north (Islam, 2001).

On a national perspective, Dhaka Megacity has a share of 1% of Bangladesh's land, but is home to 10% of its total population and 38% of the urban population. The huge population in a small area with limited transport infrastructure and service poses a challenging situation for the transport sector (Khan and Mitra, 2011).

The transportation network and systems will be developed generally on the basis of the Strategic Transport Plan or STP (2005 - 2025). There will be well coordinated multi-modal transportation systems based on metro rail, bus rapid transit. Land use plan would encourage pedestrian traffic and use of bicycles. There would be no manually driven passenger or goods transport. Waterways circular/ water transport would be one of the key elements of city transportation. For city to periphery connections a number of overhead expressways will be constructed. These will radiate in all directions. Private cars would be highly discouraged while Taxi service would be a common personalized transport. Intercity or city to regional towns connectivity would be well established (Islam, 2010).

Map-2.11 Transportation and Communication of Dhaka Megacity

Source: Compiled by the researcher

2.12 Land Use

Land use reflects the uses of land for numeric purposes that humans assign. This purely is seen from the changing land cover status of an area. The updated land use condition of any area can certainly help planning issues for different organizations to make smart and foreseeing decisions. Current distributions of land uses in RAJUK area are still dominated by agricultural land use, however not in the same proportion across the six planning regions. Residential uses of lands are quickly grabbing the open spaces and agricultural farms due to the rising demands of housing, infrastructural developments and growing population. The natural water bodies are now transformed thick and fast into numerous sectors which is reflected as 12.59 percent only in the land use category. Recreational land use is at a small scale proportionally to the huge amount of inhabitants living in the Dhaka City. Amount of restricted area changes minimum with time as cantonments and other military facilities are included in that section. The amount of industrial area and commercial area is increasing remarkably where the present status states 2.62 percent as industrial and 1 percent land use as commercial. The massive proportion is reserved by residential area and agriculture with around 75 percent coverage and all the other uses like facilities, road, railway, recreation etc (RDP Survey 2015) constitute around 25 percent land (Table 2.4).

Table-2.4 Current Distribution of Detailed Land Uses in RAJUK Area

Land Use Category	Percentage
Agriculture	38.49
Residential Area	36.47
Water bodies	12.59
Restricted Area	3.16
Industrial Area	2.61
Public Facilities	2.53
Road/Railways	2.30
Commercial	1.00
Mixed Use area	0.59
Recreational Area (Park/Playground/Urban Green Area)	0.26
Total	**100**

Source: RDP Survey, RAJUK, 2013
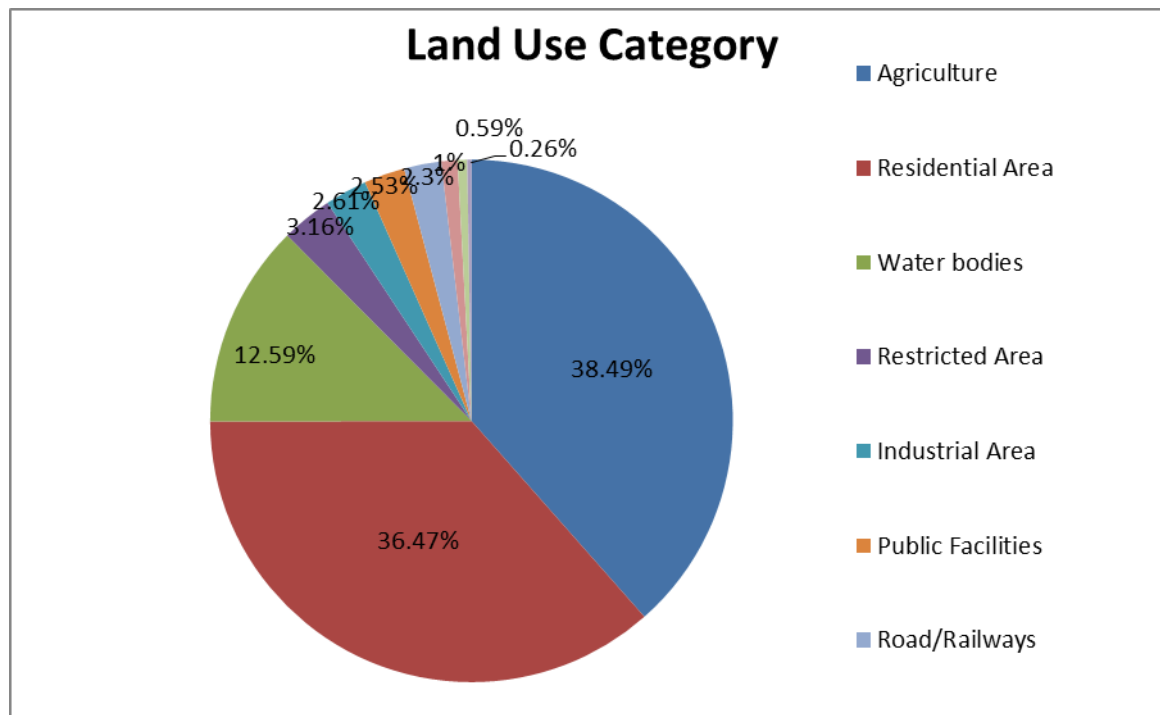
Figure-2.3 Detailed Land Uses in RAJUK Area, 2013

2.13 Conclusion

Urban Area Report of Population and Housing Census 2011 show that, 28 percent of Bangladesh's current population currently lives in urban areas. Of this urban population, more than half lives in the four largest cities: Dhaka, Chittagong, Khulna and Rajshahi. With a population of almost 15 million, Dhaka is the capital and largest city in Bangladesh and 11th largest city in the world (United Nations, 2016). At the same time, it is consistently ranked as one of the world's least livable city. Although income growth is higher and the poverty incidence is lower than the rest of Bangladesh, Dhaka still is a low income city with large numbers of poor when compared with most megacities of the world. Holding the prospects for better income opportunities than most parts of Bangladesh, rapid migration is causing Dhaka's population to grow much faster than the rest of the country. This fast urbanization is putting pressure on the city's limited land, an already fragile environment, and weak urban services. The population density is now believed to have reached around 45000 people per square kilometer at the core area of DMC, making Dhaka amongst the most densely populated city in the world.
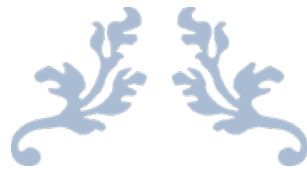
CHAPTER 3

Population Density and Distribution

3.1 Introduction

Population distribution of the country is not evenly distributed mainly due to the physiographic setting of the country and urbanization. Two large (considering area) districts of the country are Rangamati and Bandarban, but these districts have sparsely distributed population and the population of the area is also very small in size due to hill topography and less accessibility. On the other hand, Dhaka is centrally located. Dhaka District accommodates huge number of population (10% of the total population) and it is possible due to flat land with high fertility and strong magnetic attraction of people to the capital city. Dhaka exhibits the highest concentration of people compared with other districts of Bangladesh.

Table-3.1 Population of four big cities of Bangladesh in 2001 and 2011

City Name	Status of the City	Population in 2001	Population in 2011
Dhaka	Megacity	9672763	14171567
Chittagong	SMA	2991723	3724433
Rajshahi	SMA	651062	679889
Khulna	SMA	1172831	1046341

Source: Urban Area Report 2011, Vol. 3, BBS.

Dhaka, an obscure village settlement during the 8th & 9th centuries became a regional capital in 1947 with 336000 inhabitants. With at least four hundred years of vibrant and well recorded urban history, Dhaka the 'Political Centre of Newborn Bangladesh was world's first megacity in a 'least developed country in 2001 with 1 million citizens (Bertuzzo, 2009). Dhaka is the capital of Bangladesh is currently the world's 11th most populated Megacity (World Urbanization Prospects 2014, United Nations). Its existence as the largest city in the present Bangladesh region has been consistent over a period of nearly 400 years. In 2010, when Dhaka was all set to celebrate its 400 years anniversary as capital, the United Nations Human Settlements Programme (UN-HABITAT) ranked Dhaka as the 9th largest megacity of the world in terms of the size of its population. UN-HABITAT has also projected that Dhaka would became the 4th largest megacity of the world with a staggering population of

22015000 by 2025. The earlier population growth trends of Dhaka were also similarly stunning like the present as well as future trends as estimated by UN-HABITAT.

Table-3.2 Division wise Population Density

Division	Density 2011	Density 2001	Density 1991
Barisal	630	599	547
Chittagong	838	719	608
Dhaka	1521	1260	1054
Khulna	704	660	569
Rajshahi	1018	902	783
Rangpur	975	848	735
Sylhet	784	630	537
Bangladesh	976	842	720

Source: Population and Housing Census 1991, 2001 and 2011, BBS

Being the country's biggest hubs of commerce, administration, industries, education and cultural activities and has thus been receiving primary impulses for its steady growth. In the recent years, such impulses were created by various other factors, like over populated ailing rural areas that surround the city, concentrated capital investment and structural change in the economic order. As a result, Dhaka has been growing at a rate faster than the other cities of the region (Islam, 2005). At present, the population of Dhaka City is so high that it cannot be Rank Size Ruled with other cities of the country. Rather it is called a Primate City (E.A. Zohra, (1993). In fact, during the last two to three decades, Dhaka becomes a 'Mecca' for the vast number of rural out migrants of the country. As a result, Dhaka records a very high percentage of migrant population (Mahbub and Islam, 1990). Four districts within which Dhaka Megacity is located shows the following density of population (Table 3.3).

Table-3.3 District wise Population Density

District	Population 2011	Population 2001	Density 2011	Density 2001	Rank
Gazipur	3403912	2031891	1884	1167	4
Narsingdi	2224944	1895984	1934	1662	3
Narayanganj	2948217	2173948	4308	3161	2
Dhaka	12043977	8511228	8229	5831	1

Source: Population and Housing Census 1991, 2001 and 2011, BBS
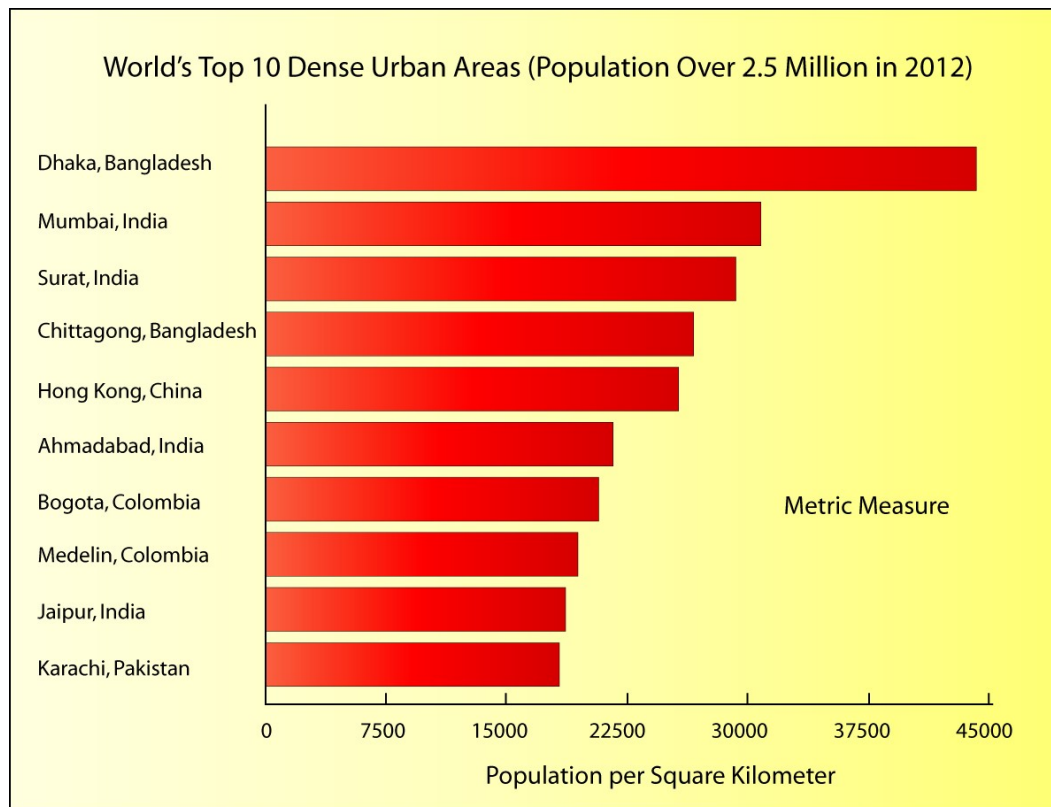
Figure-3.1 World Top Ten Densely Urban Centers

Source: Demography, World Urban Areas, 2013

This chapter is going to focus on population distribution and density of Dhaka Megacity as a whole as well as different part of the city such as Wards, Unions, DMA and Dhaka City Corporation. For the convenience of analysis in this study, city fringe (within DMA) area and ward population is denoted by urban and union (out of DMA) population is termed as rural.

3.2 Evolution of Population of Dhaka Megacity

Like many historical cities of the world, Dhaka, with its geographical centrality, strategically advantageous position and geo-hydrographical superiority along with its excellent communication networks in water and land with the other parts of the country and beyond, had all the potentiality to become one of the major cities in the region (Khan, 2011). Dhaka is the capital of the country located in a strategically central geographical position that accommodates about 10% of the nation's population. United Nations assessment, Dhaka was the 31st largest city in the world in 1985. In the year 1990, Dhaka was rank as the 24th largest megacity of the world. According to World Urbanization Prospects 2014 published by the United Nations, the population of Dhaka is now the 11th largest megacity. It also forecasts that Dhaka will be the 6th largest Megacity of the world with a population of 27.37 million in 2030 (RAJUK, 2015). Dhaka became the Mughal capital in 1610 and the first census was conducted in 1872. Regarding the population of Dhaka City, different historians and travelers have varying assumptions. Many fluctuations are found in population figures within that period. Becoming the capital in 1610 changed the history of population structure and character for Dhaka. Abdul Karim mentioned the population of that time as 100000 to 125000 people in his Dhaka the Mughal capital (pp44-45). In *Dhaka: Past Present Future* book the writer mentioned that Sebastian Manrich stated there were about 200000 populations in Dhaka city in 1640.

The regime of Shayesta Khan is called the Golden Age (1666 - 1688), when 900000 to 100000 people lived here. Dhaka lost the glory of capital in 1765 as British left and result was a decline in population to 450000 (Rennell's Letters) (Dhaka Etihash O Nagar Jeebon edited by Sharif U Ahmed, Page 18). According to James Taylor's census, Dhaka had 200000 pupils in 1800 and 68038 people in 1838 (Islam and Hasan, 2010). Comparing the population of Dhaka City during nineteenth century from 1801 gives a complete picture of rise and fall in numbers of inhabitants. In between 1801 to 1840 places like Narinda, Faridabad, Wari and Ajamganj became vacant where once population density was highest.

During the census of Henry Walter in 1830 population was 75000 and in 1838 it became only 68610. According to a land revenue survey, Dhaka had a population of 51636 in 1859. In 1868 the vice chairman George Bellet assumed minimum 60,000 persons in Dhaka Municipality. The first Government population census recorded 69212 people in 1872. The rising population of Dhaka was purely reflected in the census of 1881 giving 79076 persons. That's more than 14% increase in a decade.

Municipality Commissioners minimized the administrative boundary of Dhaka city, which gave a population of 77661 people. In 1891, population became 83633 meaning a rise of above 7% during this time and in 1901, it stood at 90000. That increase was due to natural causes and in migration (Ahmed, 2010).

In 1901, Dhaka had a population of 90542. In the next two decades in 1911 and 1921, the city experienced a slow growth (Table 3.4). The rate of the city's population growth took a momentum during 1931 - 1941 with an average rate of 4.41 percent per annum. After the partition of British India and the creation of Pakistan in 1947, Dhaka was made the capital of the province of East Bengal. Immediately after 1947, population of Dhaka recorded a very slow growth due to migration of many native Hindus, despite influx of Indian Muslims to Dhaka; its net population increase by 1951 was small but began to grow significantly in the 50s due also to internal migration from other parts of the province. In 1951, the population of Dhaka City was 411279 but it grew to 718766 in 1961 recording an annual growth of 5.74 percent during 1951 - 61.

In 1974 Dhaka's population grew to 2068353 with an annual growth rate of 11.15 percent during 1961 - 74 due mainly to rural to urban migration and territorial expansion of the census limits. In 1981, the population of the city (DSMA) increased to 3440147 persons, which recorded an annual growth rate of 5.22 (1974 - 81). According to the census of 1991, the population of Dhaka (expanded DSMA or Dhaka Megacity) was 6487459, with an annual growth rate of over 6 percent (BBS, 1994). The population of the same area of DSMA or Dhaka Megacity was found to be 10076079 in the 2001 census. In 2011 the population of the city increased to 14703859 persons.

Table-3.4 Population of Dhaka City, Male-Female since 1872 to 2011

Year	Male	Female	Total Population	Growth Rate
1872	37395	31817	69212	
1881	41703	37373	79076	1.34
1891	45199	37122	82321	0.40
1901	50263	40279	90542	0.96
1911	63091	45460	108551	1.83
1921	67333	52117	119450	0.96
1931	79365	59153	138518	1.49
1941	123156	90062	213218	4.41
1951	256087	155192	411279	6.79
1961	435681	283085	718766	5.74
1974	1197078	871275	2068353	11.15
1981	2001488	1438659	3440147	5.22
1991	3618762	2868697	6487459	6.55
2001	5620684	4455394	10076079	4.50
2011	7990677	6713182	14703859	3.85

Source: Compiled by the researcher after Islam N. 2010, Janabinnas: Nari o Nagar, (ed) Amin, S.N. Dhaka Nagar Jibone Nari. Bangladesh Asiatic Society, and BBS Census 2001 and 2011.

Systematic record of the population of Dhaka City is available since 1872 when the first official census was taken (Table 3.4). It shows that in every census Dhaka's population is gradually increased.

3.3 Distribution of Population in Dhaka Megacity

Dhaka is the only megacity of Bangladesh. The population of this megacity was always high in contrast to the other cities of this country though there were variations in population from time to time. The population of this megacity is not evenly distributed and the city experienced both spatial and temporal variations of population. Variation of population can be seen according to wards and

unions. Uneven distribution of population can be seen within urban and within rural areas of this megacity. In 2001, the highest accumulation of population in ward was 6598024 and 3478055 in union, whereas in 2011 it became 8771590 in ward and 5932269 in union (Table 3.5). The variations in population distribution caused by many factors, such as physiographic of the megacity, scope of economic activities, social security and so on.

Table-3.5 Temporal Variation of the Population of Wards and Unions of Dhaka Megacity

Year	Population			Percentage%	
	Total	Ward	Union	Ward	Union
1961	718766	495367	224399	69	31
1974	2068353	1647138	421215	80	20
1981	3440147	2816805	623342	82	18
1991	6487459	4232034	2255425	65	35
2001	10076079	6598024	3478055	65	35
2011	14703859	8771590	5932269	60	40

*New paurashava and City corporation ward of 2011 are enumerated as ward in 2001 for this research
Source: Population and Housing Census, BBS 2011

Rural population within the megacity (i.e. population counted under unions within the megacity boundary) was about 47% while urban population (i.e. population living within wards) was 53% in 2001 Census and 27% rural and 73% urban in 2011 Census. This distribution also varies from urban to urban, rural to rural, and even ward-to-ward. In most of the cases, the total population increases significantly in between 2001 to 2011 in each administrative area (Table 3.6). Following data and graphs (Maps 3.1 and 3.2) show the administrative area based population distribution of the megacity.

Table-3.6 Population Distributions in Major Administrative Regions (2001- 2011)

Major Administrative Region	Population 2001	Population 2011
North DCC	2881180	3956302
South DCC	2652245	3013803
Urban Union (within DMA+Cant.)	1191226	1980801
Paurashava	1064599	1801485
Rural Union (outside DMA)	2286829	3951468
Dhaka Megacity	**10076079**	**14703859**

Source: BBS 2001 and 2011

The boundary of Dhaka Megacity is changing ever since the independent in 1971. Even in between a census interval of 10 years brings many changes with boundaries as wards pass onto different *thana*s. This trouble requires a certain time line for the consideration of comparing changing dynamics of population of Dhaka City, which was solved through the contemplation of 2011 as base year. Population distribution is shown in Maps 3.1 and 3.2 with dot density for 2001 and 2011. Here, 1 dot = 1000 persons. Maps show that the population concentration in urban wards was high compared with unions within and outside DMA areas. The older part of the city wards exhibited the highest concentration. Concentration of markets, education institutions, and residential places etc. seemed to be the main reasons for high and low density of population. Density remains very high within DCC areas of the megacity, after that Narayanganj, Tongi, Savar *paurasavas* and Dhamsana union showed second highest density. Outside the above densely populated areas, population concentration remains relatively low and these areas are mostly unions which located at the urban fringe zones of the megacity. Within DMA, Biman Bandar *thana* and cantonment areas showed a relatively low density which was obvious as these areas were not predominantly residential area. The population of this megacity is also changing very rapidly. The total population

got its high momentum after the independence of the country in 1971. In 1974, the total population of the megacity was 2 million. In 2001, the number of population was 10.08 and in 2011 Census the figure reached to 14.70 million (Table 3.4).

Map-3.1 Population Distribution of Dhaka Megacity in 2001

Map-3.2 Population Distribution of Dhaka Megacity in 2011

3.4 Population Density of Dhaka Megacity

As stated in earlier section that the density of population within Dhaka Megacity varies greatly from the core of the city to its periphery. Using shed method Maps 3.3 and 3.4 clearly displayed these more closely. On an average, the density of the megacity was 6,945 and 10,135 persons per km^2 in 2001 and 2011 censuses respectively (Table 3.12). Areas under urban administration (i.e. ward, *Paurashava*, City Corporation, cantonment etc.) exhibited a high density as compared with rural administrative areas like unions which mostly located at the peripheries of the main/core urban areas (Maps 3.3 and 3.4). Besides urban and rural administration, the reasons for differential density between urban and rural regions of the megacity can also be explained by physiographic conditions of the respective areas as well as economic and socio-cultural background of the regions.

A close look into the Map 3.3 and Table 3.7 shows that 16 wards out of 160 exhibited a super high density (more than 100,000 person's km^2). Almost all of these wards (15 out of 16) are located within the DSCC and only remaining one ward (ward no 12 see Map 3.3) is located at Tongi *Paurashava*. Among these 16 wards, ward no 12 of Tongi *Paurashava* recorded the highest density (4.6 *lakhs* people km^2) in 2001 Census (Table 3.10). The reason behind this hyper density in this small ward (ward no 12) is the extremely high concentration of slums and low class residence areas along with very high concentration of industrial laborers who usually work nearby the Tongi industrial zone.

In 2011 Census the density of inhabitants within the DMC region increased further and the patterns of population concentration remains almost the same as stated in 2001 Census. However, in 2011 Census there were 17 wards mostly within DSCC are termed as super high density (Map 3.4). Ward no 12 of Tongi *Paurashava* again ranked the highest density which exceeded over 5 *lakhs* persons km^2 (Table 3.10).

Low density areas within DMC are mostly seen in fringe areas. In 2001, 96 ward/union had density less than 10000; in 2011, this number reduced to 80 (Maps 3.3, 3.4, Table 3.8). Lowest density is observed in the Biman Bandar *thana* in both the decades (Table 3.11). In this *thana* residential area is scarce; density is very low because of custom house, *godown* and empty space etc.
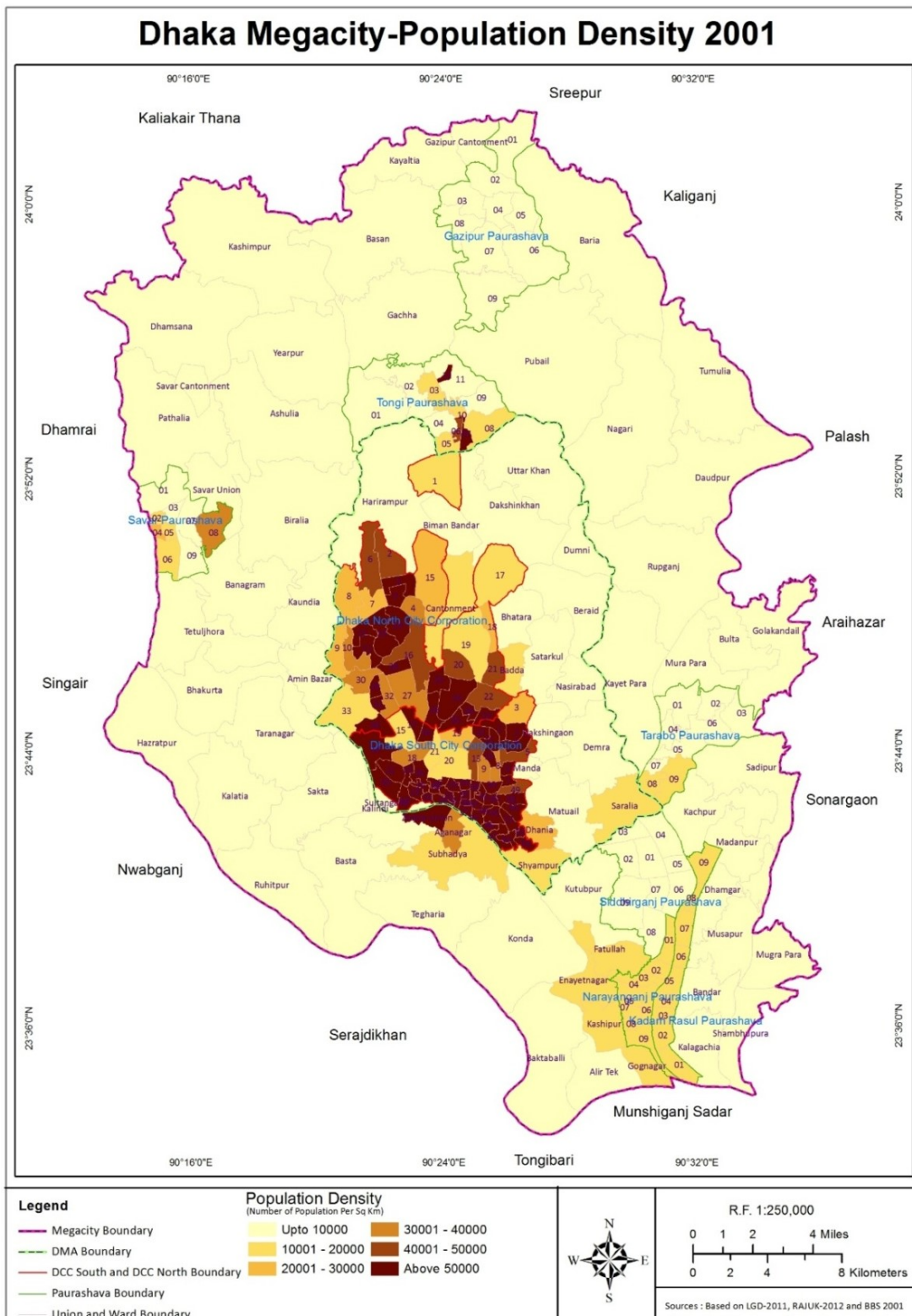
Dhaka Megacity-Population Density 2001

Legend

— Megacity Boundary
-·-·- DMA Boundary
— DCC South and DCC North Boundary
— Paurashava Boundary
— Union and Ward Boundary

Population Density
(Number of Population Per Sq Km)

Upto 10000	30001 - 40000
10001 - 20000	40001 - 50000
20001 - 30000	Above 50000

R.F. 1:250,000

0 1 2 4 Miles
0 2 4 8 Kilometers

Sources : Based on LGD-2011, RAJUK-2012 and BBS 2001

Map-3.3 Population Density of Dhaka Megacity in 2001
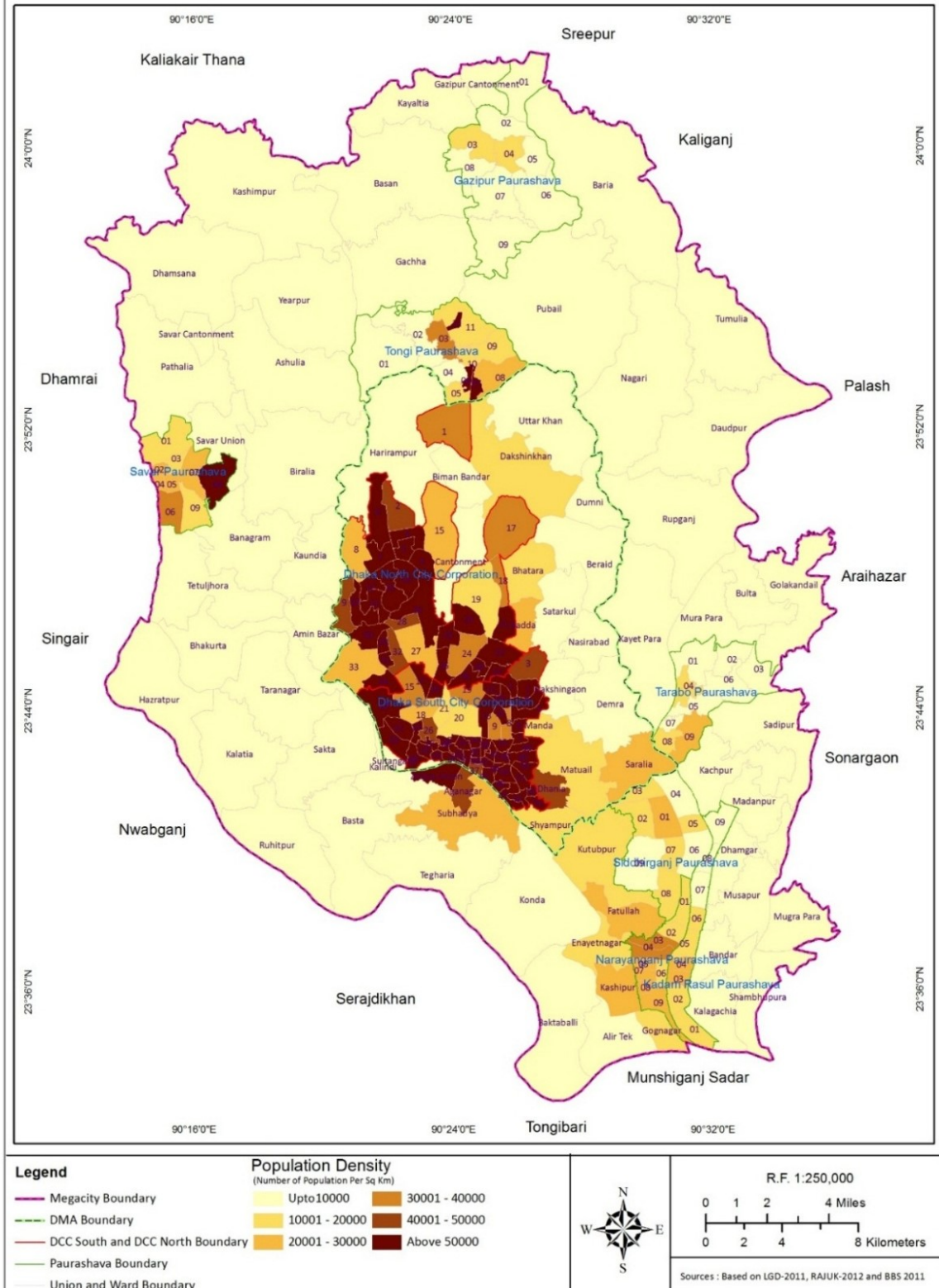
Map-3.4 Population Density of Dhaka Megacity in 2011

Table 3.7 displays the distributions of wards and unions according to density of inhabitants in 2001 and 2011 censuses. It has been observed that in most cases, high density areas were located within urban wards and rural unions were found to have lesser density of people in both censuses.

Table-3.7 Population Density of Dhaka Megacity by Ward and Union in 2001 and 2011

Density Classes	2001		2011	
	No. of Ward	No. of Union	No. of Ward	No. of Union
Up to 10000	34	62	24	56
10000-20000	34	9	26	8
20000-30000	8	1	18	5
30000-40000	9	1	12	
40000-50000	10		7	2
Above 50000	63	1	73	1
Total ward/union	158	74	160	72

Over the period of time, the density of population in wards/unions of DMC has been increasing and this has been clearly demonstrated in Tables 3.7, 3.8, 3.9 and Fig. 3.2 and 3.3. In these illustrations the patterns of density variations between two censuses i.e. 2001 Census and 2011 Census are closely examined with a view to find out the spatial or zonal patterns of population concentration over the DMC area. The average density of inhabitants within DMC has increased to 10135 persons per km^2 in 2011 Census from 6945 persons per km^2 in 2001 Census. In percentage term, the variation increased to 46% (45.93%) over the census decade (Table 4.5). This is obviously a huge increase of population. However, ward/union wise density of inhabitants varies from below 500 persons per km^2 to over 5 *lakhs* (588580 people, see Table 3.10) per km^2 in 2011 Census. Number of wards/unions having more than 50,000 inhabitants per km^2 was 64 in 2001 Census and 74 in 2011 Census (Table 3.8). On the other hand, the number of ward/union having less than 10,000 people has decrease to 80 in 2011 Census from 96 in 2001 Census (Table 3.8). The average density of 74 super high density wards/unions were found 79640 people per km^2 (Table 3.8) indicating that about one-third (31.90% or 74 wards/unions out of 232, see Table 3.8) of DMC's total wards/unions

recorded very high population density in 2011 Census year. It is also observed that most of the super high densely inhabited wards/unions are located within DSCC and DNCC (see Maps 3.3 and 3.4).

Table-3.8 Percentage Distribution of Population Density of Dhaka Megacity by Ward and Union in 2001 and 2011

Density Classes	Number of Union/Ward 2001	Number of Union/Ward 2011	Percentage of Union 2001	Percentage of Union 2011
Up to 10000	96	80	41.38	34.48
10000-20000	43	34	18.53	14.66
20000-30000	9	23	3.88	9.91
30000-40000	10	12	4.31	5.17
40000-50000	10	9	4.31	3.88
Above 50000	64	74	27.59	31.90
Total	232	232	100	100
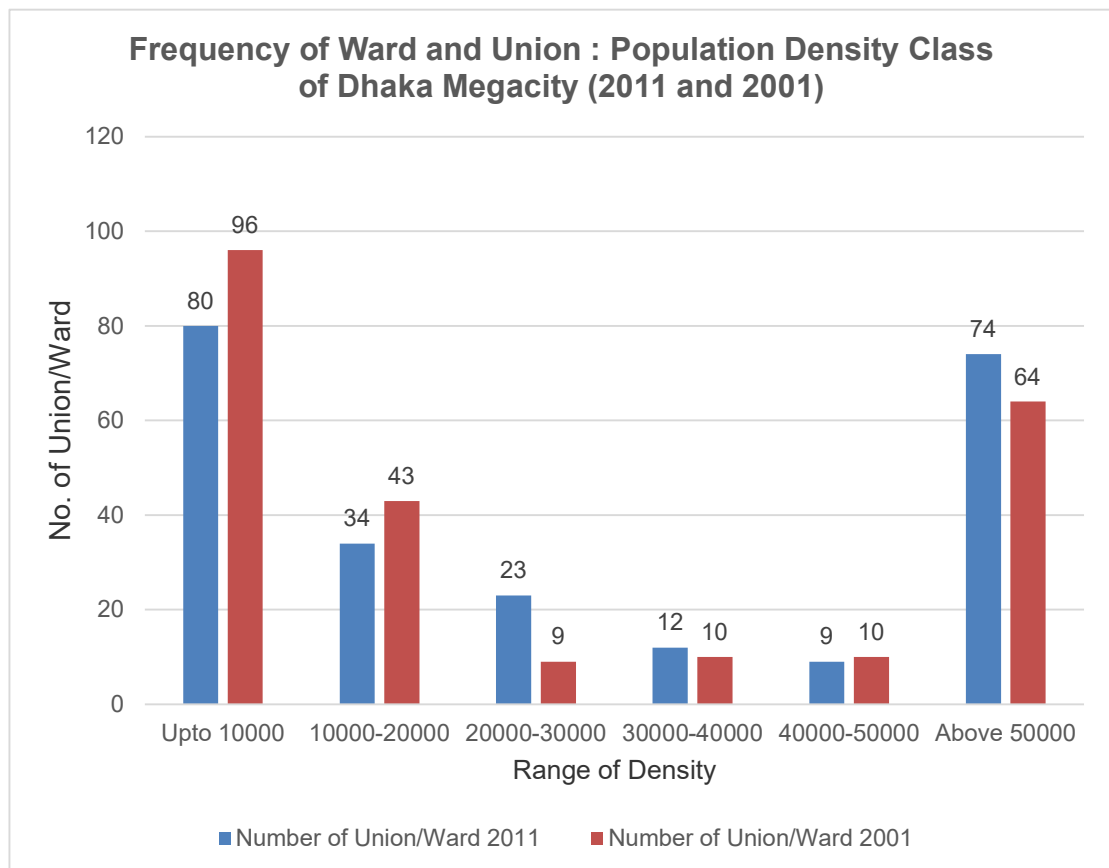
Figure-3.2 Population Density by Ward and Union of DMC in 2001 and 2011

Table-3.9 Class wise Average Population Density and Range of Density in DMC, 2001 and 2011

Density Range	Average Density 2011	Average Density 2001	Density Range-2011	Density Range-2001
Up to 10000	3367	2341	192-9804	69-9834
10000-20000	15062	13397	10980-19871	10054-19881
20000-30000	23883	23713	20495-29921	20691-28023
30000-40000	32966	33571	30049-36352	30011-39620
40000-50000	46704	45379	40378-49793	41181-48764
Above 50000	79640	71448	52622-588580	50613-460189
DMC	10135	6945	192-588580	69-460189
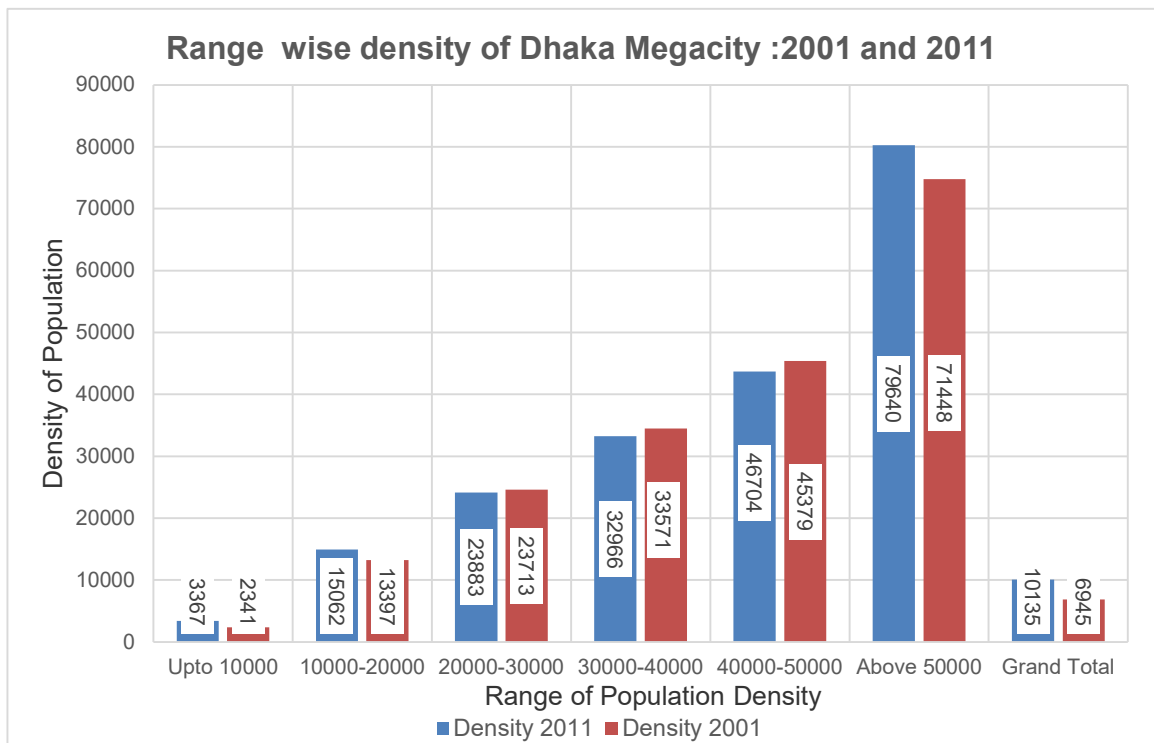
Figure-3.3 Range wise Density and Range of Density of DMC, 2011 and 2001

Table-3.10 Top ten Wards and Unions having High Population Density in DMC, 2001 and 2011

Thana Name	Ward/ Union as 2011	Rank 2011	Density 2011	Thana Name	Ward/ Union as 2001	Density 2001	Rank 2001
Tongi	Tongi Psa-Ward 12	1	588580	Tongi	Tongi Psa-Ward 12	460189	1
Bangshal	DSCC-33	2	210610	Kotwali (Dhaka)	DSCC-36	204679	2
Kotwali/ Bangshal	DSCC-35	3	200529	Kotwali/ Bangshal	DSCC-35	203293	3
Kotwali (Dhaka)	DSCC-36	4	187136	Bangshal	DSCC-33	200126	4
Kotwali/ Bangshal	DSCC-32	5	164305	Kotwali/ Bangshal	DSCC-32	177195	5
Lalbagh	DSCC-24	6	158262	Lalbagh	DSCC-24	151817	6
Sabujbagh	DSCC-7	7	145790	Chak Bazar	DSCC-28	142217	7
Chak Bazar	DSCC-28	8	136978	Chak Bazar	DSCC-29	129070	8
Bangshal	DSCC-34	9	136822	Bangshal	DSCC-34	128735	9
Sabujbagh	DSCC-6	10	134415	Sutrapur	DSCC-43	117517	10

Table-3.11 Bottom ten Ward or Union having Low Population Density in DMC, 2001 and 2011

Thana Name	Union as 2011	Rank 2011	Density 2011	Thana Name	Union as 2001	Rank 2001	Density 2001
Biman Bandar Thana	Biman Bandar (rest. Area)	1	192	Biman Bandar Thana	Biman Bandar (rest. Area)	1	69
Gazipur Sadar Upazila	Gazipur Psa- Ward 02	2	553	Gazipur Sadar Upazila	Gazipur Psa-Ward 02	2	331
Gazipur Sadar Upazila	Baria	3	734	Rupganj Upazila	Tarabo Psa-Ward-02	3	749
Kaliganj (Gazipur)	Nagari	4	1005	Gazipur Sadar Upazila	Baria	4	756
Gazipur Sadar Upazila	Gazipur Psa- Ward 06	5	1095	Savar	Biralia	5	788
Kaliganj (Gazipur)	Tumulia	6	1291	Gazipur Sadar Upazila	Gazipur Psa-Ward 06	6	891
Savar	Biralia	7	1367	Kaliganj (Gazipur	Nagari	7	901
Rupganj	Daudpur	8	1499	Tongi	Tongi Psa-Ward 01	8	966
Rupganj	Rupganj	9	1616	Savar	Yearpur	9	972
Gazipur Sadar Upazila	Pubail	10	1670	Gazipur Sadar Upazila	Pubail	10	1127

3.5 Population Density of Major Administrative Region in Dhaka Megacity

This section of the thesis displays the density patterns of the major six administrative regions of Dhaka Megacity. These are- DNCC, DSCC, *Paurashava*, DMA, unions inside and outside DMA. Table 3.12 and Fig. 3.4, and 3.5 show the overall population density patterns within these administrative zones of Dhaka Megacity (DMC). Data analyzed in these illustrations clearly indicate that the density remains uneven within the DMC and it varied from one

administrative area to another. DSCC exhibited the highest density 60292 and 68511 persons per km^2 in 2001 and 2011 census year respectively (Table 3.12) and it is followed by DNCC within which the density recorded 34957 and 48002 persons per km^2 in 2001 and 2011 censuses. After city corporations, *paurashava* towns recorded the second highest density as seen in Table 3.12. On the other hand, density remained considerable low in the periphery unions of DMC and in this case unions attached to DMA recorded higher density as compared with the unions locating outside the DMA area (Table 3.12). Fig. 3.4 and 3.5 illustrated the same findings more closely along with showing the density ranges and average density for each range in the consecutive two censuses (i.e. 2001 and 2011). The average density of inhabitants within the entire DMC area also significantly increased to 10135 persons per km^2 in 2011 Census from 6945 persons per km^2 in 2001 Census.

Table-3.12 Population Density of Major Administrative Regions in DMC, 2001 and 2011

Administrative Regions	Density-2011	Density-2001	Density Range-2011	Density Range-2001
North DCC	48002	34957	18553-92187	11221-81786
South DCC	68511	60292	17186-210610	18498-204679
Union Within DMA	9395	5603	192-46956	69-26220
Paurashavas	11241	6643	553-588580	331-460189
Union Outside DMA	4171	2425	734-62847	756-50613
Dhaka Megacity	**10135**	**6945**	**192-588580**	**69-460189**
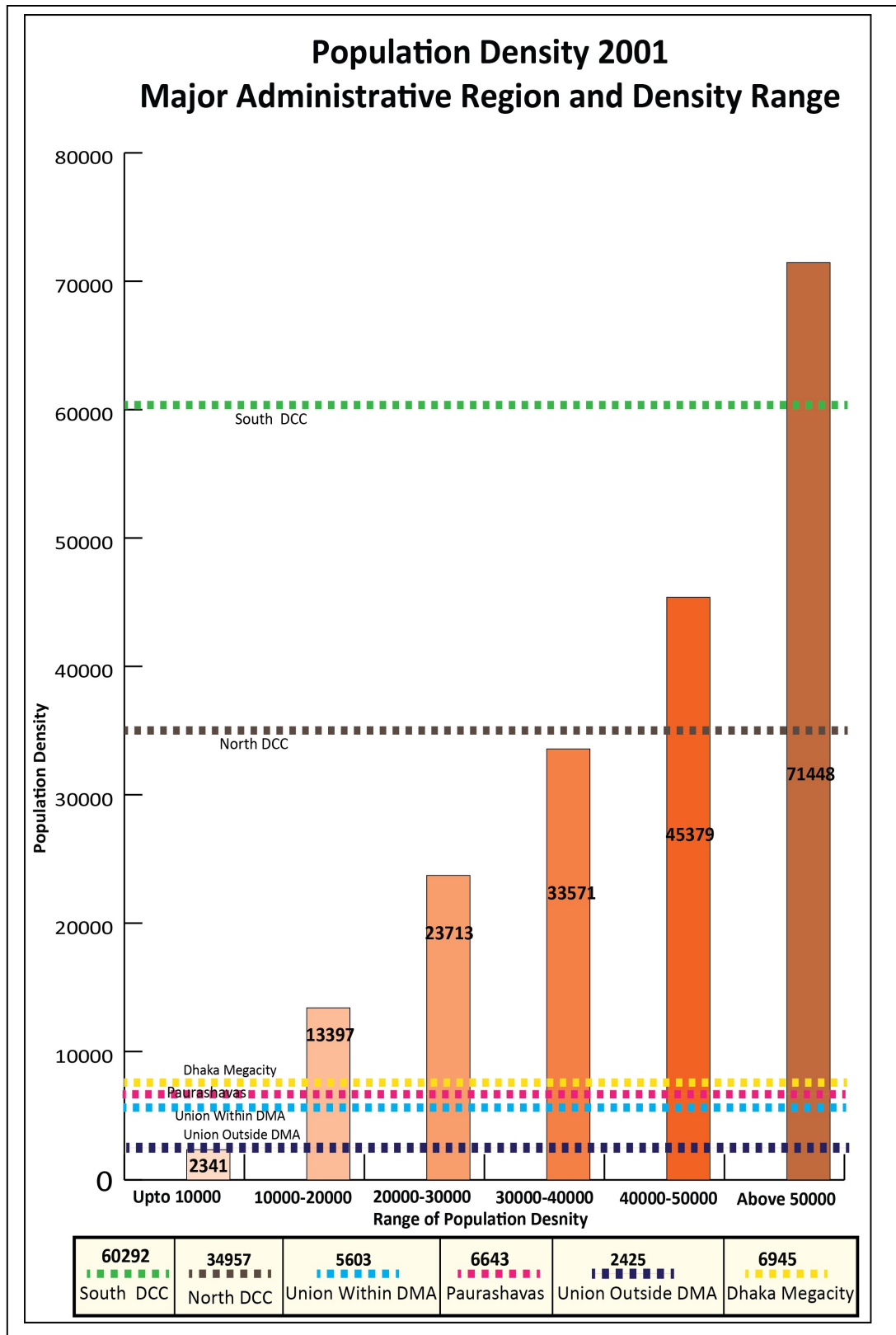
Figure-3.4 Population Density Patterns of Major Administrative Region in Dhaka Megacity, 2001

Population Density 2011
Major Administrative Region and Density Range
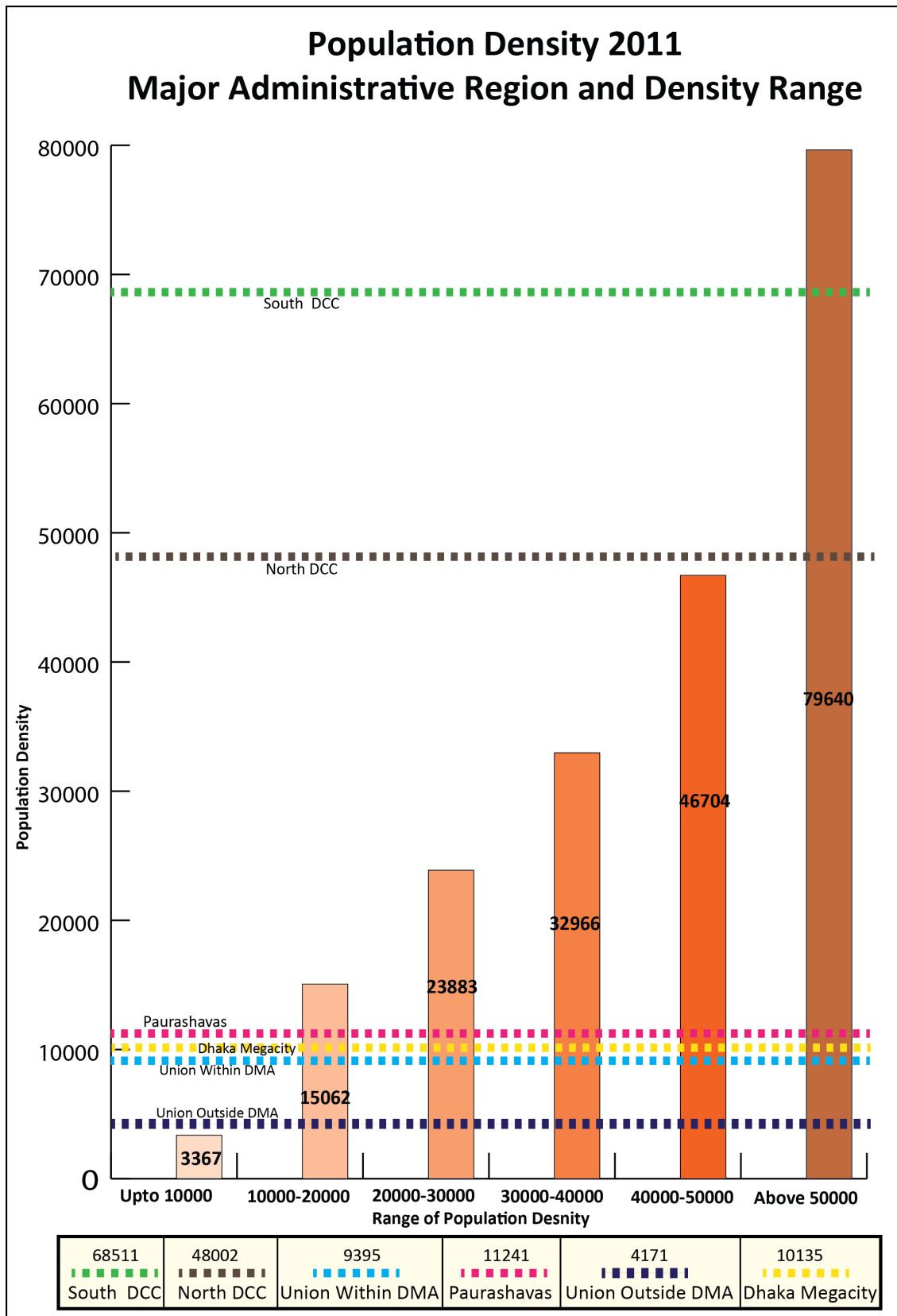
Figure-3.5 Population Density Patterns of Major Administrative Region in Dhaka Megacity, 2011

3.6 Population Density of Urban Area in Dhaka Megacity

As stated earlier that within DMC, there are two administrations- urban consisting *thanas* and wards and rural consisting *upazilas* and unions. In this sub-section of the thesis, the density patterns of people living within the city corporations, *paurashavas* and cantonments are closely analyzed. The urban built up area within Dhaka Megacity is by far the most densely populated urban area in the world. The highest density recorded within DMC is located at the centre of Dhaka City i.e. DSCC and DNCC. The average density recorded within these two city corporations was over 55,000 persons per km^2 in 2011. Unlike other districts, the overwhelming majority of the people of Dhaka District live in urban areas and most of them are within the city corporations. The level of urbanization of Dhaka District was 93%, 91.57% and 88.06% in the consecutive censuses 2011, 2001 and 1991. Map 3.5 and 3.6 clearly depict the concentration of urban population within the city corporations and *paurashavas*.

Areas/wards having more than 50,000 inhabitants per km^2 are mostly located within the two city corporations' zones. Of the top ten wards recorded super high density in 2001 and 2011 censuses, nine are located within the Dhaka City Corporations' zone (Table 3.13). All these 10 wards recorded well over 100,000 people per km^2 and some of them even much higher- over 200,000 per km^2 (see Table 3.13). Ward no 12 at Tongi *Paurashava* exhibited a hyper density- over 500,000 people per km^2 in 2011 Census. Here hundreds of thousands of industrial workers are living like the nest of ants.

Urban wards having low density of population are usually locating at the periphery of the city corporations and *paurashavas* (see Maps 3.5 and 3.6). Table 3.14 displayed the bottom ten wards having low density of people in 2001 and 2011 census years. Density within these wards recorded mostly between 1000 to 2000 people per km^2. However, the number of wards and unions having low density of people are few as compared to the counterpart high density wards/unions (see Table 3.15 and Fig. 3.6). The overwhelming majority (over 80%) of the wards/unions within the DMC recorded over 10,000

people per km^2 and over one-third (35.2%) of the wards/unions recorded over 50,000 people per km^2 (Table 3.15).

Map-3.5 Population Density of Urban Areas in Dhaka Megacity, 2001

Map-3.6 Population Density of Urban Areas in Dhaka Megacity, 2011

Table-3.13 Top ten Ward having High Population Density in Urban Area, 2001 and 2011

Ward/Union in 2001	Density 2001	Rank 2001	Ward/Union in 2011	Density 2011	Rank 2011
Tongi Psa-Ward 12	460189	1	Tongi Psa-Ward 12	588580	1
DSCC-36	204679	2	DSCC-33	210610	2
DSCC-35	203293	3	DSCC-35	200529	3
DSCC-33	200126	4	DSCC-36	187136	4
DSCC-32	177195	5	DSCC-32	164305	5
DSCC-24	151817	6	DSCC-24	158262	6
DSCC-28	142217	7	DSCC-7	145790	7
DSCC-29	129070	8	DSCC-28	136978	8
DSCC-34	128735	9	DSCC-34	136822	9
DSCC-43	117517	10	DSCC-6	134415	10

Table-3.14 Bottom ten Ward having Low Population Density in Urban Area, 2001 and 2011

Ward/Union in 2001	Density 2001	Rank 2001	Ward/Union in 2011	Density 2011	Rank 2011
Biman Bandar (rest. Area)	69	1	Biman Bandar (rest. Area)	192	1
Gazipur Psa-Ward 02	331	2	Gazipur Psa-Ward 02	553	2
Tarabo Psa Ward-02	749	3	Gazipur Psa-Ward 06	1095	3
Gazipur Psa-Ward 06	891	4	Tarabo Psa-Ward-02	1682	4
Tongi Psa- Ward 01	966	5	Tongi Psa- Ward 01	1683	5
Tarabo Psa-Ward-03	1209	6	Dumni	1809	6
Dumni	1224	7	Gazipur Psa-Ward 09	1841	7
Gazipur Psa-Ward 09	1275	8	Tarabo Psa-Ward-03	2344	8
Harirampur	1822	9	Beraid	2407	9
Gazipur Psa-Ward 08	1831	10	Demra	2679	10
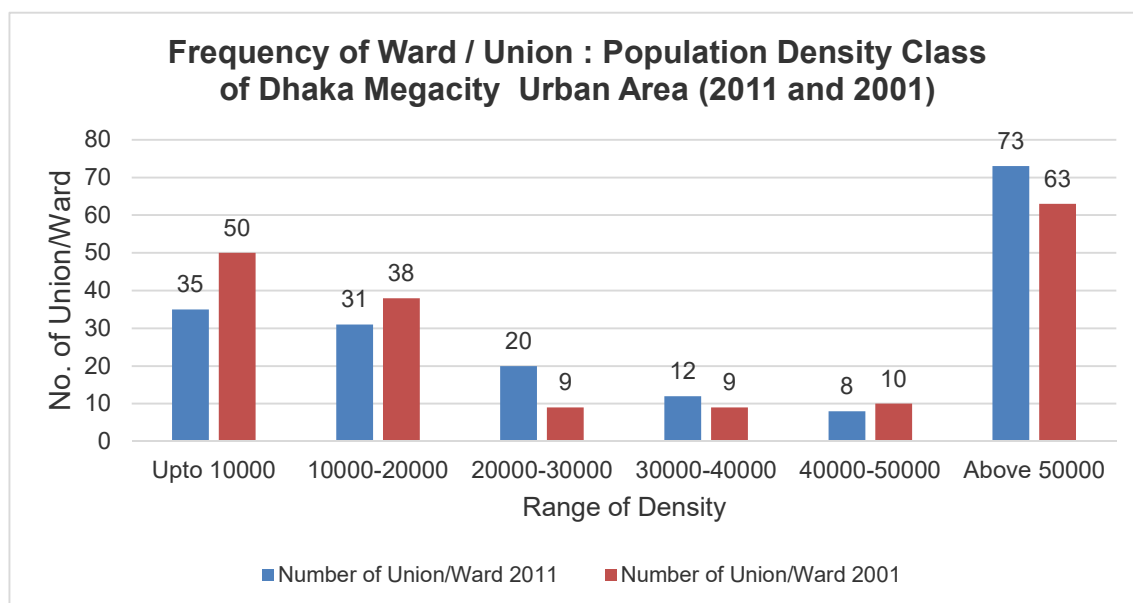
Figure-3.6 Population Density Class of Dhaka Megacity Urban Area in 2011 and 2001

Table-3.15 Class wise Population Density by Ward and Union and Percentage of Ward of Urban Area in 2011 and 2001

Density Classes	Number of Ward/Union 2011	Number of Ward/Union 2001	Percentage of Ward/Union 2011	Percentage of Ward/Union 2001
Up to 10000	35	50	19.55	27.93
10000-20000	31	38	17.32	21.23
20000-30000	20	9	11.17	5.03
30000-40000	12	9	6.70	5.03
40000-50000	8	10	4.47	5.59
Above 50000	73	63	40.78	35.20
Total no of Ward/Union	**179**	**179**	**100.00**	**100.00**

3.7 Population Density of Rural/Union (outside DMA) in Dhaka Megacity

As stated earlier that a large portion of DMC area is located outside the administration of city corporations and *paurashavas* and this vast periphery areas is administrated under *upazila* and union (see Map 3.7 and 3.8) though it is within the jurisdiction of DMC. The general density patterns of these peripheral zones are shown in Maps 3.7 and 3.8. The density of this fringe zone of DMC seems to be quite low as compared to urban built up zones. Within this vast fringe zone there are 53 unions which lie outside the DMA and the number of inhabitants lived in 2001 and 2011 censuses were 3478055 and 5932269 (Table 3.5) respectively indicating a very high growth of population (70.56% over the decade). The average density of people within this fringe zone was 2425 persons per km^2 in 2001 Census and it increased to 4171 people in 2011 Census i.e. over the decade the density increased to 72% (Table 3.12). Such result obviously indicates that the density of population within the fringe of DMC is increasing very rapidly, though it is quite low compared with the core areas of the megacity of Dhaka.

Further analysis of density data clearly indicates that the concentration of people appeared to be high in the north-western and south-western parts of the DMC fringe zones (Map 3.8) and this might be linked to rapid growth of industries and commerce to those regions. Table 3.16 and Fig. 3.7 closely analyzed the density patterns of the unions and it shows that over time higher density inhabited unions are rising quite significantly. This is quite obvious in the context of Dhaka City where residential lands become very scarce and migrants, particularly those are originating from lower middle and lower income groups are forcing to buy land or rent house in the fringes of the city.

Dhaka Megacity-Rural Area Population Density 2001

Kaliakair Thana

Sreepur

Kaliganj

Kayaltia

Basan

Gazipur Paurashava

Baria

Kashimpur

Gachha

Pubail

Dhamsana

Yearpur

Tumulia

Tongi Paurashava

Dhamrai

Pathalia(part)

Ashulia

Nagari

Palash

Savar Union

Daudpur

Biralia

Savar Paurashava

Rupganj

Banagram Union

Kaundia

Dhaka North City Corporation

Tetuljhora Union

Bulta Golakandail

Araihazar

Amin Bazar

Mura Para

Singair

Bhakurta

Kayet Para

Hazratpur

Taranagar

Tarabo Paurashava

Dhaka South City Corporation

Sadipur

Kalatia

Sakta

Kachpur

Sonargaon

Kalindi

Madanpur Union

Subhadya

Kutubpur Union

Dhamgar Union

Nwabganj

Ruhitpur

Basta

Tegharia

Siddhirganj Paurashava

Musapur Union

Konda

Farullah Union

Mugra Para

Enayetnagar Union

Bandar Union

Kashipur Union

Kadam Rasul Paurashava

Shambhupura

Serajdikhan

Baktaballi

Kalagachia Union

Alir Tek

Gognagar

Munshiganj Sadar

Tongibari

Legend

— Megacity Boundary	
--- DMA Boundary	
— Paurashava Boundary	
— Union Boundary	

Population Density
(Number of Population Per Sq Km)

756 - 2500	7501 - 10000
2501 - 5000	10001 - 20000
5001 - 7500	20001 - 60000

R.F. 1:250,000

0 1 2   4 Miles

0   2   4   8 Kilometers

Sources : Based on LGD-2011, RAJUK-2012 and BBS 2001

Map-3.7 Population Density of Unions within DMC (but outside DMA), 2001

Dhaka Megacity-Rural Area Population Density 2011

Kaliakair Thana

Sreepur

Kaliganj

Kayaltia

Kashimpur

Basan

Gazipur Paurashava

Baria

Dhamsana

Gachha

Pubail

Tumulia

Yearpur

Palash

Pathalia(part)

Tongi Paurashava

Nagari

Daudpur

Dhamrai

Ashulia

Savar Union

Biralia

Savar Paurashava

Rupganj

Banagram Union

Kaundia

Dhaka North City Corporation

Tetuljhora Union

Bulta Golakandail

Araihazar

Amin Bazar

Kayet Para

Mura Para

Bhakurta

Singair

Hazratpur

Taranagar

Dhaka South City Corporation

Tarabo Paurashava

Sadipur

Sonargaon

Kachpur

Kalatia

Sakta

Kalindi

Madanpur Union

Nwabganj

Ruhitpur

Basta

Tegharia

Kutubpur Union

Siddhirganj Paurashava

Subhadya

Dhamgar Union

Konda

Fatullah Union

Musapur Union

Mugra Para

Enayetnagar Union

Narayanganj Paurashava

Bandar Union

Serajdikhan

Kashipur Union

Kadam Rasul Paurashava

Shambhupura

Baktaballi

Kalagachia Union

Alir Tek

Gognagar

Munshiganj Sadar

Tongibari

Legend

- Megacity Boundary
- DMA Boundary
- Paurashava Boundary
- Union Boundary

Population Density
(Number of Population Per Sq Km)

734 - 2500	7501 - 10000
2501 - 5000	10001 - 20000
5001 - 7500	20001 - 70000

R.F. 1:250,000

0 1 2 4 Miles

0 2 4 8 Kilometers

Sources : Based on LGD-2011, RAJUK-2012 and BBS 2011

Map-3.8 Population Density of Unions within DMC (but outside DMA), 2011

Table-3.16 Population Densities by Unions outside of DMA Area in 2001 and 2011

Density Ranges	Number of Union 2011	Number of Union 2001	Percentage of Union 2011	Percentage of Union 2001
Up to 2000	19	33	35.85%	62.26%
2000-4000	20	11	37.74%	20.75%
4000-6000	4	1	7.55%	1.89%
6000-8000	2	1	3.77%	1.89%
8000-10000	3	5	5.65%	9.45%
Above 10000	5	2	9.43	3.76%
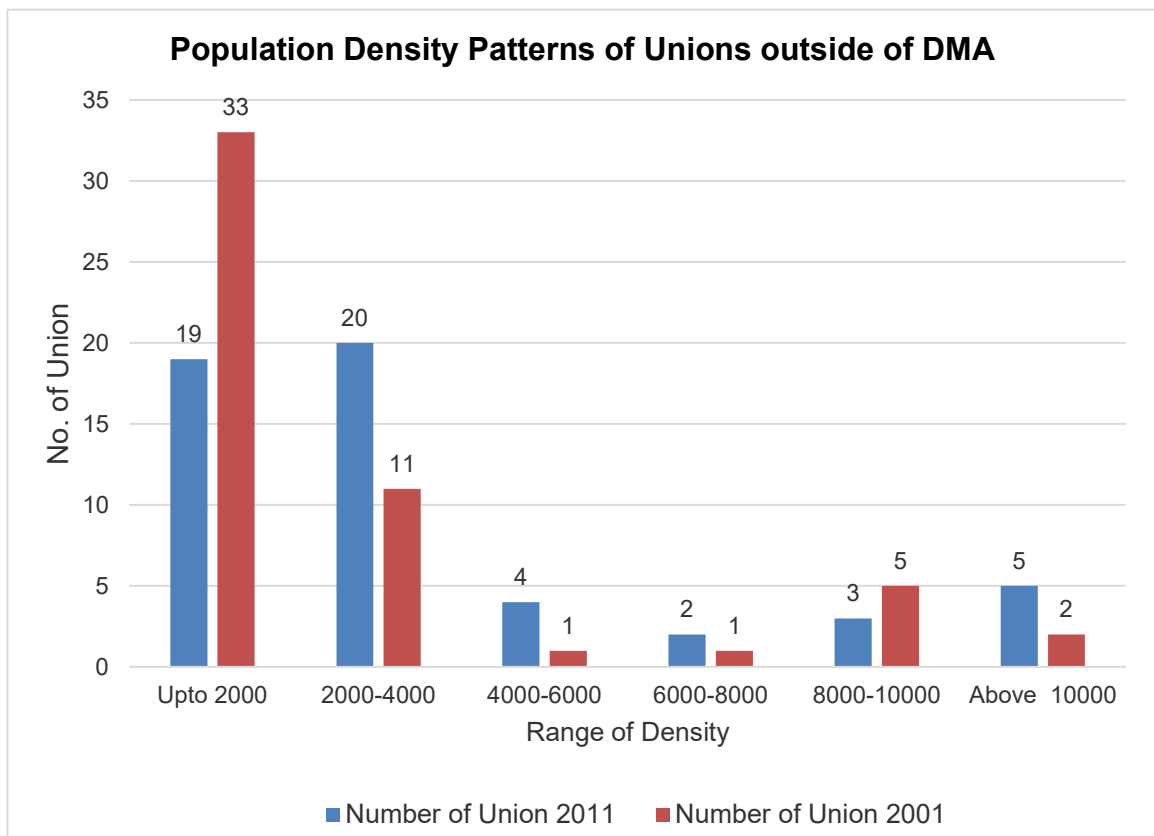
Figure-3.7 Population Density Patterns of Unions outside of DMA Area in 2011 and 2001

3.8 Population Density within DMA (Dhaka Metropolitan Area)

Dhaka Metropolitan Area (DMA) having 339.18 km^2 and 8950906 inhabitants in 2011 is basically a police administrative area consisting DSCC, DNCC, cantonments and a vast fringe area (under union administration) locating mostly in the eastern margin of the city. However, since June 2016 unions were incorporated within the two city corporations. This section of the dissertation provides a close look on the density of inhabitants within DMA.

Population density within DMA as shown in Maps 3.9 and 3.10 clearly indicates that the areas under city corporations have much higher density as compared with the areas under union administration i.e. fringe areas . On the other hand, DSCC where older part of Dhaka City is seated recorded higher density as compared with that of DNCC. The average density per km^2 recorded within DMA was 20116 and 26390 persons in 2001 and 2011 censuses respectively. On the other hand, the density within the city corporations (i.e. within wards under two city corporations) was much higher which is 55139 and 43774 persons per km^2 consecutively in 2001 and 2011. The density remains much higher in DSCC where it was 68511 persons per km^2 in 2011 and 60292 persons per km^2 in 2001. Density within DNCC rose to 48002 persons per km^2 in 2011 from 34957 persons per km^2 in 2001(Table 3.12).

It is also revealed that in most of the wards (over 60% see Map 3.9 and Table 3.17) the density exceeded over 50,000 people per km^2. In some parts (wards) of the city, the density was extremely high- over 100,000 persons per km2 and in a few words it was even over 200,000 persons per km^2 (see Table 3.18). These super high densely inhabited wards are located within DSCC. In fact all the top ten densely populated wards are located within DSCC (Table 3.18). Some important densely inhabited *thanas* within DSCC are- Bangshal, Chak Bazar, Kalabagan, Kotwali, Lalbagh, Motijheel, Sabujbagh, Shyampur and Sutrapur etc.
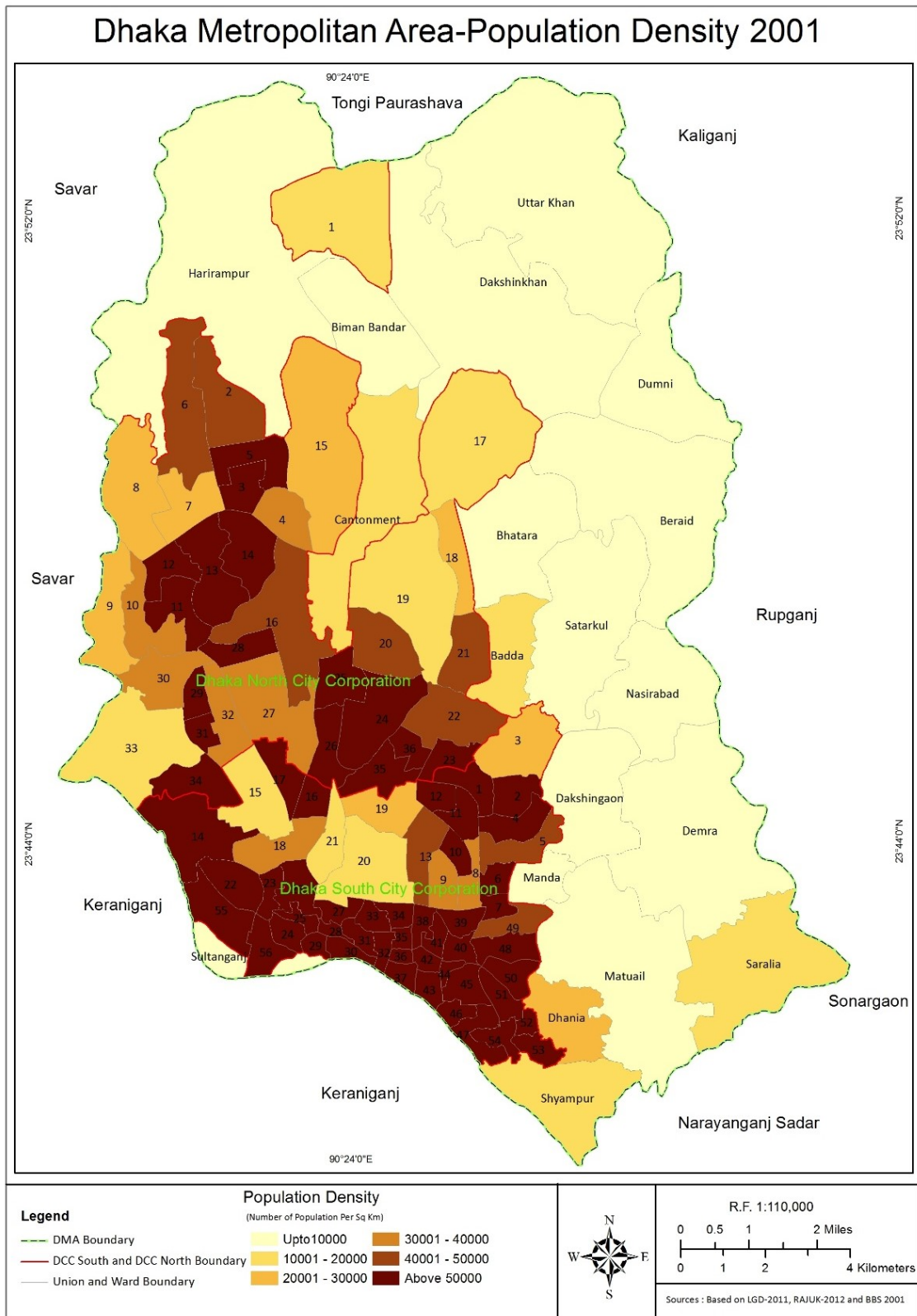
Map-3.9 Population Density of Dhaka Metropolitan Area in 2001
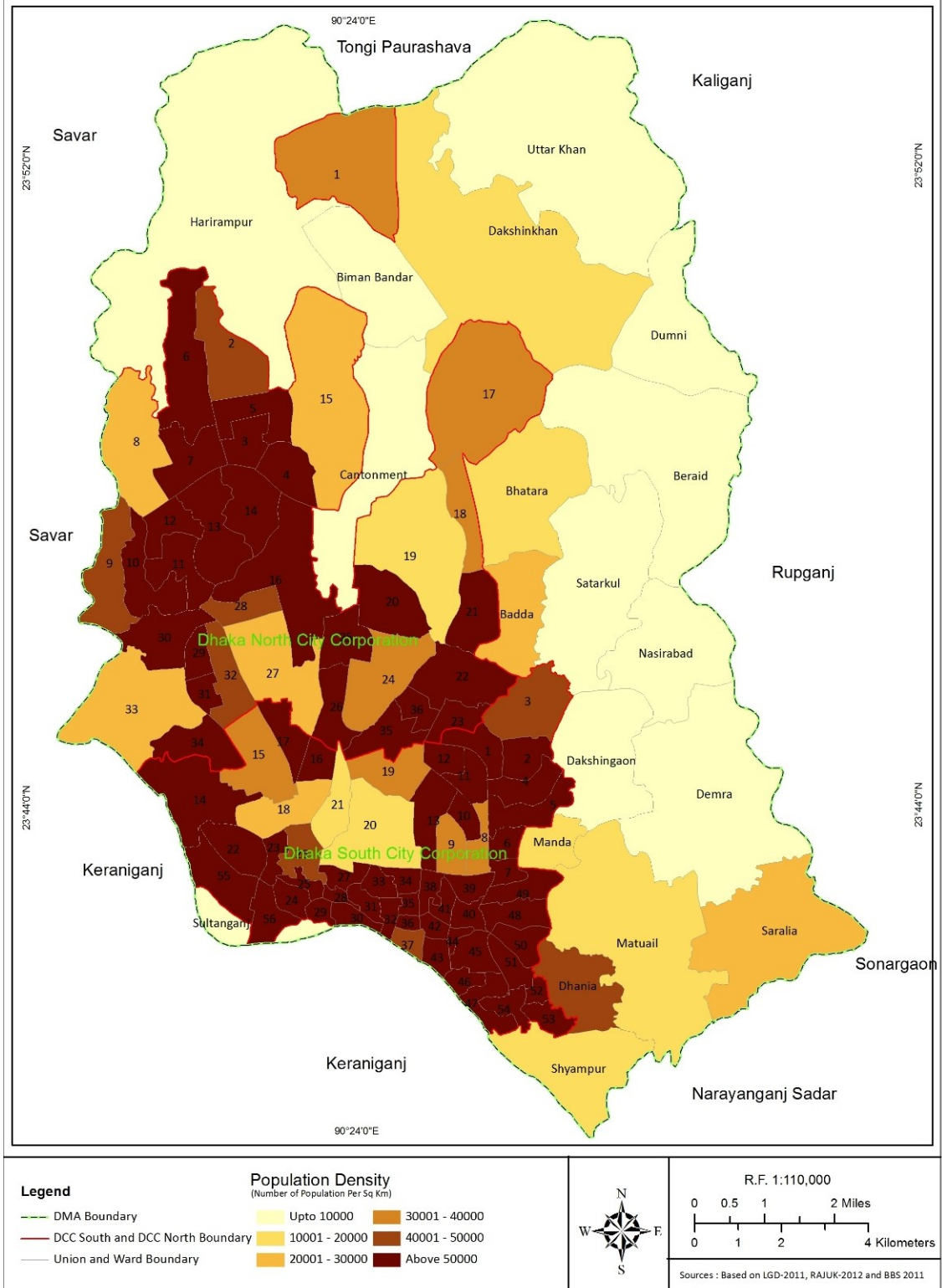
Map-3.10 Population Density of Dhaka Metropolitan Area in 2011

Areas under union administration i.e. fringe areas of DMA recorded much lower density compared with city corporations' wards. During the last two census years, the average density within the periphery of DMA was 5603 and 9395 persons per km^2 in 2001 and 2011 respectively (Table 3.12). Physiographycally the vast fringe area of the eastern part of DMA is an agricultural floodplain which is unsuitable for dense living. However, in recent decades land filling schemes run by many realestate companies have been coverting these lowlying agricultural land into urban settlement. As a result, population density within the frienge of DMA is rapidly increasing. High land value and house rent within the city corporations' area are forcing new migrants to resettle on vulnerable fringe areas of DMA (UNFPA, 2016).
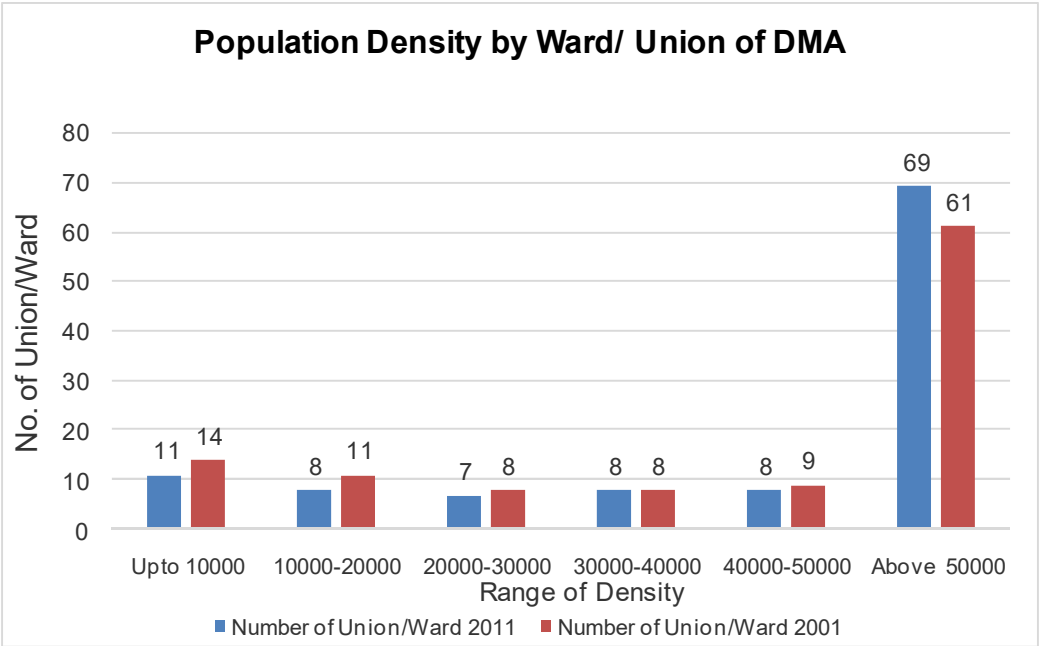
Figure-3.8 Population Density by Ward/ Union of DMA, 2001 and 2011

Table-3.17 Population Density Pattern by Ward/Union within DMA in 2001 and 2011

Density Classes	Number of Union/Ward 2011	Number of Union/Ward 2001	Percentage of Union/Ward 2011	Percentage of Union/Ward 2001
Up to 10000	11	14	9.91%	12.61%
10000-20000	8	11	7.21%	9.91%
20000-30000	7	8	6.31%	7.21%
30000-40000	8	8	7.21%	7.21%
40000-50000	8	9	7.21%	8.11%
Above 50000	69	61	62.16%	54.95%

Table- 3.18 Top ten High Density Wards under DMA in 2001 and 2011

Name of Ward in 2001	Density 2001	Rank 2001	Name of Ward in 2011	Density 2011	Rank 2011
DSCC-36	204679	1	DSCC-33	210610	1
DSCC-35	203293	2	DSCC-35	200529	2
DSCC-33	200126	3	DSCC-36	187136	3
DSCC-32	177195	4	DSCC-32	164305	4
DSCC-24	151817	5	DSCC-24	158262	5
DSCC-28	142217	6	DSCC-7	145790	6
DSCC-29	129070	7	DSCC-28	136978	7
DSCC-34	128735	8	DSCC-34	136822	8
DSCC-43	117517	9	DSCC-6	134415	9
DSCC-38	117014	10	DSCC-16	129005	10

3.9 Population Density of Paurashavas within Dhaka Megacity

At the begging of this research Dhaka Megacity area consisted of 7 municipalities, namely, Narayanganj, Kadam Rasul, Siddirganj, Tarabo, Gazipur, Tongi and Savar *Paurashava* in addition to DCC and cantonment.

Later on in 2016 Gazipur and Narayanganj declared as separate city corporation and Tongi *Paurashava* was incorporated within Gazipur City Corporation. For the convenience of this study and availability of *paurashava* data, this section of the thesis is going to present density analysis based on *paurashava* statistics of these 7 *paurashavas* (municipalities).

Population density in *paurashavas* stands much lower than that of Dhaka City Corporations and slightly higher than that of urban fringe of DMA (see Fig. 3.4 and 3.5). The average density for 7 *pauraashava* towns within DMC was 6643 and 11241 people per km^2 in the last two consecutive censuses (i.e. 2001 and 2011). However, the density varied quite significantly from one *paurahava* to another. Narayanganj *Paurashava* recorded the highest density (22563 and 18628 persons per km^2 in 2011 and 2001 (Table 3.19) and it was closely followed by Savar *Paurashava* where the density were 21139 and 9426 people per km^2 in 2011 and 2001. Gazipur *Paurashava* with undulating landscape and some forestlands recorded the lowest density (3791 and 2153 persons per km^2) within DMC. It is also found that except Narayanganj, all the *Paurashavas* indicated a high growth of population as well as densities during last census decade (2001 - 2011). On average, the density increased by 70% during 2001 - 2011. The detailed density of population by wards of 7 *Paurashavas* is displaced in Maps 3.11 and 3.12. Only two *Paurashavas* namely Tongi and Savar showed some wards having very high density (40,000+ persons per km^2). But in majority wards (70%) density remained below 20,000 population per km^2 (Table 3.20).

Table-3.19 Population Density of Paurashava in 2001 and 2011

Paurashava	Population 2011	Population 2001	Density 2011	Density 2001
Gazipur Psa	179037	101665	3791	2153
Kadam Rasul Psa	166291	128561	14742	11397
Narayanganj Psa	286330	236390	22563	18628
Savar Psa	286008	127540	21139	9426
Tarabo Psa	150709	91122	7773	4699
Tongi Psa	476350	283099	14247	8467
Shiddhirganj Psa	256760	96222	11306	4237
All Paurashava	**1801485**	**1064599**	**11241**	**6643**

Paurashavas of Dhaka Megacity-Population Density 2001

Map-3.11 Population Density of Paurashavas within DMC in 2001
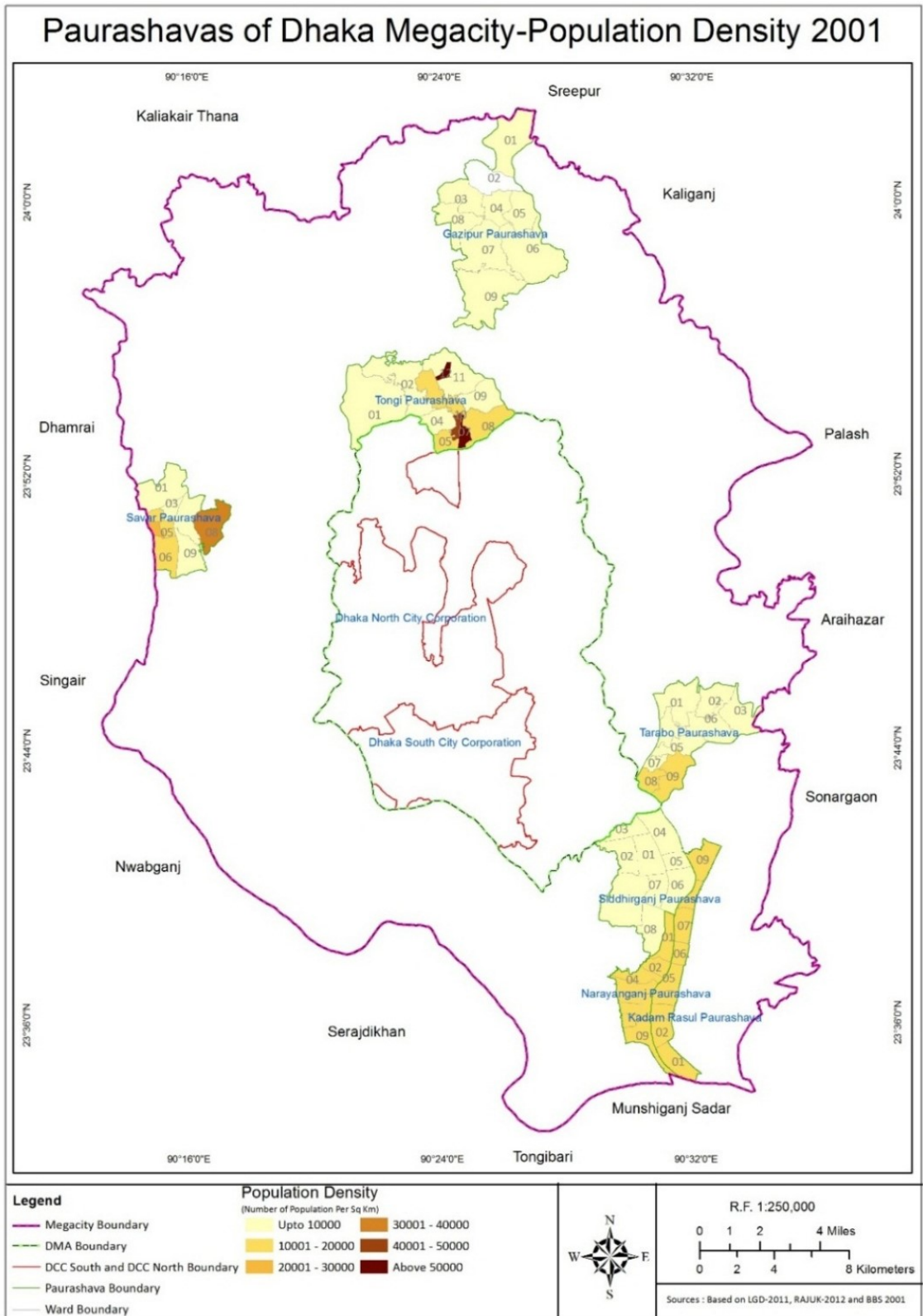
Paurashavas of Dhaka Megacity-Population Density 2011
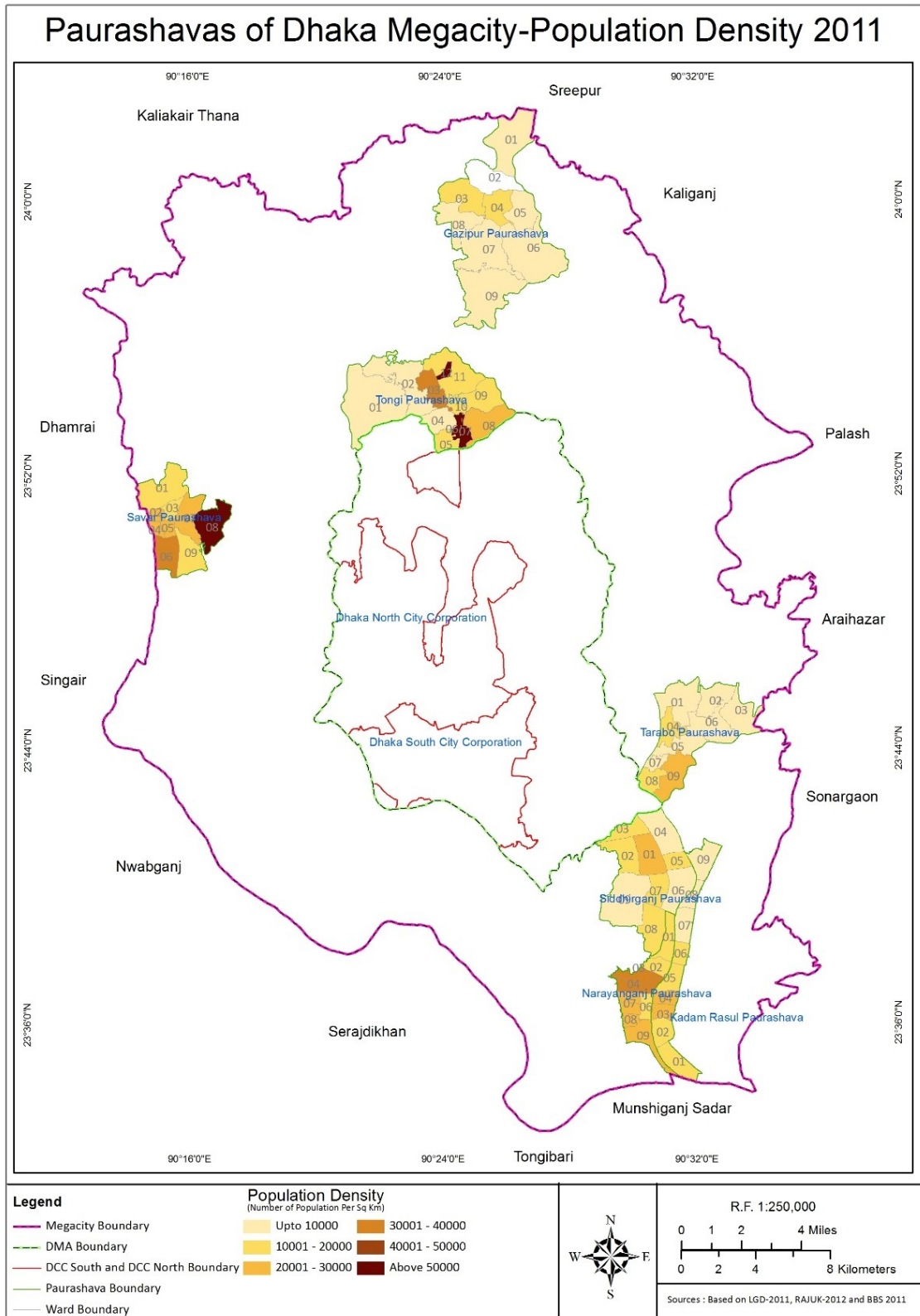
Map-3.12 Population Density of Paurashavas within DMC in 2011

Table 3.21 displays the list of top ten wards (of 7 *Paurashavas*) having high density of population. Almost all (9 out of 10) top ten high density populated wards are located in Tongi and Savar *Paurashavas*. Ward 12 of Tongi *Paurashava* recorded the ever highest density (588580 persons per km^2) in a ward within Dhaka Megacity. Such extreme or hyper density within this ward was caused by mushroom growth of dense settlements for industrial workers.

Table-3.20 Population Density Pattern of Paurashavas by Ward within DMC in 2001 and 2011

Density Ranges	Number of Ward 2011	Number of Ward 2001	Percentage of Ward 2011	Percentage of Ward 2001
Up to 10000	22	34	33.33%	51.52%
10000-20000	23	27	34.85%	40.91%
20000-30000	13	1	19.70%	1.52%
30000-40000	4	1	6.06%	1.52%
40000-50000	0	1	0	1.52%
Above 50000	4	2	6.06%	3.03%

Table-3.21 Top ten Densely Populated Wards in Paurashavas within DMC in 2001 and 2011

Name of Ward in 2001	Density 2001	Rank 2001	Name of Ward in 2011	Density 2011	Rank 2011
Tongi Psa- Ward 12	460189	1	Tongi Psa- Ward 12	588580	1
Tongi Psa- Ward 07	52340	2	Savar Psa- Ward 08	85844	2
Tongi Psa- Ward 06	44090	3	Tongi Psa- Ward 07	81648	3
Savar Psa- Ward 08	33283	4	Tongi Psa- Ward 06	56161	4
Savar Psa- Ward 04	20751	5	Narayanganj Psa- Ward 04	34364	5
Savar Psa- Ward 02	19203	6	Tongi Psa- Ward 03	33803	6
Narayanganj Psa- Ward 06	18628	7	Narayanganj Psa- Ward 03	31396	7
Tongi Psa- Ward 03	15027	8	Savar Psa- Ward 06	31104	8
Tongi Psa- Ward 10	14942	9	Savar Psa- Ward 04	28682	9
Savar Psa- Ward 06	14306	10	Savar Psa- Ward 02	28132	10

3.10 Conclusion

Dhaka Megacity experienced highest density of urban population in Bangladesh. Rapid urbanization and being a central location of country's every administrative and economic option attracts migrants from all over the country. In last twenty year the city populations become more than double. Along with the increasing of population, Dhaka City become megacity and expands its area to periphery. The population distribution over the time from 2001 and 2011 shows that the periphery area population increased more than the central area. Though population distribution shows highest concentration at central region but this research reveals that the populations are now increasing in the periphery. The population density and distribution patterns of 2001 and 2011 shows highest density in south Dhaka city corporation but the large changes of density between 2001 and 2011 seen in other than city corporation areas of Dhaka megacity and density of population become more than double in this periphery area while central city corporation area experience only about 10% of density differences from 2001 to 2011. The spatial pattern of density and distribution also reveals that the highest concentration of population are distributed linearly south to north of Dhaka Megacity as there is Dhaka city corporation in middle parts and two major industrialize city in two parts of the megacity.
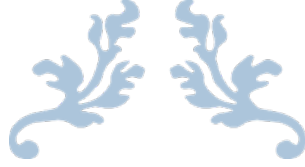
CHAPTER 4

Population Density Variation of Dhaka Megacity

4.1 Introduction

After observing many surveys, the reason behind the population of Dhaka Megacity being the greatest in the country is large population migration. Generally, people move from their rural areas towards Dhaka because of many push factors. These are landlessness, unemployment, underemployment, natural disasters etc. Population migration towards Dhaka has been increasing since the independence of the country in 1971. Unlike other cities of the country, Dhaka the capital bestowed with many opportunities such as diverse employment opportunities along with quality education, health services and other amenities and facilities.

In 2011, just fewer than 10 percent of the Bangladesh population were living in a *Zila* other than where they were born, suggesting a very low level of internal migration. However, this proportion varied widely from only a few percent in many *Zila* to as high as 51 percent in Dhaka District, 41 percent in Gazipur and 24 percent in Narayanganj districts respectively as DMC is located within these three districts. Dhaka has attracted the lion's share of lifetime migrants of the country - Dhaka District alone attracted over 4 migrants out of 10 (42 percent) and Dhaka Megacity region attracted at least 5.6 migrants out of 10 (UNFPA 2016). Central location along with good access with all districts encourages rapid growth of population within DMC region. With the increase of population, Dhaka City has been expanding geographically as well. Over the past decade (2001 - 2011) the core of the city (DMA) increased its population by 45 percent. The suburban and periurban population increase was nearly twice as great as the core, at 85 percent (Fig. 4.1).

Division wise and district wise population density variation recorded in the past census decade (i.e. 2001 - 2011) indicated that Dhaka Division and Dhaka, Gazipur, Narayanganj districts recorded the highest density variation. Of the three districts within which DMC is located Gazipur recorded (Table 4.1) the highest density variation (67.52%) followed by Dhaka (41.51%) and Narayangonj (35.62%). This finding indicates that the periphery areas of DMC exhibited higher density variation compared with core of the city.
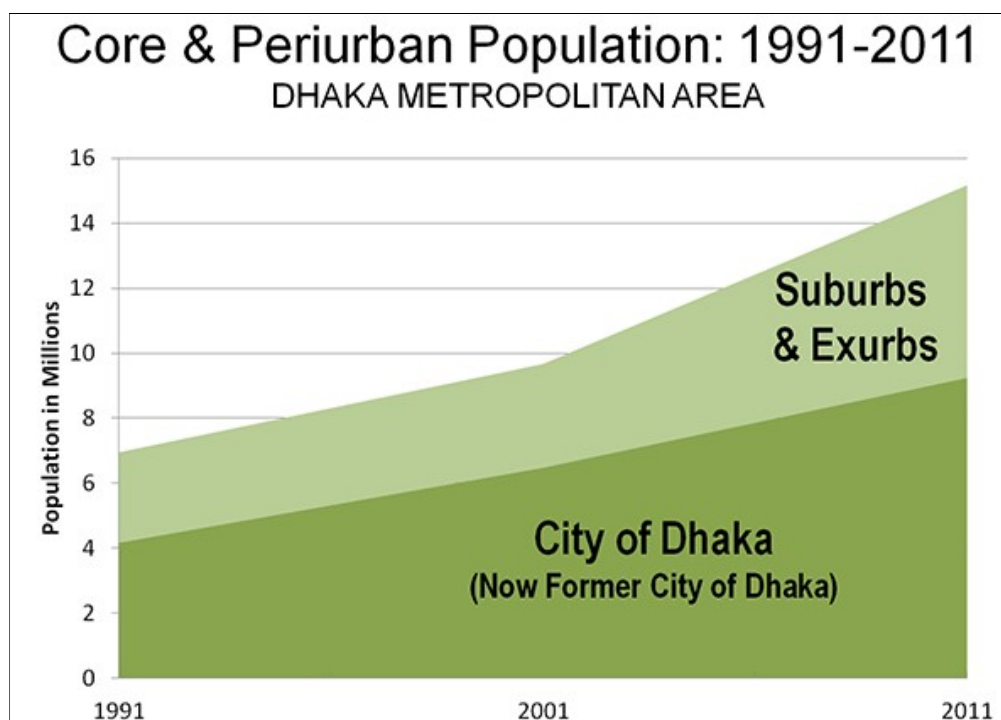
**Figure-4.1 Core and Peri-urban Population of Dhaka Metropolitan Area
1991 - 2011**

Source: A look into Dhaka, Bangladesh – The most densely populated city in the world.
Posted on *March 9, 2013 by Research Initiative for Social Equity Society - RISE Society*.

Table-4.1 Population Density Variations of Districts Containing DMC

District Name	Variation Rate 2001-11	Rank
Narayanganj	35.62	3
Dhaka	41.51	2
Gazipur	67.52	1

Source: Population Census 2011, BBS

4.2 Density Variation of Population within Dhaka Megacity in 2001- 2011

The variation of population density calculated for DMC in 2001 - 2011 was not uniform throughout the whole administrative area (wards or unions). This has been shown more closely in Table 4.2 and Fig. 4.1. A little over 10% (11.21%) of the wards/unions recorded zero variation i.e. within those areas density of population during the last census decade did not change at all. On the other hand, nearly a same proportion (10.78%) of DMC wards/unions recorded very high rate of density variation which was 150% to over 200% increase (Table

4.2). Half of the wards/unions (54.31%), however, recorded a little over zero to 50% increase of population density. Nearly one fourth (23.71%) of the wards/unions have shown 50 to 150 percent increase and within one-third (34.48% or 80 wards/unions out of 232) of all administrative zones of DMC, population density just doubled within 10 years period (i.e. 2001 - 2011) only. This finding clearly indicates that population density within DMC has been rapidly increasing.

Table-4.2 Class wise Population Density Variations by Ward/Union under DMC in 2001 - 2011

Range of Density Variation (in %)	Number of Union/Ward	Percentage of total Union/Ward
Up to 0	26	11.21
0-50	126	54.31
50-100	38	16.38
100-150	17	7.33
150-200	20	8.62
Above 200	5	2.16
Total	232	100.00

The spatial patterns of population density variation within DMC is shown in Map 4.1 and it has been clearly noticed that zero and low density variation areas are mostly located to the core area of DMC i.e. within city corporations where density has already reached to a very high level. On the contrary, high density variation areas are mostly located at the fringe or periphery zones (mostly unions), particularly at the north-western side and a small area at the south eastern fringe of DMC (see Map 4.1). Heavy concentration of industries and SMEs in these two fringes is the main reason for rapid increase of population density. Table 4.3 and Table 4.4 listed the top 10 wards/unions and bottom 10 wards/unions in terms of population density variation within DMC during 2001 - 2011 respectively. Here, zero and low density variation areas are found to locate within the city corporation zones i.e. core areas of the city and high density variation zones are found to locate at the fringe areas, mostly unions. The top five density variation (mostly unions) areas which recorded over 200% increase of population density between 2001 to 2011 are- Yearpur Union

(356.18% increase), Dhamsana Union (300.54% increase), Gachha Union (274.51% increase), Ashulia Union (243.20%), and Savar *Paurashava*- Ward 9 (212.31% increase). All the bottom 10 wards recorded minus variation which ranges from - 43.27% decrease of population variation to - 7.62% and all of them, as stated earlier, are located within the two city corporations of Dhaka.

It should also be mentioned here that most of the recent migrants to DMC were found to choose urban fringe areas for residing due to availability of land and house rent at relatively cheaper price (much cheaper than that at the city core areas). Given this situation, density of population in the fringe areas of DMC has been rapidly increasing and the density will increase further at least for the next couple of decades from now.

Table-4.3 Top ten Wards/Unions under DMC having High Population Density Variation in 2001- 2011

Name of Ward/Union	Density Variation 2001-2011 (in %)	Rank
Yearpur	356.18	1
Dhamsana	300.54	2
Gachha	274.51	3
Ashulia	243.20	4
Savar Paurashava- Ward 09	212.31	5
Harirampur	182.50	6
Kashimpur	179.90	7
Biman Bandar (rest. Area)	177.58	8
Savar Union	172.31	9
DNCC-1	167.78	10

Dhaka Megacity: Density Variation 2001-2011

Legend

- Megacity Boundary
- DMA Boundary
- DCC South and DCC North Boundary
- Paurashava Boundary
- Union and Ward Boundary

Density Variation
(Percentage Density Change Over 10 Years)

- Upto 0
- 1 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- Above 200

R.F. 1:250,000

Sources : Based on LGD-2011, RAJUK-2012 and BBS 2011 and BBS 2001
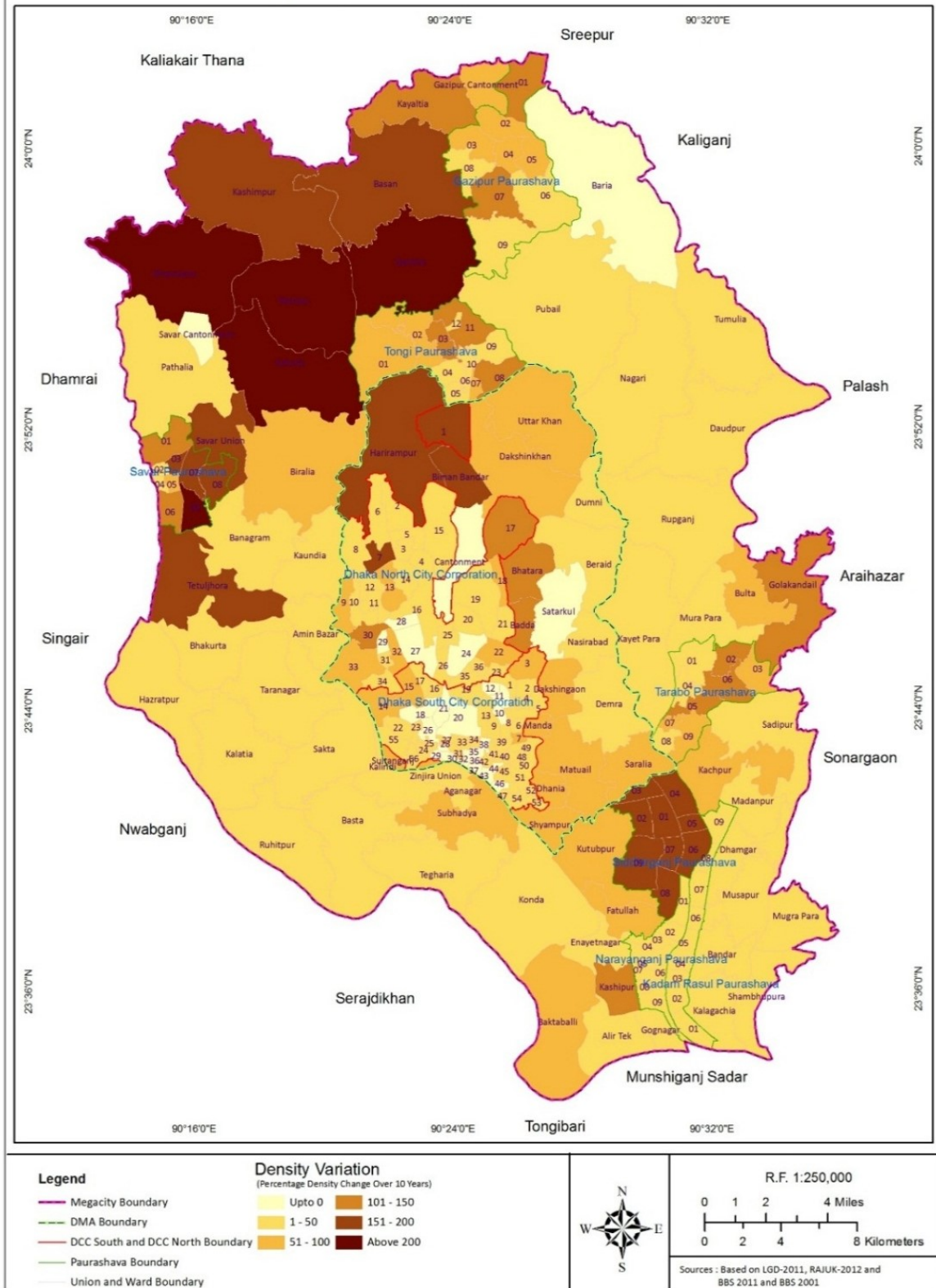
Map-4.1 Population Density Variation within DMC in 200 - 2011

Table-4.4 Bottom ten Wards/Unions under DMC having Low Population Density Variation in 2001 - 2011

Ward/Union in 2001	Density Variation 2001-2011(in %)	Rank
DNCC-24	-43.27	1
DSCC-10	-28.58	2
Savar Cantonment	-27.78	3
DNCC-28	-25.21	4
DSCC-37	-23.41	5
Cantonment (rest. Area)	-21.40	6
DSCC-18	-20.22	7
DNCC-27	-19.74	8
DSCC-36	-8.57	9
DSCC-20	-7.62	10

4.3 Population Density Variation of Major Administrative Regions of DMC

This section displays the population density variation of the major six administrative regions of Dhaka Megacity and it shows that the density varied from one administrative zone to another. Table 4.5 and Fig. 4.2 display the average density and density variation range found in the respective administrative zone. From 2001 - 2011, the highest variation of density was recorded within the outer periphery of DMC (i.e. unions outside of DMA) and it varied from - 27.77 to 356.17 per cent (Table 4.5). The peripheral zone of DMA recorded - 21.39 to 182.50 percent. DNCC recorded higher density variation (-43.26 to 167.77%) as compared with that of DSCC (28.58 to 66.95%). In fact, the density variation was found the lowest within DSCC. Average density variation of population among the 5 zones of DMC displays the similar ranks. However, for the DMC as a whole, the average population density variation for the last census decade (i.e. 2001 - 2011) was 45.93% (Fig.4.2). Except DSCC, all the other administrative zones of DMC were recorded much higher density variation than the average density variation for DMC (45.93%).

The high rate of density variation found in the periphery areas (i.e. within unions as against urban wards) seems to be quite plausible. Because, within the vast periphery areas people (mainly the migrants) are not equally attracted to live. The areas where industrial and commercial activities/facilities are highly concentrated, such as in the north-western part and some areas in the south-

eastern part of the periphery of DMC (see Map 4.1) the density variation was recorded very high.
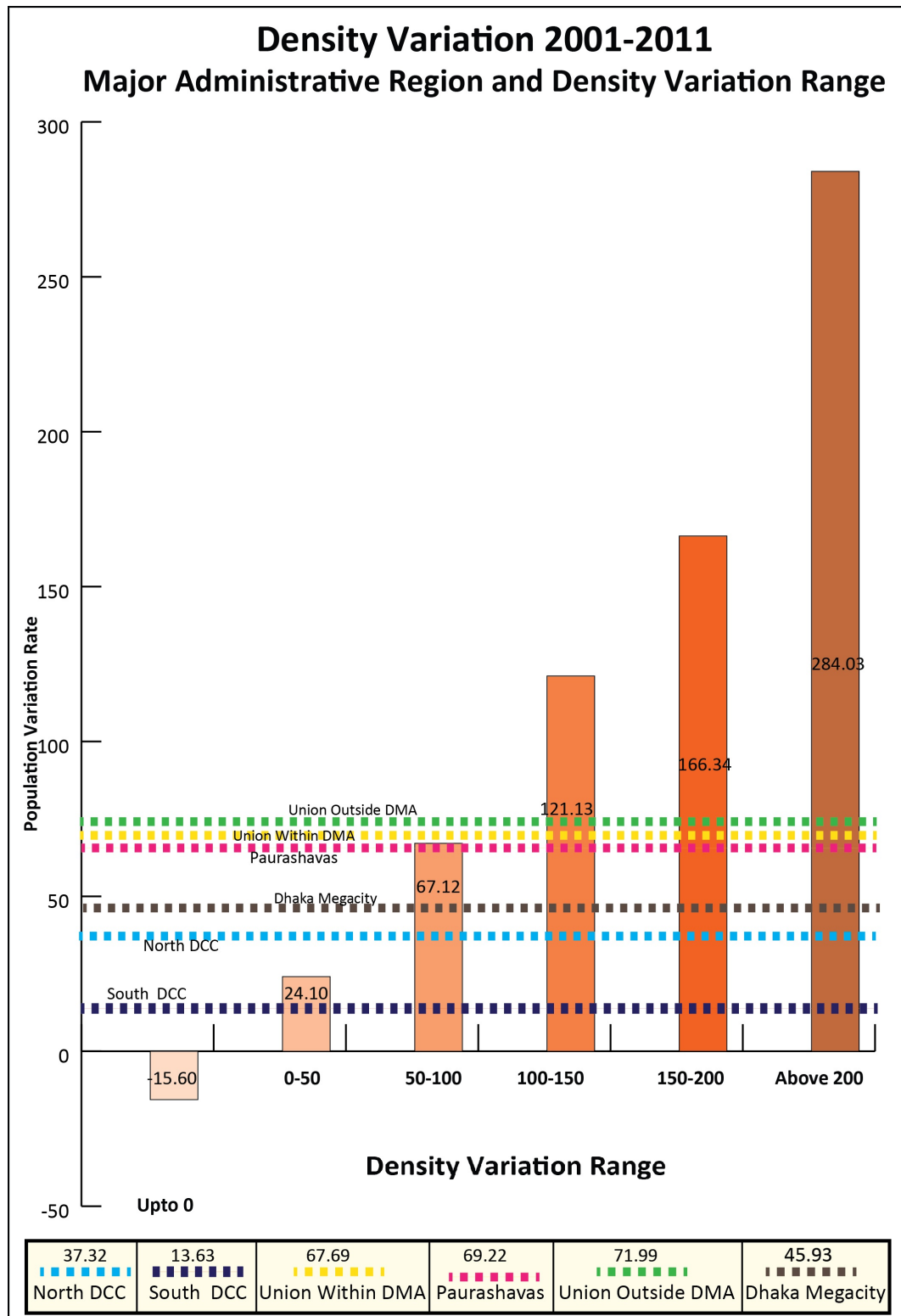
Figure-4.2 Range and Average Population Density Variation (%) by Major Administrative Regions of DMC, 2001 - 2011

On the other hand, the older part of Dhaka City (mostly DSCC) where the density of inhabitants is extremely high, density variation appeared to be low and this finding is quite obvious. Compared to the main city of Dhaka (i.e. two city corporations), average population density and range of density variation seems to be high (Table 4.5).

Table-4.5 Density Variation of Major Administrative Regions of DMC, 2001 - 2011

Administrative Unit	Average Density Variation 2001-2011 (in %)	Range of Density Variation (in %)
North DCC	37.32	- 43.26 to 167.77
South -DCC	13.63	28.58 to 66.95
Union Within DMA	67.69	- 21.39 to 182.50
Paurashavas	69.22	6.38 to 212.30
Union Outside DMA	71.99	- 27.77 to 356.17
Dhaka Megacity	45.93	- 43.26 to 356.18

4.4 Urban Area Population Density Variation within Dhaka Megacity

As stated earlier in Chapter 1 that DMC has two types of areas namely urban built up area which is under urban wards (these are within two city corporations of Dhaka City and *paurashavas,* see Map 4. 2) and the vast periphery areas (mostly outside of urban wards) usually under union administration. These urban areas include DNCC, DSCC, *Paurashava* of Gazipur, Savar, Tongi, Tarabo, Siddhirganj, Narayanganj, Kadam Rasul and Cantonments- such as Dhaka, Mirpur and Savar. Map 4.2 shows the variation of population density within different wards and Table 4.6 displays the range of density variation of all urban wards. Population density varied quite significantly from one ward to another within a *paurashava* and two city corporations as well. The high rate of (percentage) of variations was mainly found in the north-western part of DNCC, Savar *Paurashava* and Siddhirganj *Paurashava* (Map 4.2 and Fig. 4.3). Agglomeration of industries and SMEs are the reason for high density variation in these urban locations. Low density variation areas were mostly located in various wards of DSCC, DNCC, cantonment areas and all *paurashavas* excepting Savar and Siddhirganj.
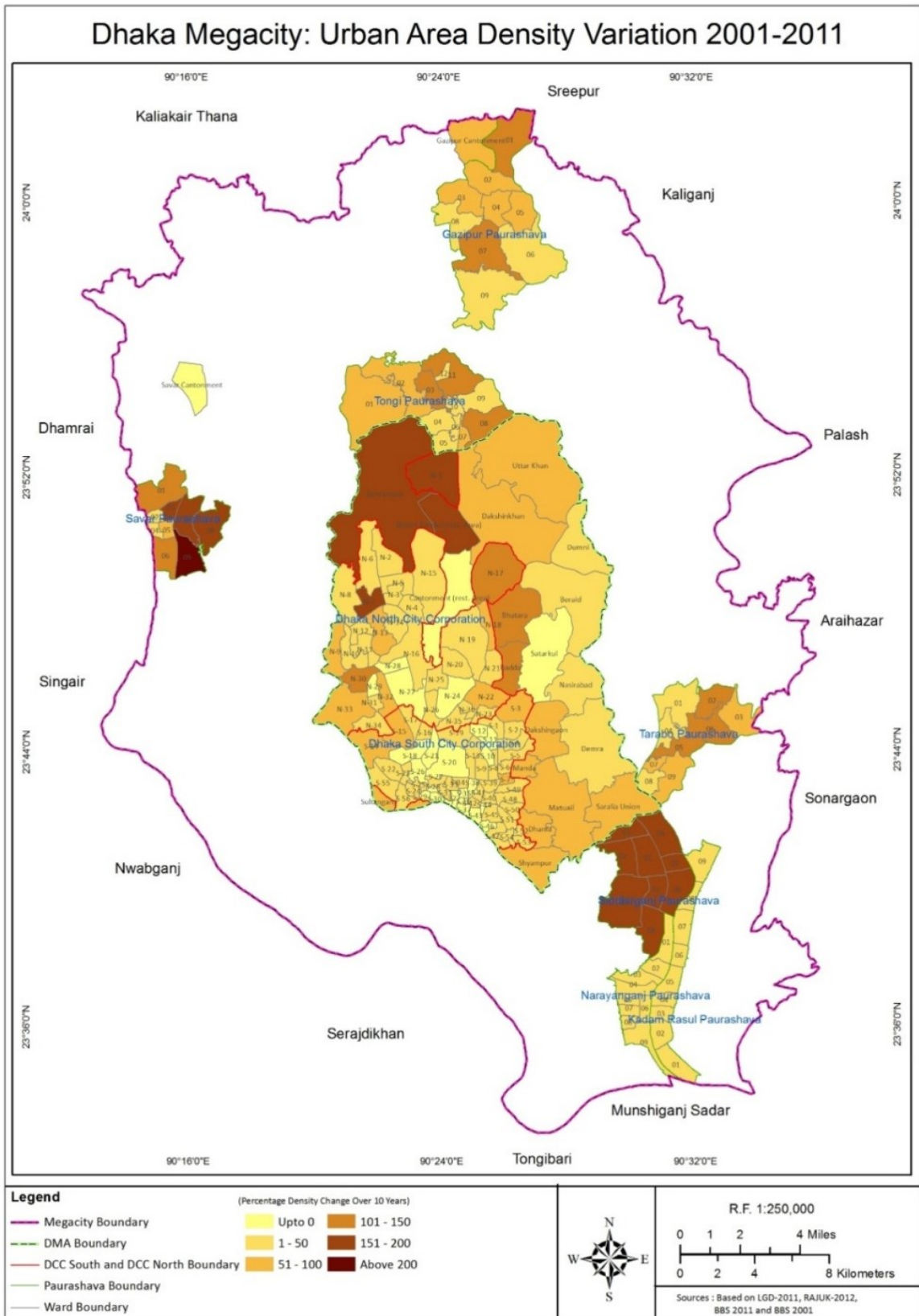
Map-4.2 Urban Area Population Density Variation of Dhaka Megacity by Ward in 200 - 2011

Regarding the range of variation half of the wards (51.40%) under DMC recorded over zero to 50% increase and nearly one-fifth (17.32%) of the wards exhibited 100 to 200 per cent increase (Table 4.6).
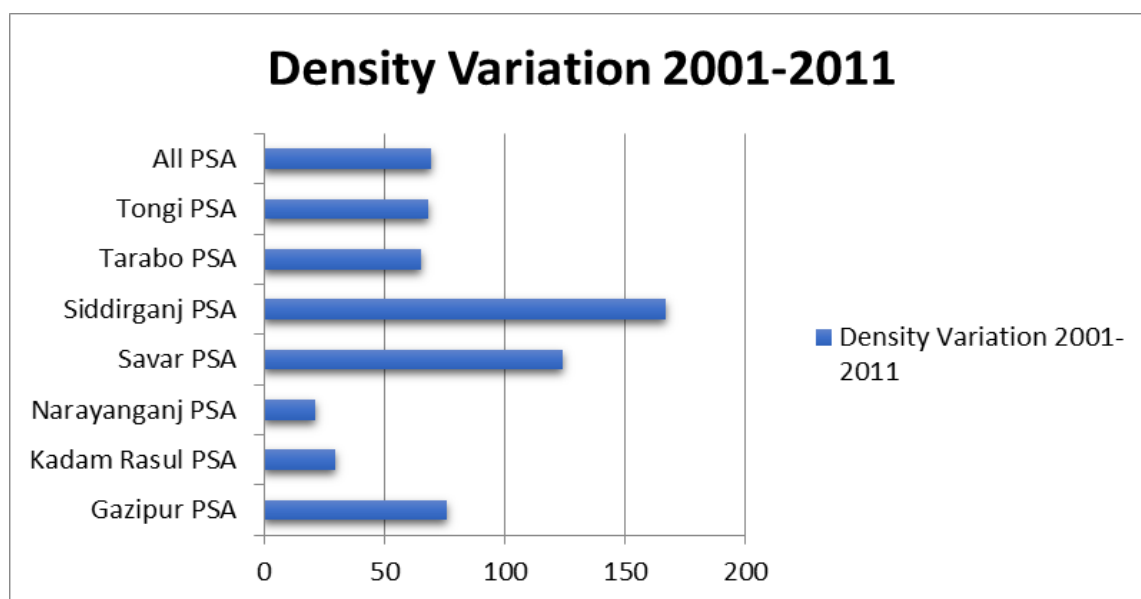
Figure-4.3 Population Density Variation of Paurashava in 2001 - 2011

Table 4.7 and 4.8 displays the top ten and bottom ten wards of density variation respectively. All top ten high density variation wards are located in Savar and Siddhirgonj *paurashavas* and the variations were ranged from 212.3% to 166.84%. On the contrary, all bottom ten wards having the low density variation showed negative variation (i.e. density decreased over 2001 to 2011) ranging from - 43.27% to - 7.62% and these wards were located within the two city corporation areas of Dhaka City.

Table-4.6 Urban Area Population Density Variation of DMC by Ward in 2001- 2011

Range of Density Variation (in %)	Number of Ward	Percentage of Ward
0 and below (minus)	25	13.97
0-50	92	51.40
50-100	31	17.32
100-150	14	7.82
150-200	16	8.94
Above 200	1	0.56
Urban Area	179	100.00

Table-4.7 Top ten High Population Density Variation Wards in DMC, 2001 - 2011

Name of Ward	Density Variation (in %)	Rank
Savar Psa- Ward 09	212.31	1
DNCC-7	153.06	2
Savar Psa- Ward 08	157.92	3
Savar Psa- Ward 03	157.98	4
Savar Psa- Ward 07	159.25	5
Siddhirganj Psa-Ward-01	166.84	6
Siddhirganj Psa-Ward-04	166.84	7
Siddhirganj Psa-Ward-09	166.84	8
Siddhirganj Psa-Ward-08	166.84	9
Siddhirganj Psa-Ward-05	166.84	10

Table-4.8 Bottom ten Low Population Density Variation Wards in DMC, 2001 - 2011

Name of Ward	Density Variation (in %)	Rank
DNCC-24	-43.27	1
DSCC-10	-28.58	2
Savar Cantonment	-27.78	3
DNCC-28	-25.21	4
DSCC-37	-23.41	5
Cantonment (rest. Area)	-21.40	6
DSCC-18	-20.22	7
DNCC-27	-19.74	8
DSCC-36	-8.57	9
DSCC-20	-7.62	10

4.5 Population Density Variation within the Periphery (Unions) under DMC

This section deals with population density variation within the vast periphery areas of DMC and it includes the areas surrounding the DMA but excluding the *paurashavas*. This extensive area is mostly administrated under 53 unions as seen in Map 4.3. The white areas within the map are urban wards which remain outside the union administration. Population density variation within these unions during 2001 to 2011 period clearly shows that most part of this periphery (64.15% areas) density variation remains fairly low to medium high (1 to 50 percent) as shows in Table 4.9 and Map 4.3. Four unions having extremely high variation of density (over 200%) are located at the north-western corner of the DMC. Unions having high to very high density variation are usually characterized by concentration of industries (mostly RMG) and a wide range of SMEs. Migrants coming from low to middle income families are usually try to settle in the periphery areas where land price and house rent are relatively low (lower than that found in the core areas of DMC).

Compared with the core areas of DMC, population density variation seems to be high in the periphery and it varies from – 2.88% to 356.18% (see Table 4.10 and 4.11). Out of 53 unions, only one union namely Baria recorded negative variation i.e. in that union population density decreased over the last census decade. Table 4.10 and 4.11 show the lists of top 10 and bottom 10 unions based on the density variation. Top 10 unions recorded 120.61 to 356.18 percent increase of population density. Whereas the bottom ten unions recorded – 2.88 to 11.72 percent increase only. Low density variation unions are mostly located in the eastern part of DMC.

Table-4.9 Range of Population Density Variations by Union in 2001 - 2011

Range of Density Variation (in %)	Number of Union	Percentage of Union
Up to 0	1	1.89
0-50	34	64.15
50-100	7	13.21
100-150	3	5.66
150-200	4	7.55
Above 200	4	7.55
Union Outside DMA	53	100.00
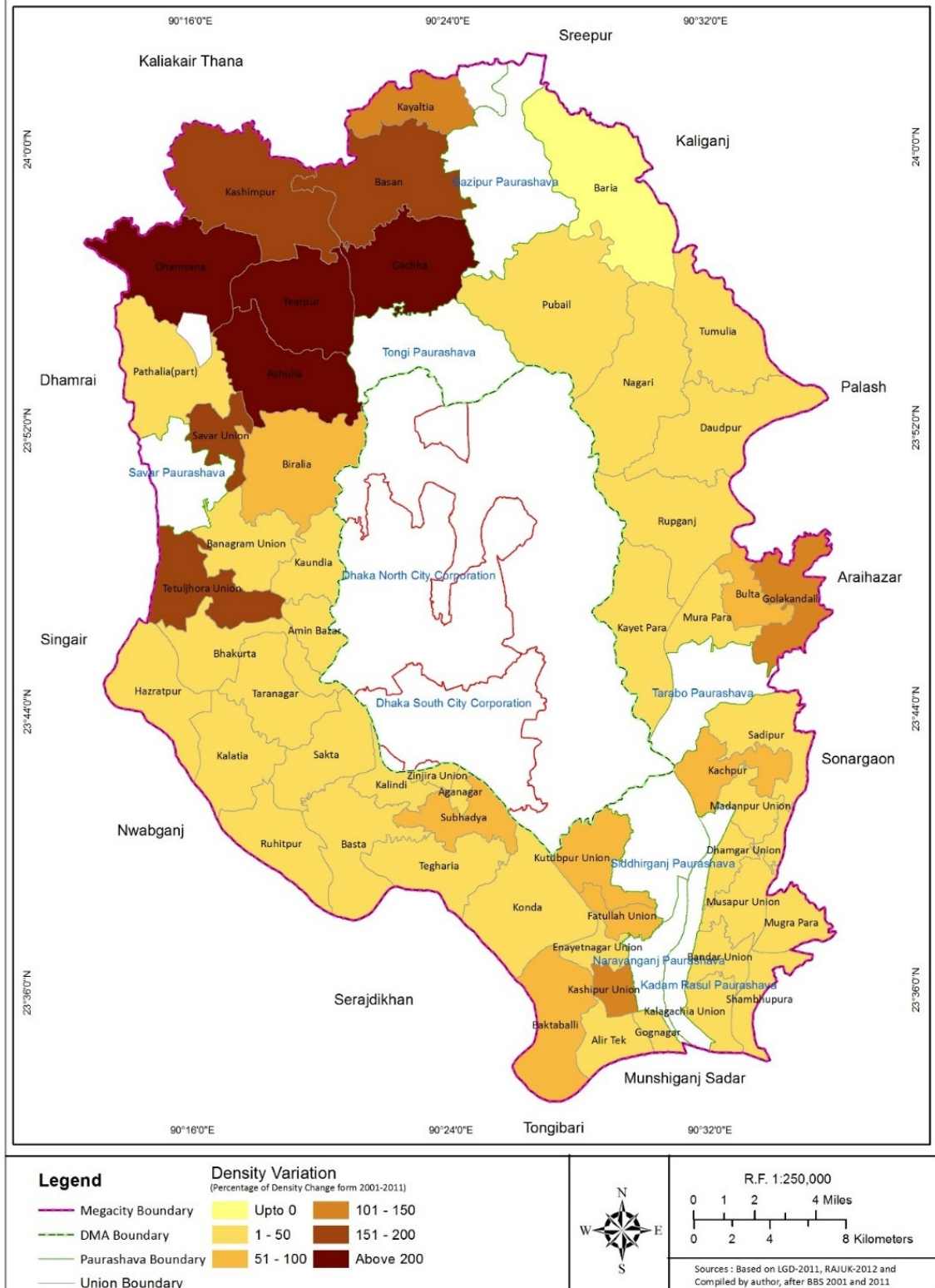
Map-4.3 Population Density Variation of Unions under DMC in 2001 - 2011

Table-4.10 Top ten Unions having High Density Variation in DMC, 2001 – 2011

Name of Union	Density Variation (in %)	Rank
Yearpur	356.18	1
Dhamsana	300.54	2
Gachha	274.51	3
Ashulia	243.20	4
Kashimpur	179.90	5
Savar Union	172.31	6
Basan	159.60	7
Tetuljhora Union	154.73	8
Golakandail	120.63	9
Kayaltia	120.61	10

Table-4.11 Bottom ten Unions having Low Density Variation in DMC, 2001 - 2011

Name of Union	Density Variation (in %)	Rank
Baria	- 2.88	1
Kayet Para	2.40	2
Tegharia	3.09	3
Daudpur	5.64	4
Rupganj	7.35	5
Tumulia	9.14	6
Shambhupura	9.60	7
AlirTek	11.17	8
Nagari	11.54	9
Ruhitpur	11.72	10

4.6 Population Density Variation within DMA (Dhaka Metropolitan Area)

Dhaka Metropolitan Area (DMA) consists of two city corporations (DNCC and DSCC), cantonments and some areas at the periphery under union administration. DMA is considered as the core urban area of Dhaka Megacity. Population density variation within DMA seems to be low as compared with the outer sides of DMA. At the core areas of DMA density variation in many wards

found to be decreased within 2001 to 2011 (see Map 4.4 and Table 4.14). High land value and house rent associated with extremely high density of inhabitants at the core regions discouraged recent migrants to live within the city core areas.

Given the above situations a significant number of wards under DSCC, DNCC and cantonment recorded minus to zero variation of density in 2001 - 2011 (Table 4.14 and Map 4.4). However, in some periphery areas (wards and unions) of DMA locating mostly at the north-western and central eastern part of DMA recorded very high density variation which ranges from 100% to nearly 200% (Table 4.13 and Map 4.4).

Within these rapid increase of population density areas a wide range of industries, commerce and informal activities have been developed over the period of 2001 - 2011. Experts believe that the periphery or fringe areas of DMA will have to accommodate millions of more people in the upcoming decades as there is hardly any space at the core areas of DMA to accommodate residences and workplaces for millions of potential migrants.

Table-4.12 Population Density Variations by Ward/Union within DMA

Range of Density Variation (in %)	Number of Ward/Union	Percentage of Ward/Union
0 and below	24	21.62
1-50	60	54.05
50-100	19	17.12
100-150	4	3.60
150-200	4	3.60
DMA	111	100.00

Dhaka Metropolitan Area: Density Variation 2001-2011

Tongi Paurashava

Kaliganj

Savar

23°52'0"N

Uttar Khan

1

Harirampur

Dakshinkhan

Biman Bandar

Dumni

6   2

15

5

17

3

8

Beraid

7   4   Cantonment

14   18   Bhatara

Savar

12   13

19   Rupganj

9   10   11

16

Satarkul

28

20

30   Dhaka North City Corporation   21   Badda

29   Nasirabad

32   27   24   22

31

33   26   36   3   23

35

34   15   17   16   19   12   2   Dakshingaon

14   18   21   11   4   Demra

20   13   10   5

22   23   Dhaka South City Corporation   9   8   6   Manda

Keraniganj   55   25   27   33   34   38   39   7   49

24   28   31   35   41   40   48

Sultanganj   56   29   30   32   36   42   44   45   50   Matuail   Saralia

37   43   51

46   52   Dhania   Sonargaon

47   54   53

Keraniganj   Shyampur

Narayanganj Sadar

23°44'0"N

23°44'0"N

Legend
- DMA Boundary
- DCC South and DCC North Boundary
- Union and Ward Boundary

Density Variation
(Percentage Density Change Over 10 Years)
- Upto 0
- 1 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- Above 200

R.F. 1:110,000

0   0.5   1   2 Miles

0   1   2   4 Kilometers

Sources : Based on LGD-2011, RAJUK-2012 and
Compiled by author, after BBS 2001 and 2011

Map-4.4 Population Density Variation within DMA in 200 - 2011

**Table-4.13 Top ten Wards/Unions having High Density Variation in DMA, 2001 - 2011**

Name of Ward/Union	Density Variation (in %)	Rank
Harirampur	182.50	1
Biman Bandar (rest. Area)	177.58	2
DNCC-1	167.78	3
DNCC-7	153.06	4
DNCC-30	139.26	5
Bhatara	126.31	6
DNCC-17	124.92	7
Badda	103.19	8
Dakshingaon	98.56	9
DNCC-22	85.63	10

Table-4.14 Bottom ten Wards/Union having Low Density Variation in DMA, 2001 - 2011

Name of Ward/Union	Density Variation (in %)	Rank
DNCC-24	- 43.27	1
DSCC-10	-28.58	2
DNCC-28	-25.21	3
DSCC-37	-23.41	4
Cantonment	-21.40	5
DSCC-18	-20.22	6
DNCC-27	-19.74	7
DSCC-36	-8.57	8
DSCC-20	-7.62	9
DSCC-26	-7.34	10

4.7 Conclusion

The population density is important key indicators of population dynamics. Dhaka Megacity has long been experiencing very high density of inhabitants than any other cities of the world. In some parts of the periphery of the city the density of population appeared to be varied at an alarming rate (doubled, tripled or even more) within a decade only. Under these circumstances, it will be very difficult to control population distribution, concentration, migration and the associated phenomenon of healthy or sustainable development of urbanization, particularly the megacity- Dhaka.
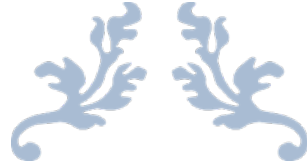
CHAPTER 5

Population Growth of Dhaka Megacity

5.1 Introduction

The population of Dhaka City has been growing at a pace of almost four percent annually, the fastest among the South Asian cities, as all the major manufacturing industries are concentrating within and nearby the DMC which attracts hordes of migrants from the vast rural hinterland centering this capital city. In the last decade, 15 *lakhs* people added to the Dhaka City population. A diverse employment opportunities and business facilities are causing rapid concentration of people and mushroom growth of slum dwellers. Data analysis clearly indicates that during the last 2 to 3 decades, population within rural areas of the Dhaka Megacity region (i.e. fringe areas of DMC) has been growing very rapidly (7 to 16 percent per annum). Whereas the core areas more particularly the older part of Dhaka City experienced comparatively a low growth of inhabitants. A large number of those recorded as rural-rural migrants within DMC or Dhaka SMA are in fact rural to urban migrants. This chapter closely explored the spatial pattern of population growth within the core areas as well as fringe zones (mostly rural region in accordance with BBS definition) of DMC.

Table-5.1 Division wise Growth Rate of Population

Division	Growth Rate 2001-2011	Growth Rate 1991-2001
Barisal	0.18	0.91
Chittagong	1.58	1.70
Dhaka	1.96	1.80
Khulna	0.65	1.49
Rajshahi	1.23	1.41
Rangpur	1.32	1.44
Sylhet	2.24	1.61
Bangladesh	1.48	1.58

Source: Population and Housing Census 1991, 2001 and 2011, BBS

Division wise growth rate of total population of Bangladesh showing in Table 5.1 clearly indicates that Dhaka Division where DMC is located records the highest growth rates followed by Chittagong and Sylhet divisions. On the other hand, Barisal and Khulna divisions recorded very low growth rates (0.18% and

0.65% respectively), even much lower than the national average growth rate of 1.48% during 2001 - 2011.

The districts within which DMC is located are shown a very high rate of population growth (Table 5.2). Of the three districts, Gazipur ranked 1 showing the highest growth rate (5.3% as against national average 1.48%). Dhaka and Narayanganj districts ranked 2 and 3 respectively showing 3.53% and 3.09% growth rate. Massive migration to DMC region caused this high level growth rates.

Table-5.2 Population Growth Rates of Districts Containing DMC

District Name	Growth Rate 2001-2011	Rank
Narayanganj	3.09	3
Dhaka	3.53	2
Gazipur	5.30	1

Source: Population and Housing Census 1991, 2001 and 2011, BBS

Dhaka today is a city of migrants. Nearly 75 percent of the heads of household were born outside the city and about 60 per cent of all population is of such status. Since the migration process continues at a high rate (at least 40 per cent of Dhaka's recent population growth is due to migration), majority of Dhaka's inhabitants will still be migrants in year 2000. These people will largely have low social, particularly educational, attainments. The proportion of the migrant population may however be less than 50 per cent in the year 2025 (Islam N. 2009).

Dhaka's metropolitan area (which includes the urban area and economically integrated rural environs) added approximately 5,000,000 new residents between 2001 and 2011. Dhaka added at least a 50 percent to its population, rising from just under 10 million populations to just over 15 million during the decade. Few, if any of the world's largest metropolitan areas or urban areas have achieved such a large percentage population increase in a period of only 10 years. However, roughly between 2001 and 2011, Dhaka's population added fewer people than some larger metropolitan areas such as Karachi, Jakarta and Shanghai (Fig. 5.1).
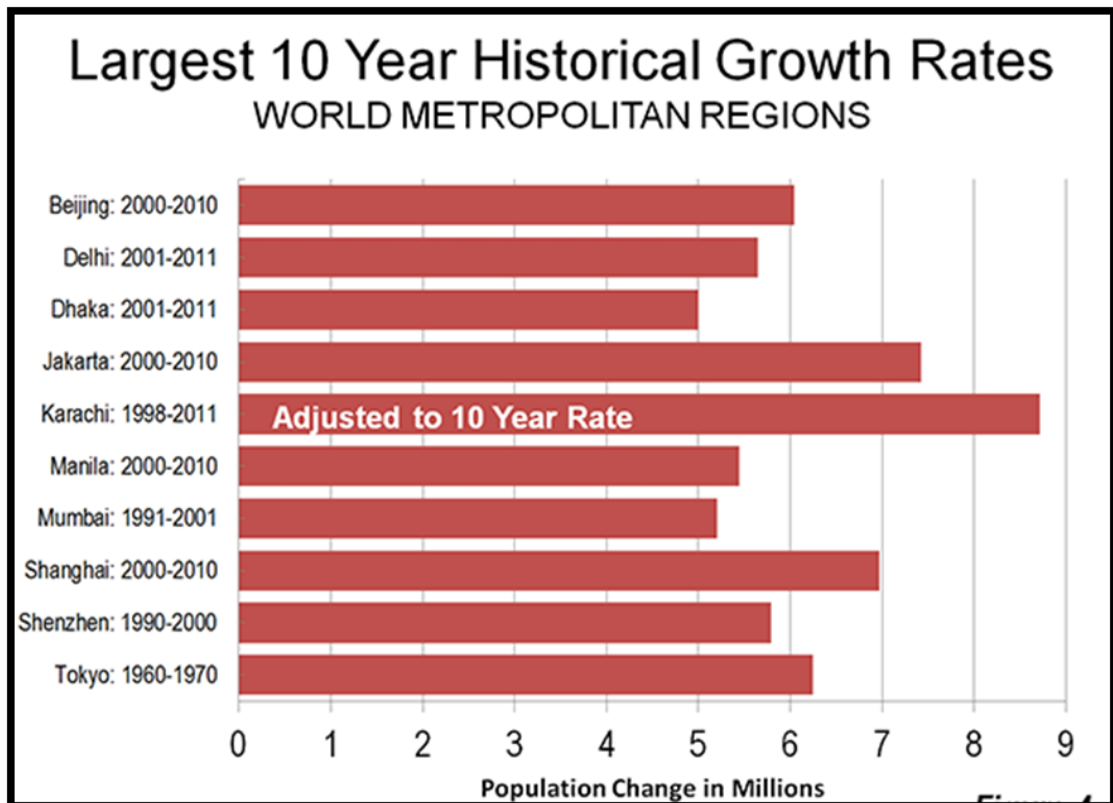
Figure-5.1 Ten Year Historical Growth Rates of Population of the World Top ten Metropolitan Cities

Source: A look into Dhaka, Bangladesh- The most densely populated city in the world. March 9, 2013 by Research Initiative for Social Equity Society –RISE Society

5.2 Population Growth Rate of Dhaka Megacity

Dhaka is also one of the fastest growing cities in the world. Population growth in Dhaka City during the period 2001 - 2011 was 3.96% per annum (RAJUK, July 2015). Due to this high growth rate, the density of population of this city is also very high and it is increasing farther. However, the distribution of population and the density over the megacity varied greatly from one part to another.

Population growth rates within DMC area varied greatly between wards and unions. It has been observed that the growth rates remain very high in the fringe areas and in few *paurashavas* rather than the central part of the megacity (Map 5.1). The detail analysis of spatial pattern of population growth rates for wards and unions is shown in Table 5.3. A little over one-third (36.64%) of the wards/unions recorded up to 2% growth rate and these areas

Dhaka Megacity: Population Growth Rate 2001-2011

Legend

- Megacity Boundary
- DMA Boundary
- DCC South and DCC North Boundary
- Paurashava Boundary
- Union and Ward Boundary

Population Growth Rate
(Percentage of Population growth Per Year)

- Upto 0
- 0.1 - 2.0
- 2.1 - 4.0
- 4.1 - 6.0
- 6.1 - 8.0
- Above 8

R.F. 1:250,000

0 1 2   4 Miles

0 2 4   8 Kilometers

Sources : Based on LGD-2011, RAJUK-2012 ,
BBS 2001 and BBS 2011.
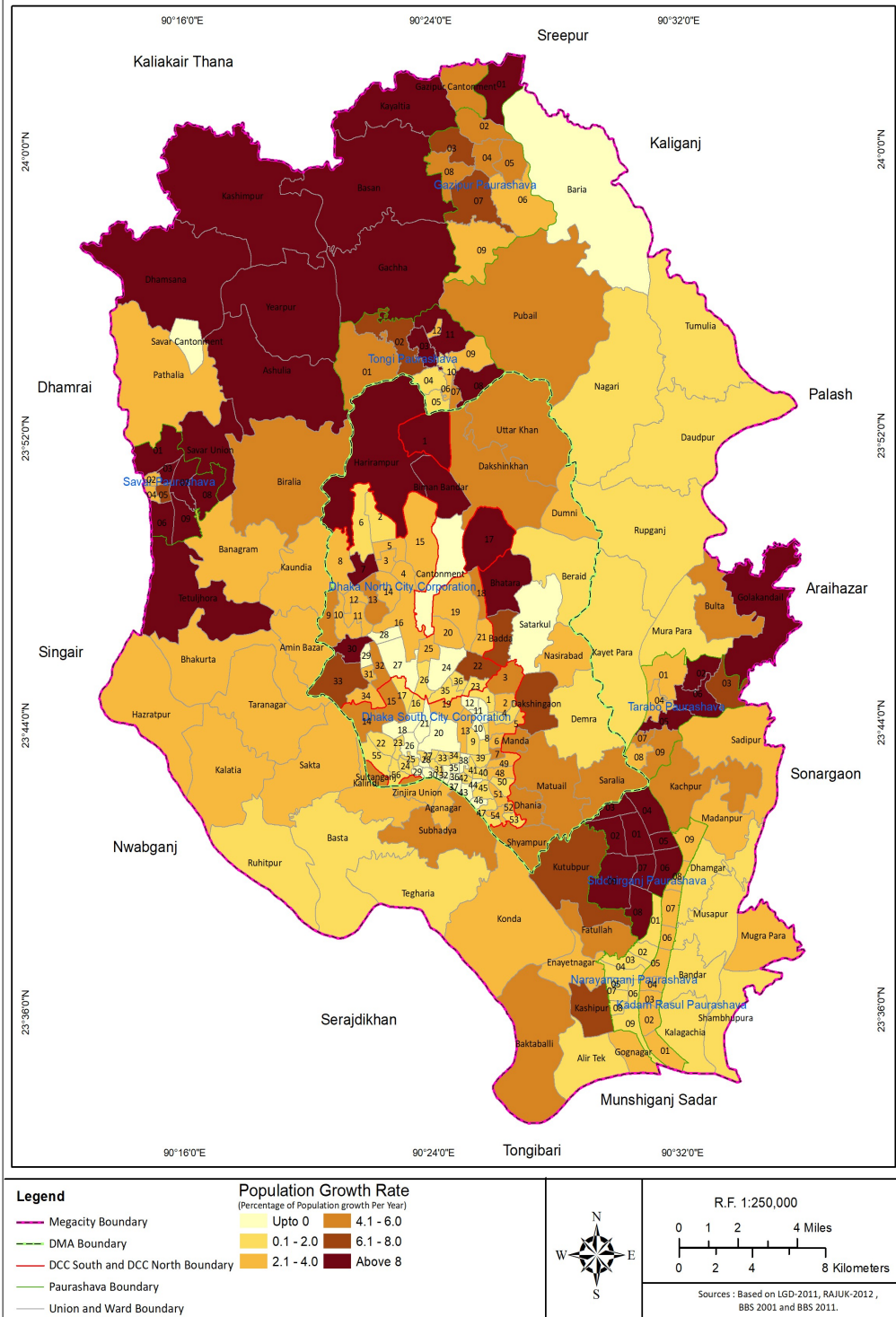
Map-5.1 Population Growth Rate of Dhaka Megacity in 2001-2011

are concentrated at or near the centre of the DMC (Table 5.3). On the other hand, over one-fifth (21.55%) of the wards/unions exhibited a very high growth rates (over 6% per annum). These areas were mostly located at the periphery zones of the city, especially at the north-western part of the megacity (Map 5.1). The largest concentration of high growth rates were seen within Gazipur District. In the eastern part of the megacity, small areas namely Golakandial and some ward of Tarabo *paurashava* located within Narayanganj District are also recorded high growth rates (above 6%).

Table 5.3 also depicted that about 70% of the union/ward of DMC exceeds the national growth rate (1.48%) of 2001- 2011 and about 40% of union/ward shows higher growth rate of Dhaka District (3.53%).

Table-5.3 Dhaka Megacity Population Growth Rate by Ward and Union in 2001 - 2011

Annual Average Growth Rate (%)	Number of Union/Ward	Cumulative Number	Percentage of Union/Ward	Cumulative Percentage
Up to 0	26	26	11.21%	11.21%
0 to 2	59	85	25.43%	36.64%
2 to 4	65	150	28.02%	64.66%
4 to 6	32	182	13.79%	78.45%
6 to 8	11	193	4.74%	83.19%
Above 8	39	232	16.81%	100.00%

Table 5.4 exhibits the growth rate patterns of wards and unions of DMC in 2001 - 2011. Out of 158 wards 45 (28.48%) recorded 2 to 4 percent growth rates and 26 wards (16.46%) recorded over 8 percent growth rates. On the other hand, only 13 unions out of 74 recorded growth rates above 8 percent per annum. In fact the growth rates of unions are significantly lower than that of wards and it is quite obvious as the unions are located at the fringe areas of DMC.

Tables 5.5 and 5.6 named the top ten and bottom ten wards/unions having the highest and the lowest growth rate of population in 2001 - 2011. High growth areas were more concentrated to unions (i.e. in the periphery zone) whereas the low growth areas were within or nearby the centre of the DMC (i.e. in urban

wards). The growth rate of the top ten wards/unions varied from 16.39% to 10.35% and all the bottom ten wards/unions recorded negative growth rates which varied from - 5.51 to - 0.79 percent. It is also noted that all the bottom ten growth rates were found within urban wards i.e. outside the periphery zones. The reasons for high growth rate, especially in the north-west part of DMC are agglomerations of industries and commerce. On the other hand, low growth urban wards are mostly located to the older part of the city (i.e. within DSCC) where population density remains extremely high. Cantonment areas are also recorded low growth of population as these zones of the city remain restricted for civil population and growth of industries and commerce.

Table-5.4 Average Annual Population Growth Rate by Ward and Union within DMC, 2001- 2011

Annual Average Growth Rate (%)	Number of Union	Number of Ward	Percentage of Union	Percentage of Ward
Up to 0	4	22	5.41%	13.92%
0 to 2	17	42	22.97%	26.58%
2 to 4	20	45	27.03%	28.48%
4 to 6	16	16	21.62%	10.13%
6 to 8	4	7	5.41%	4.43%
Above 8	13	26	17.57%	16.46%
DMC	**74**	**158**	**100.00%**	**100.00%**

Table-5.5 Top ten Wards/Unions having High Population Growth Rates under DMC, 2001 – 2011

Name of Ward and Union	Growth Rate 2001-2011	Rank
Yearpur	16.39	1
Dhamsana	14.89	2
Gachha	14.12	3
Ashulia	13.12	4
Savar Psa- Ward 09	12.06	5
Harirampur	10.94	6
Kashimpur	10.84	7
Biman Bandar (rest. Area)	10.75	8
Savar Union	10.54	9
DNCC- Ward1	10.35	10

Table-5.6 Bottom ten Ward and Union having Low Population Growth Rate under DMC, 2001 - 2011

Name of Ward/Union	Growth Rate 2001-2011	Rank
DNCC-24	-5.51	1
DSCC-10	-3.31	2
Savar Cantonment	-3.20	3
DNCC-28	-2.86	4
DSCC-37	-2.63	5
Cantonment (rest. Area)	-2.38	6
DSCC-18	-2.23	7
DNCC-27	-2.17	8
DSCC-36	-0.89	9
DSCC-20	-0.79	10

5.3 Population Growth Rate of Major Administrative Regions of DMC

Table-5.7 represents the annual average growth rate of major administrative regions of DMC in the year of 2001 to 2011. Varied rates of growth are found in the table. DSCC recorded the lowest growth rate (1.29%) and unions outside of DMA recorded the highest growth rate (5.57%). Fig. 5.2 clearly depicted the average annual growth rates of all administrative regions of DMC. The periphery areas within DMC are generally recorded the high growth rates as compared with the wards under the city corporations. The average growth rate of *paurashavas* within DMC was also high (5.40%) though it was slightly lower than the periphery areas. However, the average annual growth rate for DMC as a whole was 3.85% in 2001 to 2011. On the other hand, across the different administrative areas of DMC, the growth rates ranged from - 5.51 to 16.39 percent (Table 5.7). The differential rates of population growth found within the diverse regions/areas of DMC were caused by several reasons such as population density, house rent, land value, concentration of industries and commerce. Regions having low growth are usually characterized by high density of population, higher land value and rent. On the other hand, high growth regions are characterized mainly by low density of population, lower

land value and rend and above all the high concentration of industries and commerce.

Table-5.7 Population Growth Rate of Major Administrative Regions of DMC, 2001 - 2011

Regions of DMC	Population 2011	Population 2001	Growth Rate 2001-2011	Range of Growth Rate- 2001 - 2011
DNCC	3956302	2881180	3.22	-5.51 to 10.35
DSCC	3013803	2652245	1.29	-3.31 to 5.25
Union Within DMA	1935934	1154483	5.31	-2.38 to 10.94
Paurashavas	1801485	1064599	5.40	0.62 to 12.06
Union Outside DMA	3996335	2323572	5.57	-3.20 to 16.39
Dhaka Megacity	**14703859**	**10076079**	**3.85**	**-5.51 to 16.39**

Table-5.8 Class wise Growth Rate and Range of Growth Rate in 2001 - 2011

Class of Growth Rate	Growth Rate 2001-2011	Range of Growth Rate
Up to 0	-1.68	-5.51 to -.05
0-2	1.16	0.05 to 1.98
2-4	2.99	2.01 to 3.98
4-6	4.98	4.01 to 6.00
6-8	6.57	6.03 to 7.48
Above 8	10.68	8.03 to 16.39
DMC	3.85	-5.51 to 16.39
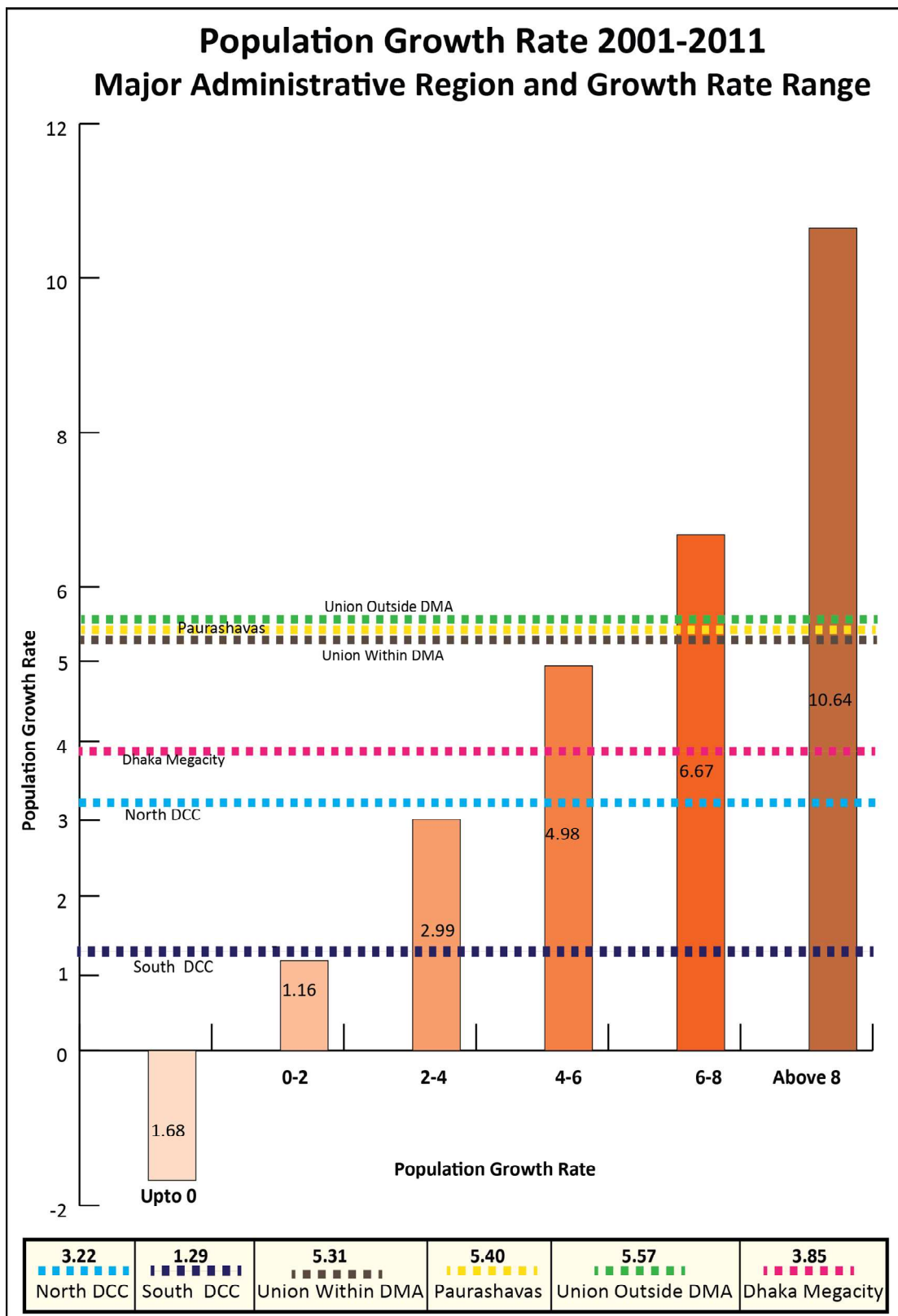
Figure-5.2 Range and Average Population Growth Rate (%) by Major Administrative Regions of DMC, 2001 - 2011

5.4 Urban Area Population Growth Rate in Dhaka Megacity

This section of the thesis focuses the annual growth rates of population living within various wards/unions under city corporations and *paurashavas* of DMC in 2001 - 2011. The growth rates across all urban wards/unions within DMC were not equal and it varied from - 5.51% to 12.06% in 2001 - 2011. The negative and low growth areas were mostly located within several wards of Dhaka City Corporations and cantonment areas (Map 5.2 and Table 5.10). Whereas, high growth urban wards/unions were found to locate at several places/wards of Savar, Siddhirganj, Tongi *paurashavas*, Harirampur Union, Uttara etc. (Table 5.9 and Map 5.2). Rapid growth of industries and commerce are the main reason for high growth of population in these regions. Among all the wards/unions under the DMC, only 25 (out of 179) recorded negative to zero growth and the vast remaining wards/unions recorded positive growth (Table 5.11). The number of wards/unions recorded over 8% growth rate were 29 (16.2%) and those recorded between 4% to 8% growth rates were 34 (19%) as seen in Table 5.11.

Table: 5.9 Top ten Ward/Union having High Population Growth Rate in DMC, 2001 – 2011

Name of Ward and Union	Growth Rate 2001-2011	Rank
Savar Psa- Ward 09	12.06	1
Harirampur	10.94	2
Biman Bandar (rest. Area)	10.75	3
DNCC-1	10.35	4
Siddhirganj Psa	10.31	5
Savar Psa- Ward 07	9.99	6
Savar Psa- Ward 03	9.94	7
Savar Psa- Ward 08	9.94	8
DNCC-7	9.73	9
DNCC-30	9.12	10
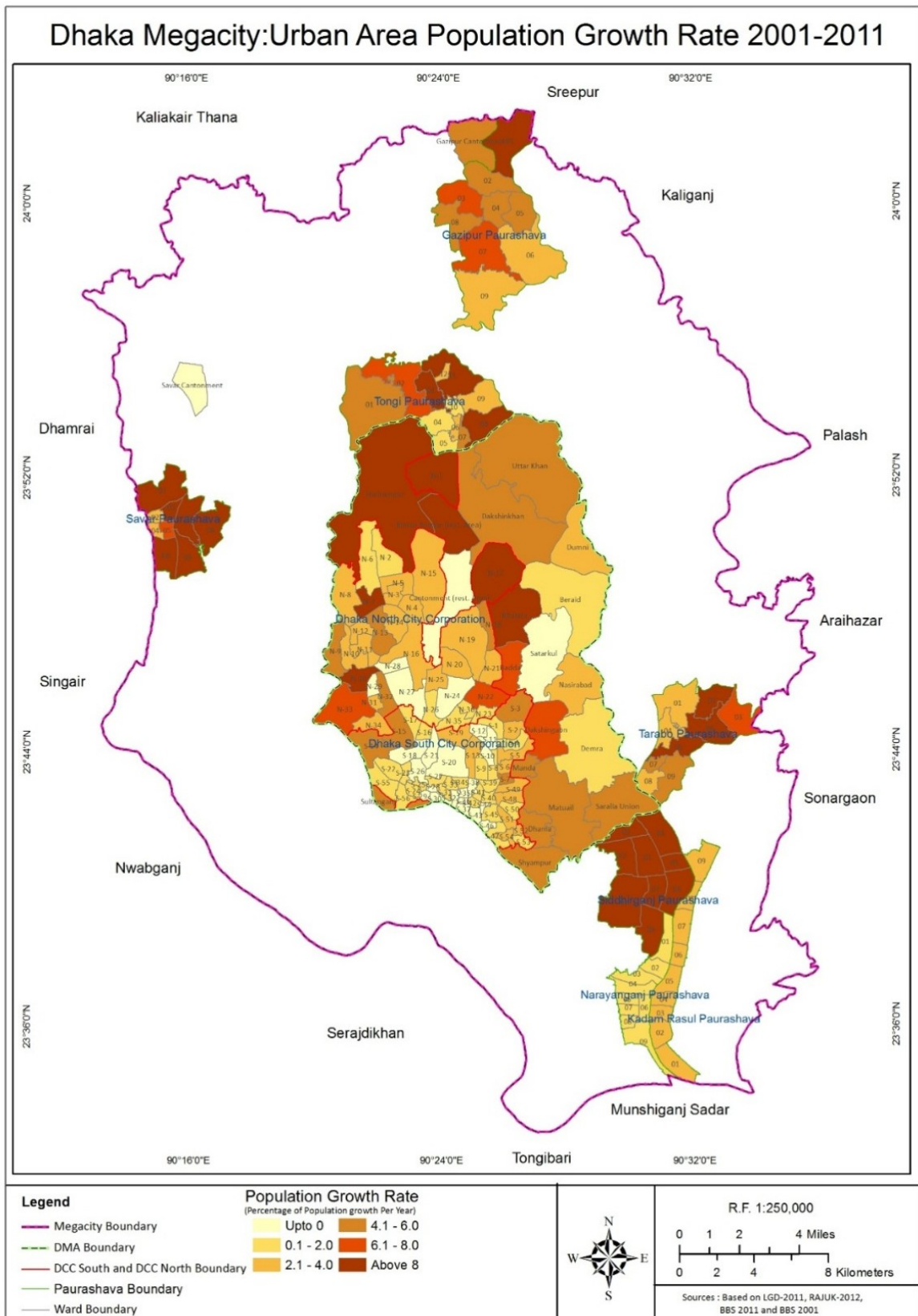
Map-5.2 Urban Area Population Growth Rate in DMC, 2001 - 2011

Table-5.10 Bottom ten Ward/Union having Low Growth of Population in DMC, 2001 - 2011

Name of Ward and Union	Growth Rate 2001-2011 (%)	Rank
DNCC-24	-5.51	1
DSCC-10	-3.31	2
Savar Cantonment	-3.20	3
DNCC-28	-2.86	4
DSCC-37	-2.63	5
Cantonment (rest. Area)	-2.38	6
DSCC-18	-2.23	7
DNCC-27	-2.17	8
DSCC-36	-0.89	9
DSCC-20	-0.79	10

Table-5.11 Urban Area Population Growth Rate of DMC by Ward and Union in 2001 - 2011

Growth Rate (%)	Number of Union/Ward	Cumulative Number	Percentage of Union/Ward	Cumulative Percentage
Up to 0	25	25	13.97	13.97
0-2	44	69	24.58	38.55
2-4	47	116	26.26	64.80
4-6	25	141	13.97	78.77
6-8	9	150	5.03	83.80
Above 8	29	179	16.20	100.00

5.5 Population Growth Rates of Unions under Dhaka Megacity

This section of the thesis analyses the exponential growth of population of unions under DMC during 2001 - 2011. Unlike the core of the DMC, this vast periphery areas surrounding the core exhibited higher growth rates (Map. 5.3 and Table 5.12). However, the growth rates over this vast fringe zone varied significantly, showing a very high growth rates (10% to over 16%) in the north-western part of the periphery (Table 5.13) where industrial and commercial activities are highly concentrated. The average growth rate of the fringe remains very high (over 5% per annum, see Fig. 5.2) and the number of unions
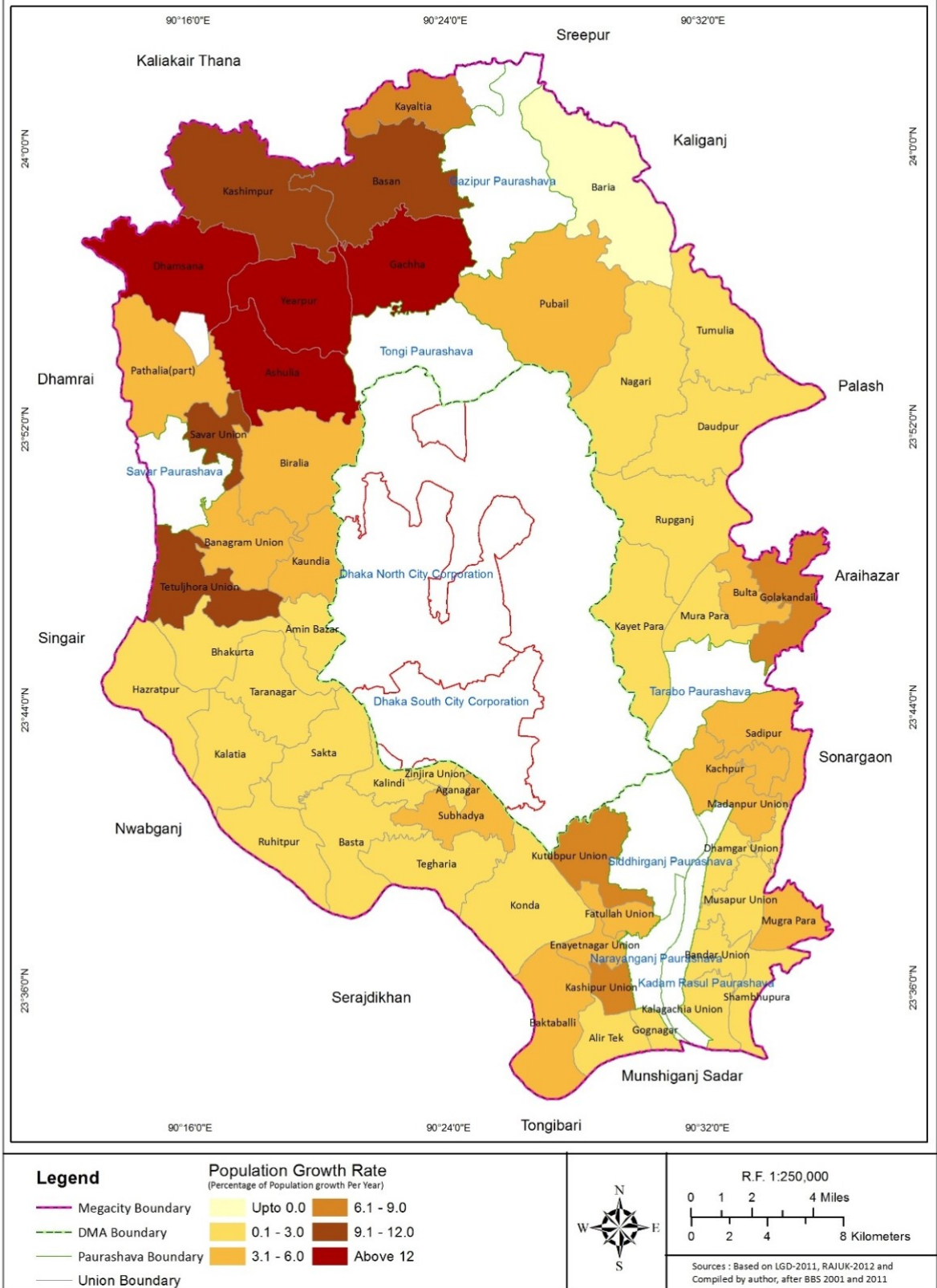
Map-5.3 Population Growth Rate of Unions under DMC in 2001 - 2011

having low growth rates are also found very few (Tables 5.12 and 5.14). It is important to note that the rapid population growth of DMC has been accelerated mainly due to steady growth of inhabitants within the vast urban fringe areas which are administrated by union councils. The negative growth of Population within the unions remains almost nil, in fact only one out of 53 unions (Table 5.14). On the other hand, a large number of urban neighborhoods (wards) recorded negative population growth (Fig. 5.2 and Table 5.10).

Table-5.12 Population Growth Rate by Union in 2001 - 2011

Growth Rate (%)	Number of Union	Percentage of Union
Up to 0	1	1.89
0-2	15	28.30
2-4	18	33.96
4-6	7	13.21
6-8	2	3.77
Above 8	10	18.87
Total	**53**	**100.00**

Table-5.13 Top ten Unions having High Growth Rate of Population in DMC, 2001 - 2011

Name of Union	Growth Rate 2001-2011	Rank
Yearpur	16.39	1
Dhamsana	14.89	2
Gachha	14.12	3
Ashulia	13.12	4
Kashimpur	10.84	5
Savar Union	10.54	6
Basan	10.01	7
Tetuljhora Union	9.80	8
Golakandail	8.23	9
Kayaltia	8.23	10

Table-5.14 Bottom ten Unions having Low Growth Rate of Population in DMC, 2001 - 2011

Name of Union	Growth Rate 2001-2011	Rank
Baria	-0.29	1
Kayet Para	0.24	2
Tegharia	0.30	3
Daudpur	0.55	4
Rupganj	0.71	5
Tumulia	0.88	6
Shambhupura	0.92	7
AlirTek	1.06	8
Nagari	1.10	9
Ruhitpur	1.11	10

5.6 Population Growth Rates of DNCC and DSCC in 2001 – 2011

Dhaka City Corporations namely DNCC (Dhaka North City Corporation) and DSCC (Dhaka South City Corporation) are the core areas of DMC where the density of population remains very high but the growth of inhabitant's remains comparatively low (compared with the fringe zones surrounding the two city corporations). This section closely analyses the comparative patterns of population growth within the two city corporations during 2001 – 2011.

Of the two city corporations, DSCC is older where population density is much higher (68511 in 2011) and the growth of inhabitants during 2001 – 2011 appeared to be significantly lower as compared with DNCC (see map. 5.4 and 5.5 and Tables 5.15 to 5.20). The average annual growth rates of population recorded for DSCC and DNCC were 1.29% and 3.22% respectively (Fig. 5.2). Within DSCC, population growth rates during 2001 – 2011 varied from - 3.31% to 5.26% (Tables 5.19 and 5.20) whereas during the same census decade DNCC recorded - 5.51% to 10.35% growth rates (Tables 5.16 and 5.17). In another statistics, the overwhelming majority of wards/unions under DSCC (92.4% or 49 out of 53 wards/unions, see Table 5.18) recorded up to 4% growth rates as against 72.22% or 26 out of 36 wards/unions under DNCC recorded 4% growth rates (Table. 5.15). That means, a significantly higher

number of wards/unions under DNCC recorded over 4% growth rates (Table 5.15 and Map 5.4) even some of the wards/unions recorded over 8% growth rates. In fact, being relatively new, the growth of population remaining higher in DNCC as compared with DSCC. All the bottom ten wards/unions under DSCC recorded negative growth rates as against to only 4 wards/unions of DNCC, where there is evident negative growth in the last census decade (i.e. 2001 - 2011).

Table-5.15 Population Growth Rates of DNCC in 2001 – 2011

Growth Rate (%)	Number of Ward	Cumulative Number	Percentage of Ward	Cumulative Percentage
Up to 0	4	4	11.11%	11.11%
0-2	6	10	16.67%	27.78%
2-4	16	26	44.44%	72.22%
4-6	4	30	11.11%	83.33%
6-8	2	32	5.56%	88.89%
Above 8	4	36	11.11%	100.00%

Dhaka North City Corporation: Population Growth Rate 2001-11
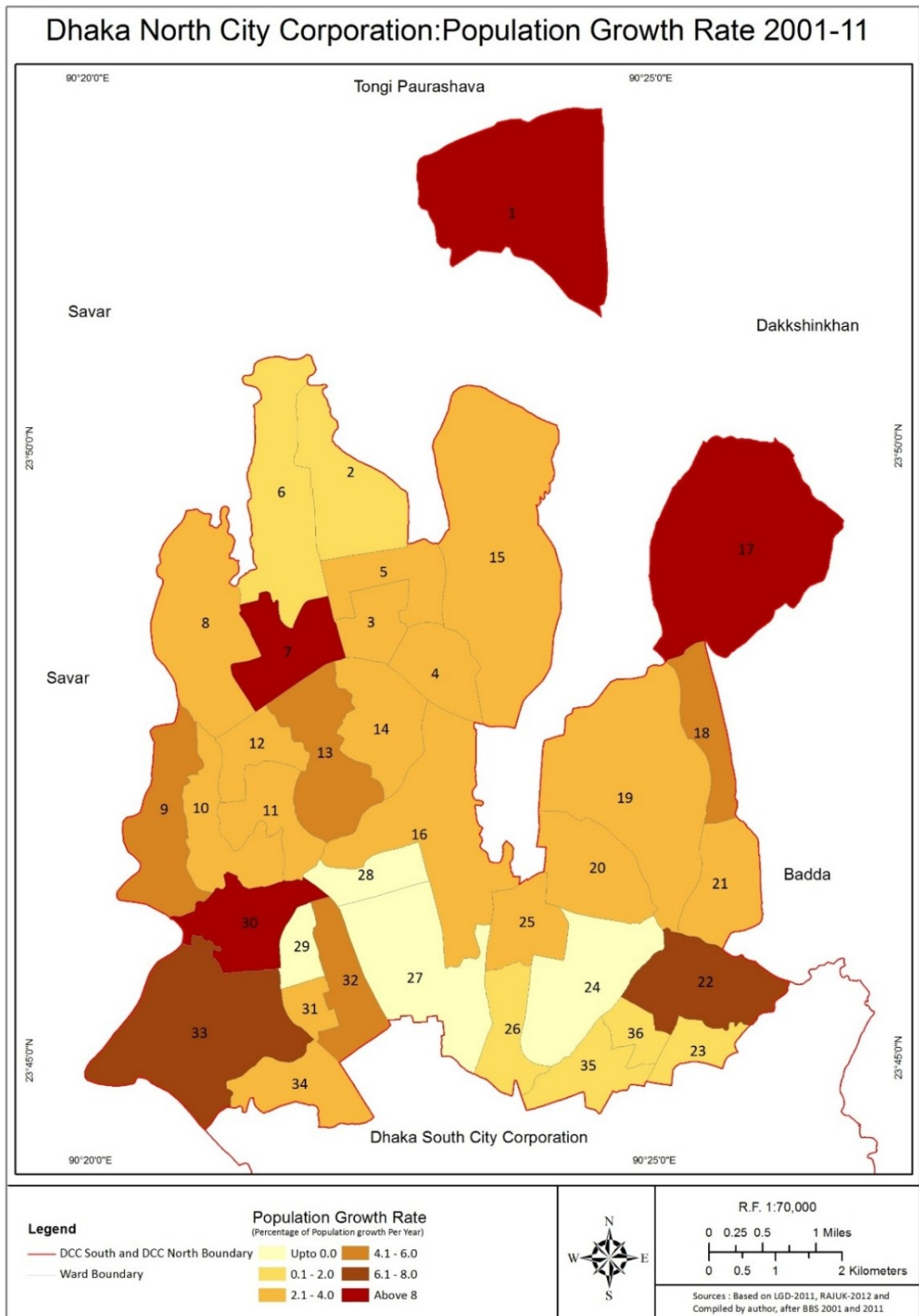
Map-5.4 Population Growth Rates of DNCC in 2001 - 2011

Table-5.16 Population Growth Rates of Top ten Wards of DNCC in 2001 – 2011

Name of Ward	Growth Rate (%)	Rank
DNCC-1	10.35	1
DNCC-7	9.73	2
DNCC-30	9.12	3
DNCC-17	8.44	4
DNCC-22	6.38	5
DNCC-33	6.09	6
DNCC-18	5.69	7
DNCC-13	5.26	8
DNCC-9	5.00	9
DNCC-32	4.54	10

Table- 5.17 Population Growth Rates of Bottom ten Wards of DNCC in 2001 – 2011

Name of Ward	Growth Rate (%)	Rank
DNCC-24	-5.51	1
DNCC-28	-2.86	2
DNCC-27	-2.17	3
DNCC-29	-0.59	4
DNCC-35	0.05	5
DNCC-26	0.38	6
DNCC-36	1.36	7
DNCC-2	1.74	8
DNCC-6	1.84	9
DNCC-23	1.95	10

Table-5.18 Population Growth Rates of DSCC in 2001 – 2011

Growth Rate (%)	Number of Union/Ward	Percentage of Union
Up to 0	18	32.14%
0-1	14	25.00%
1-2	10	17.86%
2-3	3	5.36%
3-4	7	12.50%
Above 4	4	7.14%
Total	53	100%
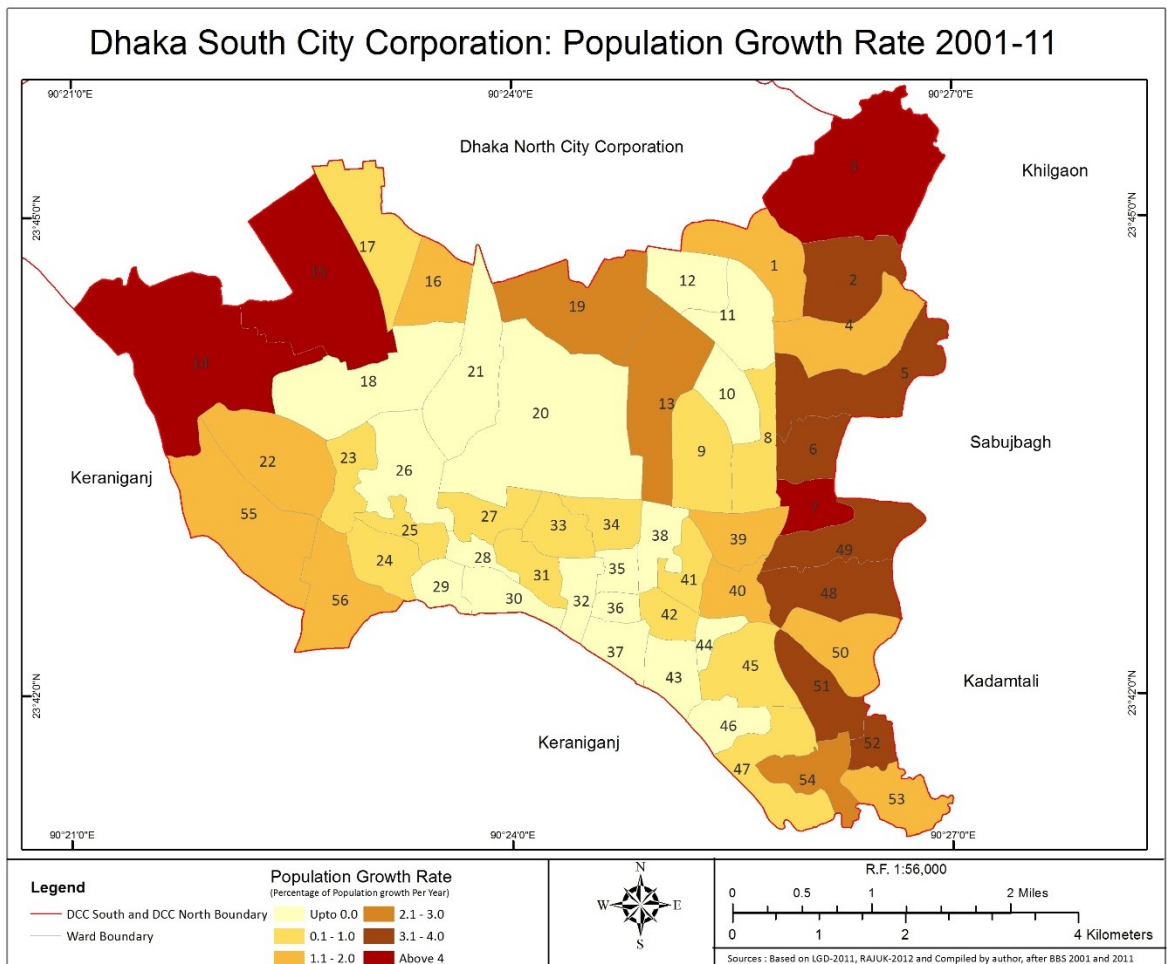
Map-5.5 Population Growth Rates of DSCC in 2001 - 2011

Table-5.19 Population Growth Rates of Top ten Wards of DSCC in 2001 - 2011

Name of Ward	Growth Rate 2001-2011	Rank
DSCC-7	5.26	1
DSCC-3	4.86	2
DSCC-15	4.64	3
DSCC-14	4.36	4
DSCC-6	3.89	5
DSCC-48	3.74	6
DSCC-51	3.24	7
DSCC-2	3.20	8
DSCC-52	3.15	9
DSCC-49	3.11	10

Table-5.20 Population Growth Rates of Bottom ten Wards of DSCC in 2001 - 2011

Name of Ward	Growth Rate (%)	Rank
DSCC-10	-3.31	1
DSCC-11	-0.63	2
DSCC-12	-0.53	3
DSCC-18	-2.23	4
DSCC-20	-0.79	5
DSCC-21	-0.73	6
DSCC-26	-0.76	7
DSCC-28	-0.37	8
DSCC-29	-0.19	9
DSCC-30	-0.05	10

5.7 Population Growth of DMA within Dhaka Megacity

Dhaka Metropolitan Area (DMA) is primarily an administrative area for police administration in the capital city Dhaka. The core areas of Dhaka City (i.e. DSCC, DNCC and cantonments) are located within the Dhaka Metropolitan Area. DMA has its' unique shape developed by 3 rivers – Buriganga on the west, Turag on the north and north-west and Balu on the east. In the southern part, Dhaka-Chittagong Road is the boundary of DMA. In late 2016 most part of DMA has been incorporated within the two city corporations of Dhaka City (i.e. DNCC and DSCC). However, for the convenience of this study, data analyses made for the two city corporations were based on old boundary of DSCC and DNCC.

The development of urbanization within the DMA is not uniform; a large part of it, especially in the eastern part still remains predominantly suburban character where agricultural land use along with semi-*pucca* and *kutcha* houses predominates. The density of population in this vast urban fringe area is significantly low as compared with the core areas of DMA. Given these facts, the growth of population within the periphery of DMA remains high as seen in Map 5.6 and Table 5.22. In the northern part of the fringe, some areas (unions) exhibited an extremely high growth of inhabitants (6% to over 10% per annum) during 2001 – 2011 (Fig. 5.6 and Table 5.22). In contrast, the growth rates within the core areas of DMA i.e. within DSCC and DNCC remains significantly low. Over one fifth (21.62%) of the ward/unions of DMA recorded negative to zero growth (Table 5.21) and 28.83% of the wards/unions within DMA (32 out of 111) evidenced 0 to 2 percent growth.

Almost all these negative and very low growth areas are located within the core areas of DMA (Map 5.6 and Table 5.23). The higher growth of population within the periphery of DMA can be plausible due to the fact that land value and house rent remains considerably low as compared with the city core areas and as a result Dhaka bound migrants had/has been attracted (or bound to) to live within the periphery of DMA. The extremely high growth of population within

some areas of the periphery of DMA is, in fact, caused by high concentration of industries and commerce in those areas.

Table-5.21 Population Growth Rate by Ward/Union within DMA, 2001 - 2011

Growth Rate (%)	Number of Ward/Union	Percent of Ward/Union
Up to 0	24	21.62
0-2	32	28.83
2-4	28	25.23
4-6	16	14.41
6-8	4	3.60
Above 8	7	6.31
Total	**111**	**100.00**

Dhaka Metropolitan Area: Population Growth Rate 2001-11
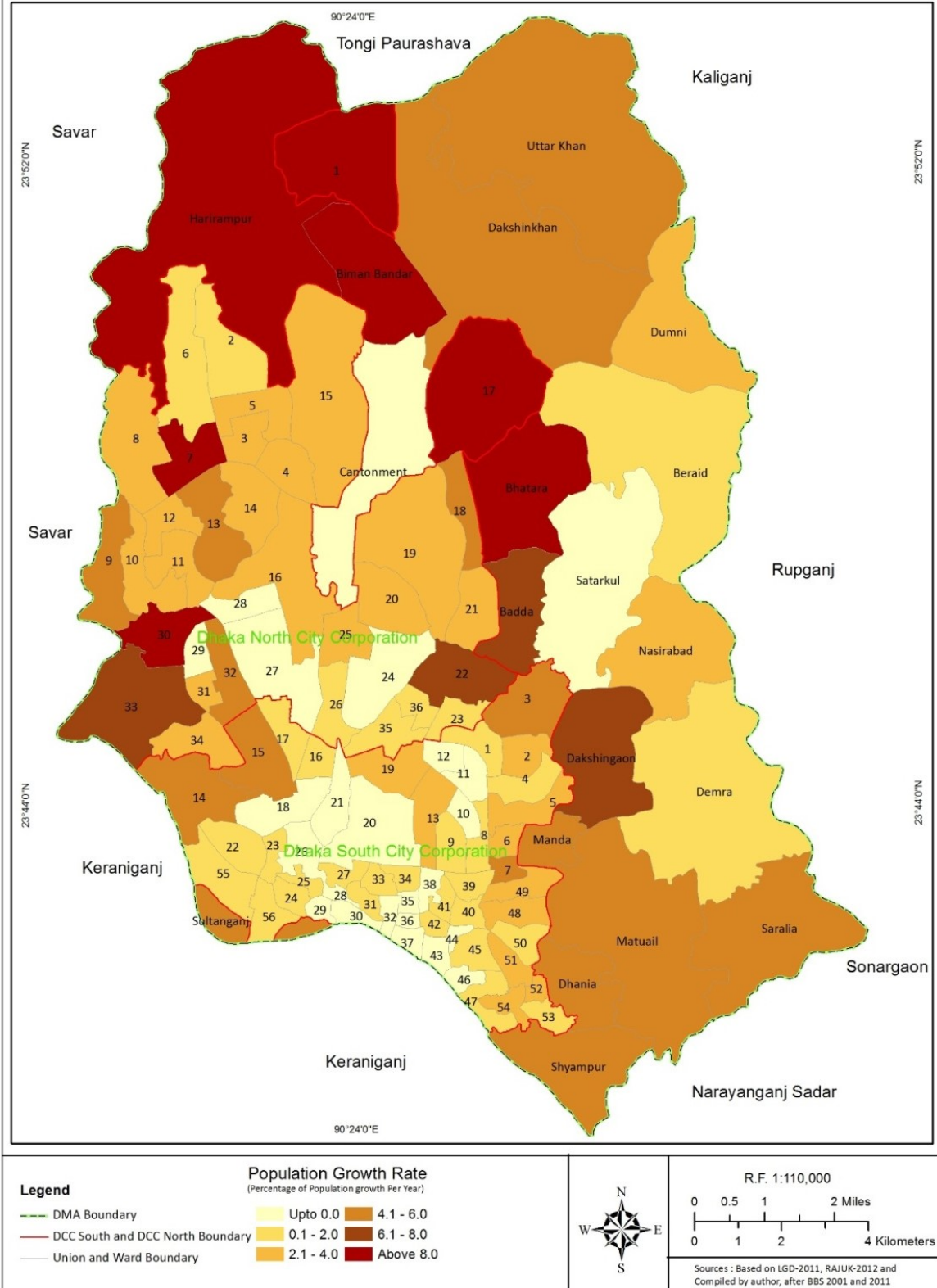
Map-5.6 Urban Population Growth Rate within DMA by Ward/Union, 2001 - 2011

Table-5.22 Top ten Wards/Unions having High Growth Rate of Population in DMA, 2001 - 2011

Name of Ward/Union	Growth Rate (%)	Rank
Harirampur	10.94	1
Biman Bandar (rest. Area)	10.75	2
DNCC-1	10.35	3
DNCC-7	9.73	4
DNCC-30	9.12	5
Bhatara	8.51	6
DNCC-17	8.44	7
Badda	7.35	8
Dakshingaon	7.10	9
DNCC-22	6.38	10

Table-5.23 Bottom ten Wards/Union having Low Population Growth Rate in DMA, 2001 - 2011

Name of Ward/union	Growth Rate (%)	Rank
DNCC-24	-5.51	1
DSCC-10	-3.31	2
DNCC-28	-2.86	3
DSCC-37	-2.63	4
Cantonment (rest. Area)	-2.38	5
DSCC-18	-2.23	6
DNCC-27	-2.17	7
DSCC-36	-0.89	8
DSCC-20	-0.79	9
DSCC-26	-0.76	10

5.8 Population Growth Rate of Paurashavas within DMC

At the beginning of this research there were 7 *paurashavas* within the DMC and the growth of population of these municipalities during 2001 - 2011 are discussed in this section. Except Narayanganj (the oldest town among the 7 *paurashavas*), the growths of population of these municipalities were high (Table 5.24), higher than that of the core areas of DMC. Map 5.7 displays the detailed growth rates by wards of these *paurashavas* and it shows that over one third of all wards (33.33%, see Table 5.25) recorded over 8% growth rates; some of them recorded even much higher 10 - 12 percent (Table 5.26). The average annual growth rate for all *paurashavas* during 2001-2011 was 5.40% (Table 5.24) which was much higher than that of DNCC, DSCC, DMC or even DMA (see Fig. 5.2). Of the seven *paurashavas*, Siddirganj recorded the highest growth rate (10.31%) and it was followed by Savar (8.41%), Gazipur (5.82%), Tongi (5.34%) and Tarabo (5.16%). Narayanganj recorded the lowest growth rate of 1.94% only. Unlike the core areas of DMC or DMA, these *paurashavas* didn't record any negative or zero growth of population within any ward during 2001 - 2011 census decade (Table 5.27).

Table-5.24 Average Growth Rate of Population at Paurashava, 2001 - 2011

Name of Paurashava	Population 2011	Population 2001	Growth Rate (%) 2001-2011
Gazipur Psa	179037	101665	5.82
Kadam Rasul Psa	166291	128561	2.61
Narayanganj Psa	286330	236390	1.94
Savar Psa	286008	127540	8.41
Shiddhirganj Psa	256760	96222	10.31
Tarabo Psa	150709	91122	5.16
Tongi Psa	476350	283099	5.34
All Paurashavas	**1801485**	**1064599**	**5.40**

The researcher tried to find out the reasons behind the rapid growth of population in these *paurashavas*. To avoid high density along with higher land

value and house rent in the core areas of Dhaka City, many people (rural out-migrants) preferred to live in those *paurashavas* locating nearby the capital city Dhaka. Being located very close to Dhaka City, these *paurashavas* also have a good access to frequent movement to and from the capital city. Some of these *paurashavas* like Savar, Gazipur, Tongi, Siddirganj already have developed industrial hubs which attracts a wide range of labourers from high skilled, semi-skilled to low skilled. Narayanganj *Paurashava* being located adjacent to Dhaka City and having high density of population, the growth rate of inhabitants during 2001 - 2011 appeared to be relatively low as compared with the other *paurashavas*. The city of Narayanganj is also one of the oldest towns nearby Dhaka City.

Table-5.25 Population Growth Rate at Paurashavas, 2001 - 2011

Growth Rate (%)	Number of Ward	Percent of Ward
up to 2	12	18.18
2-4	19	28.79
4-6	8	12.12
6-8	5	7.58
Above 8	22	33.33
Total	**66**	**100.00**

Table-5.26 Top ten Wards having High Growth Rates of Population in Paurashavas, 2001 - 2011

Name of Ward	Growth Rate (%)	Rank
Savar Psa- Ward 09	12.06	1
Siddhirganj Psa	10.31	2
Savar Psa- Ward 07	9.99	3
Savar Psa- Ward 03	9.94	4
Savar Psa- Ward 08	9.94	5
Gazipur Psa-Ward 01	9.07	6
Savar Psa- Ward 01	8.78	7
Tongi Psa- Ward 11	8.72	8
Tongi Psa- Ward 03	8.44	9
Tarabo Psa-Ward-02	8.42	10

Paurashavas of Dhaka Megacity:Population Growth Rate 2001-11

Kaliakair Thana

Sreepur

Kaliganj

01

02

03

04 05

08

07 06

09

Gazipur Paurashava

Dhamrai

Palash

02

11

09

01 04 10

05 06

Tongi Paurashava

Savar Paurashava

01

03

05

06 09 08

Dhaka North City Corporation

Araihazar

Singair

Dhaka South City Corporation

01

03

05 07 08 09

Tarabo Paurashava

Sonargaon

03

01

02 05

07 06

08 01

06

Siddhirganj Paurashava

Nwabganj

04 02 05

04

Narayanganj Paurashava

Kadam Rasul Paurashava

Serajdikhan

09 02

01

Munshiganj Sadar

Tongibari

Legend

——	Megacity Boundary	
-----	DMA Boundary	
——	DCC South and DCC North Boundary	
——	Paurashava Boundary	
——	Ward Boundary	

Population Growth Rate
(Percentage of Population growth Per Year)

	Upto 0.0		4.1 - 6.0
	0.1 - 2.0		6.1 - 8.0
	2.1 - 4.0		Above 8.0

R.F. 1:250,000

0 1 2   4 Miles

0 2   4   8 Kilometers

Sources : Based on LGD-2011, RAJUK-2012 and
Compiled by Author, based on BBS 2001 and BBS 2011

**Map-5.7 Population Growth Rates of Paurashavas within DMC,
2001 - 2011**

Table-5.27 Bottom ten Wards having Low Growth of Population in Paurashavas, 2001 - 2011

Name of Ward	Growth Rate (%)	Rank
Tongi Psa- Ward 04	0.62	1
Tongi Psa- Ward 10	0.85	2
Tongi Psa- Ward 05	1.50	3
Narayanganj Psa	1.94	4
Tarabo Psa-Ward-01	2.01	5
Gazipur Psa-Ward 06	2.08	6
Tongi Psa- Ward 06	2.45	7
Tongi Psa- Ward 12	2.49	8
Kadam Rasul Psa	2.61	9
Tarabo Psa-Ward-08	2.90	10

5.9 Conclusion

This chapter of the thesis deals with the growth of urban population in 2001-2011 within the DMC as a whole and different administrative area of DMC in particular. The main objective was to identify the high and low growth areas along with the possible reasons behind the differential growth rates within the DMC. Analyzing 2011 Census data, the study arrived at a conclusion that Dhaka Megacity had experienced a wide range of growth rates during the last census decade (2001 - 2011) within the different administrative areas of DMC. Some parts of the DMC recorded very high growth rates, especially in the north-western part where industrial and commercial activities are heavily concentrated; while in core areas or older parts of the DMC, the growth rates found significantly low, even in some areas the growth rates were negative to zero and these areas are characterized by super high density of people (density over 50,000 persons per km^2) along with very high land value and house rent. The study also noted that periphery areas of DMC and DMA where density of people along with land value and house rent remains comparatively low, the growth of population recorded high to very high. DMC is located within a flood prone area and due to shortage of naturally built up area, vast number of people are compelled to live especially in the city's flood vulnerable

periphery areas. Within DMC a significant part of it still remains almost uninhabited, especially in the periphery zones and these low-lying areas are mostly used as agricultural purposes, seasonal fishing or brick production industries or as wetlands. These are the most potential areas of expanding urban settlements in future. Due to high demand of residential and commercial lands within the DMC, land filling activities at massive scale using locally made low cost dragger technology along with boat for transporting dragged mud/soil mostly from rivers has been going on within DMC. Given this situation, the rapid growth of population, especially within the periphery areas of DMC will continue for several decades or more.
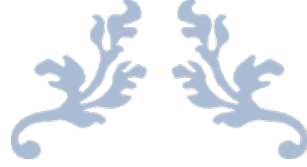
Conclusion and Recommendations

1. Introduction

Dhaka is a suitable place in terms of location of capital city of Bangladesh. It is surrounded by beautiful natural feathers like rivers, flood plains and undulating landmass of the Modhupur Tract, particularly at the northern side of the city. After the independence of Bangladesh the city began to grow very fast both in terms of population and spatial expansion. Since 1990s vertical expansion of the city along with filling of city's low-lying wetlands and floodplains together radically has been changed the city's physical dimension and population density. Since the independence, millions of voluntary and involuntary migrants mostly from the countryside migrated to this capital city for work, doing business, study and even for taking shelter due to natural hazards. Given this situation Dhaka has rapidly changed from a city to a megacity and the growth of population along with the density both has rapidly increased. Being central location with good access to almost all districts HQs DMC became the country's largest concentration of all industries (including RMG), SMEs, commerce, education, transport and construction works, and a wide variety of informal activities. Given these facts, DMC becomes the 'Mecca' for virtually all walks of people in Bangladesh. Rapid increase of population and physical expansion of the capital city puts immense pressure to city's healthy growth and economic and ecological sustainability. Based on the study findings, this concluding chapter postulates some recommendations for balanced urbanization and management of massive migration towards Dhaka Megacity.

6.2 Major Findings

The findings of this thesis based on detailed analysis of data have already been explained along with relevant statistics and illustrations in the respective chapters. In this last chapter only the major findings are briefly highlighted here and these are as follows:

1. Of the 32 world megacities, DMC ranked 11th and by 2030 it may be ranked 6th or even lower. At present the city has nearly 20 million inhabitants constituting 12% of the total population of Bangladesh and over 40% of total urban population of the country. The areal extent of DMC is only 1500 km^2 which is just one percent of the total area of Bangladesh.

2. In terms of density of population, DMC appeared as one of the highest densely populated megacities in the world. The average density of inhabitants recorded in 2011 Census was over 10,000 persons per km^2. The core areas of DMC, the average density exceeded over 50,000 persons per km^2. In some parts of the city, the density reached to 100 to 200 thousand persons per km^2. In slum areas of DMC the average density reached to a super high level (over 250,000 persons per km^2). Due to shortage of space at the core areas of the city and very high land value and house rent, population density has been increasing very rapidly along the vast urban fringe areas of DMC. Currently (in 2011 Census) the average density within the fringe area varied from over 4000 to almost 10,000 persons per km^2.

3. An acute density variation has also been observed between the core and periphery zones of DMC. On average, - 43.27 to 356.18 percent variation of density were recorded within the DMC between 2001 - 2011. The average density variation for DMC as a whole was found 45.93%. The older part of the city (i.e. DSCC) where the density was recorded very high, density variation was found very low (13.63% only). DNCC recorded 37.32% density variation. While within the periphery zones and most of the *paurashava* towns density variations were found very high 68% to 72%. Most of the recent migrants coming to stay at Dhaka City usually prefer to stay at the periphery zones due to availability of work at one hand and lower land value and house rent (lower than that of the core areas of Dhaka City).

4. As stated earlier that DMC is one of the fastest growing megacities in the world. The average annual exponential population growth rate for DMC as a whole was recorded 3.85% between 2001 - 2011. However, within the vast areas of DMC (i.e. wards and unions), growth rates were found to be varied

from - 5.5% to 16.4%. High growth rate areas were mostly located at the fringe areas, particularly at the north-western and eastern fringe areas. Older part of the city, particularly DSCC recorded relatively low growth rates (- 3.31 to 5.26 percent per annum). The average growth rate recorded for DSCC and DNCC were 1.29% and 3.22% respectively. Negative growth areas are mostly located at the core areas and relatively older parts of DMC including Dhaka Cantonment. Whereas high growth rates (areas having over 10% growth rates per annum) were located mostly at the periphery areas, particularly at around Savar *Paurashava*, Tongi, Konabari, Siddirganj *Paurashava*, Vatara, Golakandail, Tarabo *Paurashava* etc. These are the areas where industrial and commercial activities along with construction works have been concentrated in the recent decades or so. It should be noted here that high growth rates are usually found in the areas where the density of population appeared to be low.

6.3 Recommendations

To turn the once traditional Dhaka City into an aesthetic, healthy and habitable modern city is indeed a demand of time. Dhaka is one of the fastest growing megacities in the world. But at the same time, it is the most unlivable city as well. Acute population pressure mainly arising from massive in-migration to this capital city is the root cause of haphazard and unhealthy growth of urbanization within DMC. Huge population along with very high density and growth rate of people, poor economic, housing and education status of the citizens make the city almost unmanageable particularly from the point of traffic and waste management, natural hazards and health risks management and overall sustainability of the city itself. Given these situations and based on the study findings, some relevant recommendations are put forwarded here with a view to make DMC a decent and livable modern city in Asia. These recommendations are listed below:

1. The root cause of unlivability in Dhaka City obviously associated with the city's huge size of population (currently about 20 million) and severely

compact living i.e. very high density of people. To address this vital issue, first and foremost task will be to undertake appropriate and effective policy prescriptions to divert Dhaka-bound potential migrants preferably to all regional cities and district HQs so that the rural out-migrants can have easy access and get vital services (e.g. quality school education, health services and adequate employments) to nearby cities and towns.

2. Discourage permanent and quasi-permanent migrants to settle within DMC and this policy can easily and effectively be implemented by introducing regular commuter services through train from Dhaka to greater districts like Mymensingh, Tangail, Comilla, and even to Faridpur, Jessore etc. (when Padma Bridge will be opened). It will not only reduce population pressure to DMC rather it will tremendously enhance rural development, agricultural productivity and above all socio-economic condition of rural people. India has already introduced regular commuter services from big cities to their respective hinterland and it brings immense benefits to both big cities and their vast rural hinterlands. In fact, rural-urban commuting services have been recognized as an effective policy to combat massive migration to big cities throughout the whole world. For balanced urbanization, decentralization of some facilities from mega urban centre (Dhaka, Chittagong) should be removed to district town.

3. Population migration and urbanization has an intrinsic relationship. To implement planned migration (particularly rural to urban internal migration) planned urbanization is essential prerequisite. In Bangladesh and also many developing countries, growth and development of many cities usually occur naturally without having any long lusting vision along with appropriate and adequate planning. In a planned city, population size along with its density both is essential part of planning and those should be considered well before the start of building a city. If these two vital parameters exceed the planned limits, the city will be automatically unsustainable. This has happened for Dhaka City. Now we can't reduce the population of DMC by force or even by introducing policy which will be attractive to millions of potential returnees from Dhaka City. Given this fact, recommendations one and two as stated

above will be more appropriate for sustainability of DMC and maintain livability of its people.

4. Bangladesh has more than 500 urban centers and of them only around 10 centers along with their vast fringe areas is located within DMC. In fact, except the divisional HQs and a few greater district towns like Comilla, Mymensingh, Jessore, Bogra, Cox's Bazar etc. the overwhelming majority of cities and towns are virtually remain less attractive to millions of rural-urban migrants. The main reason behind this is the general negligence of formulating proper urbanization policy for those urban centre's. Given this situation, immediate attention should be given to make those towns attractive to the neighboring rural people (i.e. hinterland's people) so that potential rural out-migrants are encouraged to migrate to those secondary towns instead of overcrowding to Dhaka City. In many studies, experts have already emphasized to develop secondary towns in planned way with a view to reduce excessive migration pressure to Dhaka City at one hand and make those towns sustainable and socio-environmentally livable.

5. Like Bangladesh, the city of Dhaka has been experiencing a wide range of common natural hazards like floods, water logging, heavy rain, storms (nor'wester, thunderstorm, and hailstorm), heat waves, fog, etc. Seismic experts believe that an earthquake with medium to high range along the north-eastern part of the Himalayan Range may have a severe impact on densely inhabited city of Dhaka. The city's living environment has already been severely affected by air, water, dust and noise pollutions and these are causing a serious health hazard. Under these circumstances, we must be cautious about the rapid growth of population size along with hyper density of people and properties within Dhaka City. The impacts of hazards and pollutions on the capital city- Dhaka can be much more than what we think today. Being the capital and industrial, commercial and educational headquarters of the country, Dhaka is contributing over one-third of the national GDP. The combined and cumulative effects of the above natural hazards and pollutions within DMC region, may jeopardize or even collapse

the country's economy, administration, development vis-a-vis the progress of the country. Therefore, concentration of people along with their properties within DMC should strictly be reduced by introducing innovative population distribution plan, alternative urbanization plan (i.e. secondary town development) and above all diverting potential migrants' flows outside of the capital city.

6. To release severe population pressure from the capital city, decentralization of certain services and facilities should be undertaken by introducing innovative and lucrative policies. It is difficult but not impossible. Some services or facilities from health, education, judicial, financial, commercial, and industrial and even some administrative services can be shifted from Dhaka to other convenient cities or places. Private entrepreneurs should be motivated and given certain incentives to shift their firms from Dhaka and new entrepreneurs will not be allowed to establish their firms within or nearby the capital. For greater interest of the country and people, a precise policy for decentralizing services and facilities from the capital should be formulated by consulting with relevant stakeholders, experts and reviewing relevant policies undertaken by other countries.

7. In order to release the pressure of over population and congestion in the inner-city areas of DMC, a policy of de-concentration should be adopted. Under this policy existing satellite towns e.g. Savar *Paurashava* should be developed further and establishing new satellite towns should be undertaken immediately. In addition, less attractive periphery areas of DMC (i.e. areas where population growth rates are relatively low, particularly at the western part of the periphery) should be made attractive to the potential migrants by introducing attractive incentives for housing, business, etc.

8. Finally, a sustainable population density plan should be developed and be maintained considering the country's natural hazards, social threats and security and above all the growing environmental risks that make Dhaka City one of the most unlivable cities in the world.

6.4 Further Research Needs

Dhaka Megacity where the country's administrative, industrial, commercial and cultural capitals are located deserves special attention to a wide range of researchers for its' sustainable growth and development. Census data based scientific and in-depth studies on population dynamics of Dhaka Megacity are very scanty and keeping this in mind upcoming researchers should give adequate attention to explore the population dynamics of the capital city Dhaka. In this study only two important aspects or parameters of population dynamics (i.e. population density and growth) were analyzed for a decade only (2001 - 2011). To find out the trends of population dynamism over a long period retrospective data on density and growth as well as other aspects like fertility, mortality, migration, sex ratio etc. should be incorporated under study by future researchers. To depict the realistic picture of population dynamism within the vast areas of DMC, a comprehensive understanding of physical and environmental aspects over the vast terrain of DMC and its surroundings are also needed.

6.5 Conclusion

The rapid growth of population along with the physical expansion of Dhaka as the country's single largest primate city can't be stopped easily unless a bunch of drastic policies some of them as recommended in this thesis are implemented immediately. The rapid and uncontrolled growth of people has already caused a great deal of damages to this vitally important capital city Dhaka. The city has already ranked as the second most unlivable mega urban regions in the world. Experts from home and abroad have already forecasted a catastrophic future for Dhaka Megacity due to her rapid and unhealthy growth along with fast worsening of physical environment and human health. Under these circumstances, massive population pressure to DMC should be curtailed as early as possible.
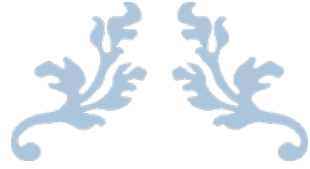
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Appendix

Appendix 1: Union/Ward level Administrative demarcation					
District	**Thana-Name**	**Word/Union_Name**	**Admin_2**	**Admin_3**	**Area_Final**
Dhaka	Biman Bandar/Uttara	DNCC-1	DMA-North DCC	DMA	6.10
Dhaka	Darus Salam	DNCC-10	DMA-North DCC	DMA	1.67
Dhaka	Mirpur (Dhaka)	DNCC-11	DMA-North DCC	DMA	1.13
Dhaka	Mirpur (Dhaka)	DNCC-12	DMA-North DCC	DMA	1.70
Dhaka	Mirpur (Dhaka)	DNCC-13	DMA-North DCC	DMA	1.81
Dhaka	Kafrul/Mirpur	DNCC-14	DMA-North DCC	DMA	1.95
Dhaka	Cantonment/Kafrul/Pallabi	DNCC-15	DMA-North DCC	DMA	5.81
Dhaka	Kafrul	DNCC-16	DMA-North DCC	DMA	2.09
Dhaka	Badda/Khilkhet	DNCC-17	DMA-North DCC	DMA	5.48
Dhaka	Gulshan	DNCC-18	DMA-North DCC	DMA	1.75
Dhaka	Gulshan	DNCC-19	DMA-North DCC	DMA	5.19
Dhaka	Pallabi	DNCC-2	DMA-North DCC	DMA	3.05
Dhaka	Gulshan/Tejgaon Ind. Area	DNCC-20	DMA-North DCC	DMA	1.73
Dhaka	Badda	DNCC-21	DMA-North DCC	DMA	1.45
Dhaka	Rampura	DNCC-22	DMA-North DCC	DMA	1.81
Dhaka	Rampura	DNCC-23	DMA-North DCC	DMA	0.86
Dhaka	Tejgaon Ind. Area	DNCC-24	DMA-North DCC	DMA	3.08
Dhaka	Tejgaon/Tejgaon Ind. Area	DNCC-25	DMA-North DCC	DMA	1.22
Dhaka	Tejgaon	DNCC-26	DMA-North DCC	DMA	1.11
Dhaka	Tejgaon/Sher-E-Bangla Nagar	DNCC-27	DMA-North DCC	DMA	3.66
Dhaka	Sher-E-Bangla Nagar	DNCC-28	DMA-North DCC	DMA	1.53
Dhaka	Mohammadpur (Dhaka)	DNCC-29	DMA-North DCC	DMA	0.71
Dhaka	Pallabi	DNCC-3	DMA-North DCC	DMA	1.10
Dhaka	Adabor	DNCC-30	DMA-North DCC	DMA	2.38
Dhaka	Mohammadpur (Dhaka)	DNCC-31	DMA-North DCC	DMA	0.63

Appendix 1: Union/Ward level Administrative demarcation					
District	Thana-Name	Word/Union_Name	Admin_2	Admin_3	Area_Final
Dhaka	Mohammadpur (Dhaka)	DNCC-32	DMA-North DCC	DMA	1.56
Dhaka	Adabor/Hazaribagh/Mohammadpur	DNCC-33	DMA-North DCC	DMA	5.59
Dhaka	Dhanmondi/Mohammadpur	DNCC-34	DMA-North DCC	DMA	1.36
Dhaka	Ramna	DNCC-35	DMA-North DCC	DMA	1.15
Dhaka	Ramna	DNCC-36	DMA-North DCC	DMA	0.77
Dhaka	Kafrul	DNCC-4	DMA-North DCC	DMA	1.34
Dhaka	Pallabi	DNCC-5	DMA-North DCC	DMA	1.34
Dhaka	Pallabi	DNCC-6	DMA-North DCC	DMA	3.03
Dhaka	Mirpur/Pallabi/Shah Ali	DNCC-7	DMA-North DCC	DMA	1.88
Dhaka	Shah Ali	DNCC-8	DMA-North DCC	DMA	3.78
Dhaka	Darus Salam	DNCC-9	DMA-North DCC	DMA	1.62
Dhaka	Khilgaon	DSCC-1	DMA-South DCC	DMA	0.83
Dhaka	Motijheel	DSCC-10	DMA-South DCC	DMA	0.38
Dhaka	Motijheel	DSCC-11	DMA-South DCC	DMA	0.81
Dhaka	Motijheel	DSCC-12	DMA-South DCC	DMA	0.51
Dhaka	Paltan	DSCC-13	DMA-South DCC	DMA	1.04
Dhaka	Hazaribagh/Dhanmondi	DSCC-14	DMA-South DCC	DMA	1.35
Dhaka	Dhanmondi	DSCC-15	DMA-South DCC	DMA	2.34
Dhaka	Kalabagan	DSCC-16	DMA-South DCC	DMA	0.62
Dhaka	Mohammadpur/Kalabagan	DSCC-17	DMA-South DCC	DMA	0.70
Dhaka	New Market	DSCC-18	DMA-South DCC	DMA	1.90
Dhaka	Ramna	DSCC-19	DMA-South DCC	DMA	1.74
Dhaka	Khilgaon	DSCC-2	DMA-South DCC	DMA	1.15
Dhaka	Lalbagh/Shabagh	DSCC-20	DMA-South DCC	DMA	2.08
Dhaka	Shahbagh	DSCC-21	DMA-South DCC	DMA	1.95

Appendix 1: Union/Ward level Administrative demarcation

District	Thana-Name	Word/Union_Name	Admin_2	Admin_3	Area_Final
Dhaka	Hazaribagh	DSCC-22	DMA-South DCC	DMA	1.07
Dhaka	Lalbagh	DSCC-23	DMA-South DCC	DMA	0.48
Dhaka	Lalbagh	DSCC-24	DMA-South DCC	DMA	0.42
Dhaka	Lalbagh	DSCC-25	DMA-South DCC	DMA	0.36
Dhaka	Lalbagh	DSCC-26	DMA-South DCC	DMA	0.92
Dhaka	Kotwali/Bangshal/Chak Bazar	DSCC-27	DMA-South DCC	DMA	0.51
Dhaka	Chak Bazar	DSCC-28	DMA-South DCC	DMA	0.18
Dhaka	Chak Bazar	DSCC-29	DMA-South DCC	DMA	0.46
Dhaka	Khilgaon	DSCC-3	DMA-South DCC	DMA	1.93
Dhaka	Kotwali/Bangshal/Chak Bazar	DSCC-30	DMA-South DCC	DMA	0.35
Dhaka	Kotwali/Bangshal/Chak Bazar	DSCC-31	DMA-South DCC	DMA	0.47
Dhaka	Kotwali/Bangshal	DSCC-32	DMA-South DCC	DMA	0.22
Dhaka	Bangshal	DSCC-33	DMA-South DCC	DMA	0.31
Dhaka	Bangshal	DSCC-34	DMA-South DCC	DMA	0.37
Dhaka	Kotwali/Bangshal	DSCC-35	DMA-South DCC	DMA	0.14
Dhaka	Kotwali (Dhaka)	DSCC-36	DMA-South DCC	DMA	0.14
Dhaka	Kotwali (Dhaka)	DSCC-37	DMA-South DCC	DMA	0.45
Dhaka	Sutrapur	DSCC-38	DMA-South DCC	DMA	0.42
Dhaka	Sutrapur	DSCC-39	DMA-South DCC	DMA	0.67
Dhaka	Sabujbagh	DSCC-4	DMA-South DCC	DMA	0.98
Dhaka	Gendaria/Jatrabari	DSCC-40	DMA-South DCC	DMA	0.55
Dhaka	Sutrapur	DSCC-41	DMA-South DCC	DMA	0.43
Dhaka	Sutrapur	DSCC-42	DMA-South DCC	DMA	0.27
Dhaka	Sutrapur	DSCC-43	DMA-South DCC	DMA	0.36
Dhaka	Sutrapur/Gendaria	DSCC-44	DMA-South DCC	DMA	0.27

Appendix 1: Union/Ward level Administrative demarcation					
District	**Thana-Name**	**Word/Union_Name**	**Admin_2**	**Admin_3**	**Area_Final**
Dhaka	Gendaria	DSCC-45	DMA-South DCC	DMA	0.54
Dhaka	Gendaria	DSCC-46	DMA-South DCC	DMA	0.51
Dhaka	Shyampur	DSCC-47	DMA-South DCC	DMA	0.58
Dhaka	Jatrabari	DSCC-48	DMA-South DCC	DMA	0.76
Dhaka	Jatrabari	DSCC-49	DMA-South DCC	DMA	1.09
Dhaka	Sabujbagh	DSCC-5	DMA-South DCC	DMA	1.02
Dhaka	Jatrabari	DSCC-50	DMA-South DCC	DMA	0.86
Dhaka	Shyampur	DSCC-51	DMA-South DCC	DMA	0.66
Dhaka	Kadamtali	DSCC-52	DMA-South DCC	DMA	0.54
Dhaka	Kadamtali	DSCC-53	DMA-South DCC	DMA	0.74
Dhaka	Shyampur	DSCC-54	DMA-South DCC	DMA	0.93
Dhaka	Lalbagh	DSCC-55	DMA-South DCC	DMA	1.35
Dhaka	Lalbagh	DSCC-56	DMA-South DCC	DMA	1.00
Dhaka	Sabujbagh	DSCC-6	DMA-South DCC	DMA	0.59
Dhaka	Sabujbagh	DSCC-7	DMA-South DCC	DMA	0.40
Dhaka	Motijheel	DSCC-8	DMA-South DCC	DMA	0.97
Dhaka	Motijheel	DSCC-9	DMA-South DCC	DMA	1.32
Dhaka	Badda	Badda	Badda	DMA	8.02
Dhaka	Badda	Beraid	Beraid	DMA	6.21
Dhaka	Badda	Bhatara	Bhatara	DMA	7.64
Dhaka	Biman Bandar Thana	Biman Bandar (rest. Area)	Biman Bandar (rest. Area)	DMA	8.95
Dhaka	Cantonment	Cantonment (rest. Area)	Cantonment (rest. Area)	DMA	7.46
Dhaka	Khilgaon/Sabujbagh	Dakshingaon	Dakshingaon	DMA	9.06
Dhaka	Biman Bandar/Dakshinkhan/Khilkhet	Dakshinkhan	Dakshinkhan	DMA	22.92
Dhaka	Demra	Demra	Demra	DMA	13.36

Appendix 1: Union/Ward level Administrative demarcation

District	Thana-Name	Word/Union_Name	Admin_2	Admin_3	Area_Final
Dhaka	Jatrabari/kadamtali	Dhania	Dhania	DMA	5.56
Dhaka	Khilkhet	Dumni	Dumni	DMA	9.32
Dhaka	Turag	Harirampur	Harirampur	DMA	30.56
Dhaka	Sabujbagh	Manda	Manda	DMA	5.05
Dhaka	Demra/Jatrabari/Kadamtali	Matuail	Matuail	DMA	11.03
Dhaka	Khilgaon	Nasirabad	Nasirabad	DMA	5.56
Dhaka	Demra	Saralia Union	Saralia Union	DMA	7.64
Dhaka	Badda	Satarkul	Satarkul	DMA	8.41
Dhaka	Kadamtali	Shyampur	Shyampur	DMA	6.91
Dhaka	Kamrangir Char	Sultanganj	Sultanganj	DMA	11.88
Dhaka	Uttar Khan	Uttar Khan	Uttar Khan	DMA	20.51
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 01	Gazipur Paurashava	Paurashava	3.27
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 02	Gazipur Paurashava	Paurashava	10.70
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 03	Gazipur Paurashava	Paurashava	3.68
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 04	Gazipur Paurashava	Paurashava	2.23
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 05	Gazipur Paurashava	Paurashava	3.69
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 06	Gazipur Paurashava	Paurashava	7.46
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 07	Gazipur Paurashava	Paurashava	4.18
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 08	Gazipur Paurashava	Paurashava	4.16
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 09	Gazipur Paurashava	Paurashava	7.86
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 01	Kadam Rasul Paurashava	Paurashava	1.02
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 02	Kadam Rasul Paurashava	Paurashava	1.15
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 03	Kadam Rasul Paurashava	Paurashava	0.96
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 04	Kadam Rasul Paurashava	Paurashava	1.13
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 05	Kadam Rasul Paurashava	Paurashava	1.57

Appendix 1: Union/Ward level Administrative demarcation					
District	**Thana-Name**	**Word/Union_Name**	**Admin_2**	**Admin_3**	**Area_Final**
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 06	Kadam Rasul Paurashava	Paurashava	1.27
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 07	Kadam Rasul Paurashava	Paurashava	1.60
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 08	Kadam Rasul Paurashava	Paurashava	1.15
Narayanganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 09	Kadam Rasul Paurashava	Paurashava	1.43
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 01	Narayanganj Paurashava	Paurashava	1.65
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 02	Narayanganj Paurashava	Paurashava	1.38
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 03	Narayanganj Paurashava	Paurashava	1.28
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 04	Narayanganj Paurashava	Paurashava	1.37
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 05	Narayanganj Paurashava	Paurashava	1.32
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 06	Narayanganj Paurashava	Paurashava	1.34
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 07	Narayanganj Paurashava	Paurashava	1.63
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 08	Narayanganj Paurashava	Paurashava	1.36
Narayanganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 09	Narayanganj Paurashava	Paurashava	1.36
Dhaka	Savar	Savar Paurashava- Ward 01	Savar Paurashava	Paurashava	3.06
Dhaka	Savar	Savar Paurashava- Ward 02	Savar Paurashava	Paurashava	0.72
Dhaka	Savar	Savar Paurashava- Ward 03	Savar Paurashava	Paurashava	1.52
Dhaka	Savar	Savar Paurashava- Ward 04	Savar Paurashava	Paurashava	0.51
Dhaka	Savar	Savar Paurashava- Ward 05	Savar Paurashava	Paurashava	1.29
Dhaka	Savar	Savar Paurashava- Ward 06	Savar Paurashava	Paurashava	1.40
Dhaka	Savar	Savar Paurashava- Ward 07	Savar Paurashava	Paurashava	2.21
Dhaka	Savar	Savar Paurashava- Ward 08	Savar Paurashava	Paurashava	0.36
Dhaka	Savar	Savar Paurashava- Ward 09	Savar Paurashava	Paurashava	2.46
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-01	Siddhirganj Paurashava	Paurashava	1.66
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-02	Siddhirganj Paurashava	Paurashava	1.68
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-03	Siddhirganj Paurashava	Paurashava	2.69

Appendix 1: Union/Ward level Administrative demarcation

District	Thana-Name	Word/Union_Name	Admin_2	Admin_3	Area_Final
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-04	Siddhirganj Paurashava	Paurashava	2.72
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-05	Siddhirganj Paurashava	Paurashava	1.66
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-06	Siddhirganj Paurashava	Paurashava	2.66
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-07	Siddhirganj Paurashava	Paurashava	1.39
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-08	Siddhirganj Paurashava	Paurashava	2.62
Narayanganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-09	Siddhirganj Paurashava	Paurashava	5.63
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-01	Tarabo Paurashava	Paurashava	1.37
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-02	Tarabo Paurashava	Paurashava	2.10
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-03	Tarabo Paurashava	Paurashava	5.29
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-04	Tarabo Paurashava	Paurashava	1.13
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-05	Tarabo Paurashava	Paurashava	2.02
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-06	Tarabo Paurashava	Paurashava	2.82
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-07	Tarabo Paurashava	Paurashava	1.60
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-08	Tarabo Paurashava	Paurashava	1.13
Narayanganj	Rupganj Upazila	Tarabo Paurashava-Ward-09	Tarabo Paurashava	Paurashava	1.93
Gazipur	Tongi	Tongi Paurashava- Ward 01	Tongi Paurashava	Paurashava	9.21
Gazipur	Tongi	Tongi Paurashava- Ward 02	Tongi Paurashava	Paurashava	5.19
Gazipur	Tongi	Tongi Paurashava- Ward 03	Tongi Paurashava	Paurashava	2.00
Gazipur	Tongi	Tongi Paurashava- Ward 04	Tongi Paurashava	Paurashava	1.89
Gazipur	Tongi	Tongi Paurashava- Ward 05	Tongi Paurashava	Paurashava	2.31
Gazipur	Tongi	Tongi Paurashava- Ward 06	Tongi Paurashava	Paurashava	0.66
Gazipur	Tongi	Tongi Paurashava- Ward 07	Tongi Paurashava	Paurashava	0.66
Gazipur	Tongi	Tongi Paurashava- Ward 08	Tongi Paurashava	Paurashava	2.87
Gazipur	Tongi	Tongi Paurashava- Ward 09	Tongi Paurashava	Paurashava	2.83
Gazipur	Tongi	Tongi Paurashava- Ward 10	Tongi Paurashava	Paurashava	0.72

Appendix 1: Union/Ward level Administrative demarcation

District	Thana-Name	Word/Union_Name	Admin_2	Admin_3	Area_Final
Gazipur	Tongi	Tongi Paurashava- Ward 11	Tongi Paurashava	Paurashava	5.04
Gazipur	Tongi	Tongi Paurashava- Ward 12	Tongi Paurashava	Paurashava	0.06
Dhaka	Keraniganj	Aganagar	Aganagar	Union	1.49
Narayanganj	Narayanganj Sadar	Alir Tek	Alir Tek	Union	8.4294
Dhaka	Savar	Amin Bazar	Amin Bazar	Union	10.93845
Dhaka	Savar	Ashulia	Ashulia	Union	26.10174
Narayanganj	Narayanganj Sadar	Baktaballi	Baktaballi	Union	21.81
Dhaka	Savar	Banagram Union	Banagram Union	Union	18.05
Narayanganj	Bandar Upazila	Bandar Union	Bandar Union	Union	7.59
Gazipur	Gazipur Sadar Upazila	Baria	Baria	Union	45.95
Gazipur	Gazipur Sadar Upazila	Basan	Basan	Union	32.75
Dhaka	Keraniganj	Basta	Basta	Union	19.88993
Dhaka	Savar	Bhakurta	Bhakurta	Union	21.0554
Dhaka	Savar	Biralia	Biralia	Union	30.14042
Narayanganj	Rupganj	Bulta	Bulta	Union	9.635
Narayanganj	Rupganj	Daudpur	Daudpur	Union	27.97
Narayanganj	Bandar Upazila	Dhamgar Union	Dhamgar Union	Union	9.5
Dhaka	Savar	Dhamsana	Dhamsana	Union	32.77083
Narayanganj	Narayanganj Sadar	Enayetnagar Union	Enayetnagar Union	Union	5.54
Narayanganj	Narayanganj Sadar	Fatullah Union	Fatullah Union	Union	7.25
Gazipur	Gazipur Sadar Upazila	Gachha	Gachha	Union	25.8589
Narayanganj	Narayanganj Sadar	Gognagar	Gognagar	Union	1.8696
Narayanganj	Rupganj	Golakandail	Golakandail	Union	18.5585
Dhaka	Keraniganj	Hazratpur	Hazratpur	Union	16.83865
Narayanganj	Sonargaon	Kachpur	Kachpur	Union	12.55

Appendix 1: Union/Ward level Administrative demarcation					
District	**Thana-Name**	**Word/Union_Name**	**Admin_2**	**Admin_3**	**Area_Final**
Narayanganj	Bandar Upazila	Kalagachhia Union	Kalagachhia Union	Union	9.58
Dhaka	Keraniganj	Kalatia	Kalatia	Union	17.38902
Dhaka	Keraniganj	Kalindi	Kalindi	Union	6.786451
Gazipur	Gazipur Sadar Upazila	Kashimpur	Kashimpur	Union	42.39
Narayanganj	Narayanganj Sadar	Kashipur Union	Kashipur Union	Union	5.67
Dhaka	Savar	Kaundia	Kaundia	Union	11.47262
Gazipur	Gazipur Sadar Upazila	Kayaltia	Kayaltia	Union	15.03
Narayanganj	Rupganj	Kayet Para	Kayet Para	Union	26.28
Dhaka	Keraniganj	Konda	Konda	Union	25.37332
Narayanganj	Narayanganj Sadar	Kutubpur Union	Kutubpur Union	Union	14.7627
Narayanganj	Bandar Upazila	Madanpur Union	Madanpur Union	Union	6.22
Narayanganj	Sonargaon	Mugra Para	Mugra Para	Union	8.45
Narayanganj	Rupganj	Mura Para	Mura Para	Union	8.84
Narayanganj	Bandar Upazila	Musapur Union	Musapur Union	Union	10.15
Gazipur	Kaliganj (Gazipur)	Nagari	Nagari	Union	33.92
Dhaka	Savar	Pathalia(part)	Pathalia(part)	Union	28.74
Gazipur	Gazipur Sadar Upazila	Pubail	Pubail	Union	48.3105
Dhaka	Keraniganj	Ruhitpur	Ruhitpur	Union	15.09449
Narayanganj	Rupganj	Rupganj	Rupganj	Union	29.23
Narayanganj	Sonargaon	Sadipur	Sadipur	Union	18.57
Dhaka	Keraniganj	Sakta	Sakta	Union	16.39
Dhaka	Savar	Savar Union	Savar Union	Union	10.20193
Narayanganj	Sonargaon	Shambhupura	Shambhupura	Union	15.61
Dhaka	Keraniganj	Subhadya	Subhadya (part)	Union	10.3719
Dhaka	Keraniganj	Taranagar	Taranagar	Union	17.38092

Appendix 1: Union/Ward level Administrative demarcation

District	Thana-Name	Word/Union_Name	Admin_2	Admin_3	Area_Final
Dhaka	Keraniganj	Tegharia	Tegharia	Union	17.52256
Dhaka	Savar	Tetuljhora Union	Tetuljhora Union	Union	15.55178
Gazipur	Kaliganj (Gazipur)	Tumulia	Tumulia	Union	23.5523
Dhaka	Savar	Yearpur	Yearpur	Union	26.34859
Dhaka	Keraniganj	Zinjira Union	Zinjira Union	Union	1.75
Gazipur	Gazipur Sadar Upazila	Gazipur Cantonment	Gazipur Cantonment	Union	5.34
Dhaka	Savar	Savar Cantonment	Savar Cantonment	Union	3.25

District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Dhaka	Adabor	DNCC-30	186639	78006	78420	32776	100568	86071	42465	35541	9.12	58.20
Dhaka	Adabor/Hazaribagh/Moha mmadpur	DNCC-33	114756	63549	20529	11368	62616	52140	36437	27112	6.09	44.62
Dhaka	Badda	DNCC-21	96111	70708	66283	48764	54002	42109	39978	30730	3.12	26.43
Dhaka	Badda/Khilkhet	DNCC-17	196479	87355	35854	15941	113621	82858	48712	38643	8.44	55.54
Dhaka	Biman Bandar/Uttara	DNCC-1	183298	68451	30049	11221	103139	80159	38331	30120	10.35	62.66
Dhaka	Cantonment/Kafrul/Pallabi	DNCC-15	173842	120217	29921	20691	89940	83902	62897	57320	3.76	30.85
Dhaka	Darus Salam	DNCC-10	87879	63071	52622	37767	47258	40621	34677	28394	3.37	28.23
Dhaka	Darus Salam	DNCC-9	71260	43744	43988	27002	39668	31592	25210	18534	5.00	38.61
Dhaka	Dhanmondi/Mohammadp ur	DNCC-34	106548	73469	78344	54021	59121	47427	39625	33844	3.79	31.05
Dhaka	Gulshan	DNCC-18	63616	36572	36352	20898	36676	26940	21584	14988	5.69	42.51
Dhaka	Gulshan	DNCC-19	96291	74336	18553	14323	52245	44046	42415	31921	2.62	22.80
Dhaka	Gulshan/Tejgaon Ind. Area	DNCC-20	98618	79682	57005	46059	55417	43201	43339	36343	2.15	19.20
Dhaka	Kafrul	DNCC-16	142413	101432	68140	48532	75213	67200	54811	46621	3.45	28.78
Dhaka	Kafrul	DNCC-4	75246	53088	56154	39618	41636	33610	29745	23343	3.55	29.45
Dhaka	Kafrul/Mirpur	DNCC-14	163797	113292	83998	58098	87862	75935	62340	50952	3.76	30.83
Dhaka	Mirpur (Dhaka)	DNCC-11	97033	76930	85870	68080	53018	44015	42170	34760	2.35	20.72
Dhaka	Mirpur (Dhaka)	DNCC-12	116544	92032	68555	54136	62754	53790	50380	41652	2.39	21.03
Dhaka	Mirpur (Dhaka)	DNCC-13	157206	94174	86854	52030	83505	73701	50278	43896	5.26	40.10
Dhaka	Mirpur/Pallabi/Shah Ali	DNCC-7	113750	44950	60505	23910	60408	53342	24257	20693	9.73	60.48
Dhaka	Mohammadpur (Dhaka)	DNCC-29	54739	58068	77097	81786	30524	24215	31693	26375	-0.59	-6.08
Dhaka	Mohammadpur (Dhaka)	DNCC-31	51384	41922	81562	66543	28916	22468	23027	18895	2.06	18.41
Dhaka	Mohammadpur (Dhaka)	DNCC-32	72973	46817	46778	30011	38267	34706	26077	20740	4.54	35.84
Dhaka	Pallabi	DNCC-2	151868	127851	49793	41918	79637	72231	67972	59879	1.74	15.81

Appendix 2: Ward/union level demographic data of Dhaka Megacity

Appendix 2: Ward/union level demographic data of Dhaka Megacity

District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Dhaka	Pallabi	DNCC-3	94664	69956	86058	63596	49093	45571	37265	32691	3.07	26.10
Dhaka	Pallabi	DNCC-5	118110	87115	88142	65011	61601	56509	46507	40608	3.09	26.24
Dhaka	Pallabi	DNCC-6	163770	136453	54050	45034	86232	77538	74864	61589	1.84	16.68
Dhaka	Ramna	DNCC-35	74069	73666	64408	64057	41058	33011	41060	32606	0.05	0.54
Dhaka	Ramna	DNCC-36	70984	62031	92187	80560	39495	31489	34182	27849	1.36	12.61
Dhaka	Rampura	DNCC-22	160316	86363	88572	47714	83857	76459	47451	38912	6.38	46.13
Dhaka	Rampura	DNCC-23	63763	52560	74143	61116	35246	28517	29934	22626	1.95	17.57
Dhaka	Shah Ali	DNCC-8	111251	81168	29431	21473	59607	51644	43477	37691	3.20	27.04
Dhaka	Sher-E-Bangla Nagar	DNCC-28	65984	88225	43127	57663	36028	29956	47827	40398	-2.86	-33.71
Dhaka	Tejgaon	DNCC-26	67876	65329	61150	58855	40739	27137	41616	23713	0.38	3.75
Dhaka	Tejgaon Ind. Area	DNCC-24	103274	182034	33531	59102	64638	38636	113657	68377	-5.51	-76.26
Dhaka	Tejgaon/Sher-E-Bangla Nagar	DNCC-27	90224	112413	24651	30714	49602	40622	72685	39728	-2.17	-24.59
Dhaka	Tejgaon/Tejgaon Ind. Area	DNCC-25	99727	74151	81743	60780	56547	43180	41953	32198	3.01	25.65
Dhaka	Bangshal	DSCC-33	65289	62039	210610	200126	41136	24153	37938	24101	0.51	4.98
Dhaka	Bangshal	DSCC-34	50624	47632	136822	128735	35423	15201	31966	15666	0.61	5.91
Dhaka	Chak Bazar	DSCC-28	24656	25599	136978	142217	15108	9548	15883	9716	-0.37	-3.82
Dhaka	Chak Bazar	DSCC-29	58233	59372	126593	129070	35427	22806	36786	22586	-0.19	-1.96
Dhaka	Dhanmondi	DSCC-15	72449	46017	30961	19665	37125	35324	25536	20481	4.64	36.48
Dhaka	Gendaria	DSCC-45	50419	49801	93369	92224	27906	22513	28941	20860	0.12	1.23
Dhaka	Gendaria	DSCC-46	40267	41014	78955	80420	22693	17574	23249	17765	-0.18	-1.86
Dhaka	Gendaria/Jatrabari	DSCC-40	46434	41546	84425	75538	26126	20308	23616	17930	1.12	10.53
Dhaka	Hazaribagh	DSCC-22	84519	70561	78990	65945	45152	39367	38567	31994	1.82	16.51
Dhaka	Hazaribagh/Dhanmondi	DSCC-14	128921	84162	95497	62342	71423	57498	47590	36572	4.36	34.72
Dhaka	Jatrabari	DSCC-48	58741	40684	77291	53532	35305	23436	24120	16564	3.74	30.74

District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
		Appendix 2: Ward/union level demographic data of Dhaka Megacity										
Dhaka	Jatrabari	DSCC-49	60966	44887	55932	41181	33078	27888	24347	20540	3.11	26.37
Dhaka	Jatrabari	DSCC-50	56766	51305	66007	59657	32293	24473	29288	22017	1.02	9.62
Dhaka	Kadamtali	DSCC-52	43954	32231	81396	59687	23295	20659	17785	14446	3.15	26.67
Dhaka	Kadamtali	DSCC-53	58954	50334	79668	68019	30678	28276	27068	23266	1.59	14.62
Dhaka	Kalabagan	DSCC-16	79983	67193	129005	108376	46344	33639	38898	28295	1.76	15.99
Dhaka	Khilgaon	DSCC-1	68931	61252	83049	73798	36872	32059	33066	28186	1.19	11.14
Dhaka	Khilgaon	DSCC-2	113273	82636	98498	71857	59610	53663	44849	37787	3.20	27.05
Dhaka	Khilgaon	DSCC-3	86931	54084	45042	28023	46921	40010	29671	24413	4.86	37.79
Dhaka	Kotwali (Dhaka)	DSCC-36	26199	28655	187136	204679	15509	10690	17740	10915	-0.89	-9.37
Dhaka	Kotwali (Dhaka)	DSCC-37	18170	23725	40378	52722	12640	5530	17000	6725	-2.63	-30.57
Dhaka	Kotwali/Bangshal	DSCC-32	36147	38983	164305	177195	22939	13208	24541	14442	-0.75	-7.85
Dhaka	Kotwali/Bangshal	DSCC-35	28074	28461	200529	203293	18817	9257	18631	9830	-0.14	-1.38
Dhaka	Kotwali/Bangshal/Chak Bazar	DSCC-27	28525	26207	55931	51386	16193	12332	16306	9901	0.85	8.13
Dhaka	Kotwali/Bangshal/Chak Bazar	DSCC-30	33613	33793	96037	96551	23780	9833	22950	10843	-0.05	-0.54
Dhaka	Kotwali/Bangshal/Chak Bazar	DSCC-31	35656	34896	75864	74247	24748	10908	24224	10672	0.22	2.13
Dhaka	Lalbagh	DSCC-23	48875	48575	101823	101198	27621	21254	27182	21393	0.06	0.61
Dhaka	Lalbagh	DSCC-24	66470	63763	158262	151817	35539	30931	35164	28599	0.42	4.07
Dhaka	Lalbagh	DSCC-25	29832	28390	82867	78861	16221	13611	16088	12302	0.50	4.83
Dhaka	Lalbagh	DSCC-26	44540	48066	48413	52246	21583	22957	24416	23650	-0.76	-7.92
Dhaka	Lalbagh	DSCC-55	94573	84023	70054	62239	50894	43679	45922	38101	1.19	11.16
Dhaka	Lalbagh	DSCC-56	82069	69037	82069	69037	44356	37713	41797	27240	1.74	15.88
Dhaka	Lalbagh/Shabagh	DSCC-20	38201	41352	18366	19881	26450	11751	27793	13559	-0.79	-8.25
Dhaka	Mohammadpur/Kalabagan	DSCC-17	58863	55880	84090	79829	33622	25241	31121	24759	0.52	5.07
Dhaka	Motijheel	DSCC-10	21968	30760	57811	80947	11623	10345	16706	14054	-3.31	-40.02

District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Dhaka	Motijheel	DSCC-11	59999	63906	74073	78896	31722	28277	35375	28531	-0.63	-6.51
Dhaka	Motijheel	DSCC-12	51067	53832	100131	105553	28300	22767	30348	23484	-0.53	-5.41
Dhaka	Motijheel	DSCC-8	34867	31802	35945	32786	21467	13400	19563	12239	0.92	8.79
Dhaka	Motijheel	DSCC-9	42105	40664	31898	30806	30203	11902	28509	12155	0.35	3.42
Dhaka	New Market	DSCC-18	49523	62078	26065	32673	32685	16838	39349	22729	-2.23	-25.35
Dhaka	Paltan	DSCC-13	59639	48664	57345	46792	36311	23328	31241	17423	2.05	18.40
Dhaka	Ramna	DSCC-19	55920	45774	32138	26307	27709	28211	24089	21685	2.02	18.14
Dhaka	Sabujbagh	DSCC-4	82701	72677	84389	74160	43167	39534	39086	33591	1.30	12.12
Dhaka	Sabujbagh	DSCC-5	60788	44950	59596	44069	32573	28215	24609	20341	3.06	26.05
Dhaka	Sabujbagh	DSCC-6	79305	54133	134415	91751	45268	34037	30210	23923	3.89	31.74
Dhaka	Sabujbagh	DSCC-7	58316	34929	145790	87323	32991	25325	19734	15195	5.26	40.10
Dhaka	Shahbagh	DSCC-21	33513	36071	17186	18498	21857	11656	22958	13113	-0.73	-7.63
Dhaka	Shyampur	DSCC-47	48026	44854	82803	77334	25777	22249	24724	20130	0.69	6.60
Dhaka	Shyampur	DSCC-51	69399	50451	105150	76441	40176	29223	28913	21538	3.24	27.30
Dhaka	Shyampur	DSCC-54	66637	50489	71653	54289	36452	30185	29421	21068	2.81	24.23
Dhaka	Sutrapur	DSCC-38	46140	49146	109857	117014	28004	18136	30733	18413	-0.63	-6.51
Dhaka	Sutrapur	DSCC-39	38322	34069	57197	50849	21488	16834	19115	14954	1.18	11.10
Dhaka	Sutrapur	DSCC-41	40587	38602	94388	89772	21969	18618	21782	16820	0.50	4.89
Dhaka	Sutrapur	DSCC-42	27882	27753	103267	102789	15258	12624	15928	11825	0.05	0.46
Dhaka	Sutrapur	DSCC-43	40043	42306	111231	117517	24300	15743	26174	16132	-0.55	-5.65
Dhaka	Sutrapur/Gendaria	DSCC-44	26939	28180	99774	104370	14705	12234	16355	11825	-0.45	-4.61
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 01	11822	14285	11590	11397	5977	5845	7422	6862	2.61	1.67
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 02	17694	14285	15386	11397	8777	8917	7422	6862	2.61	25.93
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 03	22176	14285	23100	11397	11380	10796	7422	6862	2.61	50.66

Appendix 2: Ward/union level demographic data of Dhaka Megacity

Appendix 2: Ward/union level demographic data of Dhaka Megacity											
District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 04	30728	14285	27193	11397	15633	15095	7422	6862	2.61	58.09
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 05	30572	14285	19473	11397	15553	15019	7422	6862	2.61	41.47
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 06	20308	14285	15991	11397	10029	10279	7422	6862	2.61	28.73
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 07	12636	14285	7898	11397	6431	6205	7422	6862	2.61	-44.31
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 08	6812	14285	5923	11397	3462	3350	7422	6862	2.61	-92.40
Narayan ganj	Bandar Upazila	Kadam Rasul Paurashava-Ward 09	13543	14285	9471	11397	7020	6523	7422	6862	2.61	-20.34
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 01	17136	7189	5240	2198	9886	7250	4110	3079	9.07	58.05
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 02	5918	3541	553	331	2935	2983	1843	1698	5.27	40.17
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 03	40406	20509	10980	5573	21004	19402	11050	9459	7.02	49.24
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 04	35210	21311	15789	9557	17874	17336	11347	9964	5.15	39.47
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 05	14955	9436	4053	2557	7924	7031	5055	4381	4.71	36.90
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 06	8170	6650	1095	891	4220	3950	3488	3162	2.08	18.60
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 07	31363	15393	7503	3683	16379	14984	8367	7026	7.38	50.92
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 08	11405	7616	2742	1831	5898	5507	3938	3678	4.12	33.22
Gazipur	Gazipur Sadar Upazila	Gazipur Paurashava-Ward 09	14474	10020	1841	1275	7496	6978	5177	4843	3.75	30.77
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 01	20489	26266	12418	18628	10685	9804	14275	11991	1.94	-50.01
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 02	24550	26266	17790	18628	12782	11768	14275	11991	1.94	-4.71
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 03	40187	26266	31396	18628	20871	19316	14275	11991	1.94	40.67
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 04	47079	26266	34364	18628	24400	22679	14275	11991	1.94	45.79
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 05	29431	26266	22296	18628	15372	14059	14275	11991	1.94	16.45

Appendix 2: Ward/union level demographic data of Dhaka Megacity											
District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 06	24096	26266	17982	18628	12707	11389	14275	11991	1.94	-3.59
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 07	34496	26266	21163	18628	17659	16837	14275	11991	1.94	11.98
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 08	35518	26266	26116	18628	18126	17392	14275	11991	1.94	28.67
Narayan ganj	Narayanganj Sadar	Narayanganj Paurashava- Ward 09	30484	26266	22415	18628	15612	14872	14275	11991	1.94	16.89
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-01	36592	10691	22043	4237	18961	17631	5969	4722	10.31	80.78
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-02	25585	10691	15229	4237	13180	12405	5969	4722	10.31	72.18
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-03	35947	10691	13363	4237	18931	17016	5969	4722	10.31	68.29
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-04	23385	10691	8597	4237	12240	11145	5969	4722	10.31	50.72
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-05	18421	10691	11097	4237	9334	9087	5969	4722	10.31	61.82
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-06	25100	10691	9436	4237	12878	12222	5969	4722	10.31	55.10
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-07	21888	10691	15747	4237	11165	10723	5969	4722	10.31	73.09
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-08	42704	10691	16299	4237	22169	20535	5969	4722	10.31	74.00
Narayan ganj	Narayanganj Sadar	Siddhirganj Paurashava-Ward-09	27138	10691	4820	4237	13840	13298	5969	4722	10.31	12.10
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-01	8168	6694	5962	4886	4225	3943	3468	3226	2.01	18.05
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-02	3532	1573	1682	749	1826	1706	843	730	8.42	55.46
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-03	12398	6397	2344	1209	6548	5850	3475	2922	6.84	48.40
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-04	15264	10460	13508	9257	8403	6861	5782	4678	3.85	31.47
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-05	17070	7884	8450	3903	9213	7857	4487	3397	8.03	53.81
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-06	19989	8912	7088	3160	10815	9174	5009	3903	8.41	55.42
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-07	12833	8085	8021	5053	7122	5711	4512	3573	4.73	37.00

District	Thana	Word/Union_Name	Pop_2011	Pop_2001	Density_11	Density_2001	Male_11	Female_2011	Male_2001	Female 2001	Growth_Rate	Density_Variation
		Appendix 2: Ward/union level demographic data of Dhaka Megacity										
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-08	20065	15079	17757	13344	10854	9211	8547	6532	2.90	24.85
Narayan ganj	Rupganj Upazila	Tarabo Paurashava-Ward-09	41390	26038	21446	13491	22082	19308	16331	9707	4.74	37.09
Dhaka	Savar	Savar Paurashava- Ward 01	34926	15051	11414	4919	17479	17447	7524	7527	8.78	56.91
Dhaka	Savar	Savar Paurashava- Ward 02	20255	13826	28132	19203	10146	10109	7194	6632	3.89	31.74
Dhaka	Savar	Savar Paurashava- Ward 03	30204	11708	19871	7703	15456	14748	6020	5688	9.94	61.24
Dhaka	Savar	Savar Paurashava- Ward 04	14628	10583	28682	20751	7641	6987	6152	4431	3.29	27.65
Dhaka	Savar	Savar Paurashava- Ward 05	28373	14449	21995	11201	14842	13531	7681	6768	6.98	49.07
Dhaka	Savar	Savar Paurashava- Ward 06	43545	20029	31104	14306	23046	20499	11285	8744	8.08	54.00
Dhaka	Savar	Savar Paurashava- Ward 07	50053	19307	22648	8736	26212	23841	10367	8940	9.99	61.43
Dhaka	Savar	Savar Paurashava- Ward 08	30904	11982	85844	33283	15944	14960	6385	5597	9.94	61.23
Dhaka	Savar	Savar Paurashava- Ward 09	33120	10605	13463	4311	18192	14928	5883	4722	12.06	67.98
Gazipur	Tongi	Tongi Paurashava- Ward 01	15504	8894	1683	966	8496	7008	4817	4077	5.71	42.63
Gazipur	Tongi	Tongi Paurashava- Ward 02	26092	13758	5027	2651	13632	12460	7521	6237	6.61	47.27
Gazipur	Tongi	Tongi Paurashava- Ward 03	67605	30053	33803	15027	36680	30925	16565	13488	8.44	55.55
Gazipur	Tongi	Tongi Paurashava- Ward 04	17171	16140	9085	8540	9821	7350	9663	6477	0.62	6.00
Gazipur	Tongi	Tongi Paurashava- Ward 05	26956	23235	11669	10058	16261	10695	14265	8970	1.50	13.80
Gazipur	Tongi	Tongi Paurashava- Ward 06	37045	29083	56161	44090	19880	17165	16167	12916	2.45	21.49
Gazipur	Tongi	Tongi Paurashava- Ward 07	53857	34525	81648	52340	28489	25368	18506	16019	4.55	35.90
Gazipur	Tongi	Tongi Paurashava- Ward 08	77701	34804	27074	12127	42558	35143	19607	15197	8.36	55.21
Gazipur	Tongi	Tongi Paurashava- Ward 09	31710	22131	11205	7820	16379	15331	11941	10190	3.66	30.21

Appendix 2: Ward/union level demographic data of Dhaka Megacity											
District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Gazipur	Tongi	Tongi Paurashava- Ward 10	11705	10758	16257	14942	6354	5351	6126	4632	0.85	8.09
Gazipur	Tongi	Tongi Paurashava- Ward 11	77658	33646	15408	6676	40362	37296	17990	15656	8.72	56.67
Gazipur	Tongi	Tongi Paurashava- Ward 12	33346	26072	588580	460189	16324	17022	13167	12905	2.49	21.81
Narayan ganj	Bandar Upazila	Bandar Union	29578	24992	3897	3293	14962	14616	12714	12278	1.70	15.50
Narayan ganj	Bandar Upazila	Dhamgar Union	26210	21545	2759	2268	13362	12848	11332	10213	1.98	17.80
Narayan ganj	Bandar Upazila	Kalagachhia Union	43556	37977	4547	3964	21580	21976	18839	19138	1.38	12.81
Narayan ganj	Bandar Upazila	Madanpur Union	21273	15554	3420	2501	11154	10119	8155	7399	3.18	26.88
Narayan ganj	Bandar Upazila	Musapur Union	25933	21591	2555	2127	13171	12762	11196	10395	1.85	16.74
Gazipur	Gazipur Sadar Upazila	Baria	33715	34714	734	756	16915	16800	18430	16284	-0.29	-2.96
Gazipur	Gazipur Sadar Upazila	Basan	148715	57287	4541	1749	81226	67489	30945	26342	10.01	61.48
Gazipur	Gazipur Sadar Upazila	Gachha	253512	67691	9804	2618	138133	115379	36163	31528	14.12	73.30
Gazipur	Gazipur Sadar Upazila	Kashimpur	135121	48275	3188	1139	72645	62476	26574	21701	10.84	64.27
Gazipur	Gazipur Sadar Upazila	Kayaltia	45410	20584	3022	1370	23389	22021	10681	9903	8.23	54.67
Gazipur	Gazipur Sadar Upazila	Pubail	80659	54451	1670	1127	41546	39113	27910	26541	4.01	32.49
Gazipur	Kaliganj (Gazipur)	Nagari	34103	30576	1005	901	17121	16982	15499	15077	1.10	10.34
Gazipur	Kaliganj (Gazipur)	Tumulia	30406	27859	1291	1183	14918	15488	14000	13859	0.88	8.38
Dhaka	Keraniganj	Aganagar	73012	59034	49001	39620	44927	28085	35686	23348	2.15	19.14
Dhaka	Keraniganj	Basta	34181	28721	1719	1444	16886	17295	14467	14254	1.76	15.97
Dhaka	Keraniganj	Hazratpur	33069	26536	1964	1576	16320	16749	13268	13268	2.23	19.76
Dhaka	Keraniganj	Kalatia	40007	32143	2301	1848	19261	20746	15669	16474	2.21	19.66
Dhaka	Keraniganj	Kalindi	46783	35363	6894	5211	24467	22316	18885	16478	2.84	24.41
Dhaka	Keraniganj	Konda	67204	50074	2649	1973	34821	32383	26526	23548	2.99	25.49
Dhaka	Keraniganj	Ruhitpur	31563	28253	2091	1872	15645	15918	14590	13663	1.11	10.49

District	Thana	Word/Union_Name	Pop_2011	Pop_2001	Density_11	Density_2001	Male_11	Female_2011	Male_2001	Female_2001	Growth_Rate	Density_Variation
Dhaka	Keraniganj	Sakta	58075	43240	3543	2638	30028	28047	22455	20785	2.99	25.54
Dhaka	Keraniganj	Subhadya	225865	146379	21777	14113	122612	103253	79686	66693	4.43	35.19
Dhaka	Keraniganj	Taranagar	42203	33355	2428	1919	21441	20762	17075	16280	2.38	20.97
Dhaka	Keraniganj	Tegharia	32416	31444	1850	1794	16766	15650	16104	15340	0.30	3.00
Dhaka	Keraniganj	Zinjira Union	109982	88572	62847	50613	58635	51347	48321	40251	2.19	19.47
Narayanganj	Narayanganj Sadar	Alir Tek	18676	16800	2216	1993	10060	8616	8863	7937	1.06	10.04
Narayanganj	Narayanganj Sadar	Baktaballi	54237	35227	2487	1615	28830	25407	18897	16330	4.41	35.05
Narayanganj	Narayanganj Sadar	Enayetnagar Union	97049	71260	17518	12863	50741	46308	39013	32247	3.14	26.57
Narayanganj	Narayanganj Sadar	Fatullah Union	206426	117863	28473	16257	108669	97757	65425	52438	5.76	42.90
Narayanganj	Narayanganj Sadar	Gognagar	27534	20805	14727	11128	14077	13457	11011	9794	2.84	24.44
Narayanganj	Narayanganj Sadar	Kashipur Union	117326	57006	20692	10054	61010	56316	30766	26240	7.48	51.41
Narayanganj	Narayanganj Sadar	Kutubpur Union	259262	144303	17562	9775	136342	122920	79934	64369	6.03	44.34
Narayanganj	Rupganj	Bulta	49976	32182	5187	3340	26596	23380	17082	15100	4.50	35.61
Narayanganj	Rupganj	Daudpur	41921	39683	1499	1419	21901	20020	20065	19618	0.55	5.34
Narayanganj	Rupganj	Golakandail	62747	28440	3381	1532	33470	29277	15378	13062	8.23	54.68
Narayanganj	Rupganj	Kayet Para	66200	64650	2519	2460	33580	32620	33082	31568	0.24	2.34
Narayanganj	Rupganj	Mura Para	32593	27009	3687	3055	16946	15647	14204	12805	1.90	17.13
Narayanganj	Rupganj	Rupganj	47246	44013	1616	1506	24073	23173	22703	21310	0.71	6.84
Dhaka	Savar	Amin Bazar	37500	29991	3428	2742	20397	17103	15694	14297	2.26	20.02
Dhaka	Savar	Ashulia	143952	41944	5515	1607	78305	65647	22505	19439	13.12	70.86
Dhaka	Savar	Banagram Union	33627	24742	1863	1371	17786	15841	13308	11434	3.12	26.42

Appendix 2: Ward/union level demographic data of Dhaka Megacity

District	Thana	Word/Union_Name	Pop_2011	Pop_2001	Density_11	Density_2001	Male_11	Female_2011	Male_2001	Female 2001	Growth_Rate	Density_Variation

Appendix 2: Ward/union level demographic data of Dhaka Megacity

District	Thana	Word/Union_Name	Pop_2011	Pop_2001	Density_11	Density_2001	Male_11	Female_2011	Male_2001	Female 2001	Growth_Rate	Density_Variation
Dhaka	Savar	Bhakurta	44947	36308	2135	1724	23746	21201	19220	17088	2.16	19.22
Dhaka	Savar	Biralia	41188	23760	1367	788	22392	18796	12726	11034	5.66	42.31
Dhaka	Savar	Dhamsana	308024	76902	9399	2347	162372	145652	40419	36483	14.89	75.03
Dhaka	Savar	Kaundia	27796	20065	2423	1749	14952	12844	10386	9679	3.31	27.81
Dhaka	Savar	Pathalia(part)	93150	64806	3241	2255	49001	44149	34707	30099	3.69	30.43
Dhaka	Savar	Savar Union	45887	16851	4498	1652	24360	21527	8797	8054	10.54	63.28
Dhaka	Savar	Tetuljhora Union	106929	41978	6876	2699	58214	48715	23424	18554	9.80	60.74
Dhaka	Savar	Yearpur	116836	25612	4434	972	63234	53602	13918	11694	16.39	78.08
Narayan ganj	Sonargaon	Kachpur	60734	35947	4839	2864	31228	29506	19839	16108	5.38	40.81
Narayan ganj	Sonargaon	Mugra Para	33506	24115	3965	2854	17299	16207	12630	11485	3.34	28.03
Narayan ganj	Sonargaon	Sadipur	47002	34044	2531	1833	24523	22479	17683	16361	3.28	27.57
Narayan ganj	Sonargaon	Shambhupura	26646	24313	1707	1558	13017	13629	12096	12217	0.92	8.76
Dhaka	Badda	Badda	180554	88860	22513	11080	99794	80760	48099	40761	7.35	50.78
Dhaka	Badda	Beraid	14949	12698	2407	2045	7756	7193	6663	6035	1.65	15.06
Dhaka	Badda	Bhatara	126694	55983	16583	7328	72469	54225	31579	24404	8.51	55.81
Dhaka	Badda	Satarkul	23663	24553	2814	2920	12544	11119	13132	11421	-0.37	-3.76
Dhaka	Biman Bandar Thana	Biman Bandar (rest. Area)	1721	620	192	69	1348	373	576	44	10.75	63.97
Dhaka	Biman Bandar/Dakshinkhan/Khilk het	Dakshinkhan	272807	181091	11903	7901	145668	127139	99584	81507	4.18	33.62
Dhaka	Cantonment	Cantonment (rest. Area)	61249	77922	8210	10445	38055	23194	49097	28825	-2.38	-27.22
Dhaka	Demra	Demra	35786	30685	2679	2297	20262	15524	18698	11987	1.55	14.25
Dhaka	Demra	Saralia Union	156583	88470	20495	11580	83495	73088	49582	38888	5.88	43.50
Dhaka	Demra/Jatrabari/Kadamtali	Matuail	183295	108466	16618	9834	98330	84965	59700	48766	5.39	40.82

Appendix 2: Ward/union level demographic data of Dhaka Megacity											
District	Thana	Word/Union_Name	Pop_ 2011	Pop_ 2001	Density _11	Density_ 2001	Male_ 11	Female_ 2011	Male_ 2001	Female 2001	Growth_ Rate	Density_ Variation
Gazipur	Gazipur Sadar Upazila	Gazipur Cantonment	34024	21730	6372	4069	17691	16333	11472	10258	4.59	36.13
Dhaka	Jatrabari/kadamtali	Dhania	261074	145785	46956	26220	140315	120759	79688	66097	6.00	44.16
Dhaka	Kadamtali	Shyampur	116954	73187	16925	10591	65667	51287	42273	30914	4.80	37.42
Dhaka	Kamrangir Char	Sultanganj	93601	55139	7879	4641	50973	42628	29734	25405	5.43	41.09
Dhaka	Khilgaon	Nasirabad	21378	15812	3845	2844	11331	10047	8697	7115	3.06	26.04
Dhaka	Khilgaon/Sabujbagh	Dakshingaon	70203	35356	7749	3902	36740	33463	18794	16562	7.10	49.64
Dhaka	Khilkhet	Dumni	16862	11412	1809	1224	9286	7576	5969	5443	3.98	32.32
Dhaka	Sabujbagh	Manda	62312	40743	12339	8068	33393	28919	22652	18091	4.34	34.61
Dhaka	Savar	Savar Cantonment	10843	15013	3336	4619	8060	2783	12219	2794	-3.20	-38.46
Dhaka	Turag	Harirampur	157316	55687	5148	1822	86428	70888	29771	25916	10.94	64.60
Dhaka	Uttar Khan	Uttar Khan	78933	52014	3849	2536	41362	37571	27254	24760	4.26	34.10

Appendix 3: Google Earth Image of Dhaka Megacity and surrounding Areas, 2014

Appendix 4: Rennel's Map of Dhaka city

ENVIRONS OF DACCA
1765 A.D. AFTER RENNEL

SCALE
BRITISH MILES