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Development Dynamics and Sustainability in the Newly Formed Municipalities of Kathmandu Valley:

A Case of Kageshwori Manohara Municipality

by

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A THESIS

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CERTIFICATE

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I hereby declare that the thesis entitled "**Development Dynamics and Sustainability in the newly formed municipalities of Kathmandu Valley: A Case of Kageshwori Manohara Municipality**" submitted to the Department of Architecture in partial fulfillment of the requirement for the degree of Master Science in Urban Planning, is a record of an original work done under the guidance of **Dr. Jagadish Chandra Pokharel**, Former VC, National Planning Commission. This thesis contains only work completed by me except for the consulted material which has been duly referenced and acknowledged.

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ABSTRACT

Cities offer a significant range of opportunities and life quality improvements to their residents. Kathmandu Valley from its historic period has been the political and economic capital seat of the country. With the increasing global trend of urbanization, Valley is also growing with Kathmandu city regarded as one of the fastest urbanizing cities of South Asia. The impact of urbanization currently is not only limited within the core of Kathmandu but rather has spread in the suburb areas. The figure above shows the growth trend of Kathmandu Valley. The total built up area in 1989 was 5% which has increased to 26% by 2016 as per the study of Ishtiaque et al. It is seen to be expanding rapidly outwards after 2009. Till 2016, the intensification at center and spread outwards both can be seen. It is in 2014 the new municipalities were added to the Valley.

Kageshwori Manohara municipality which fell under rural areas just half a decade back is now an independent municipal corporation. The development pattern of the municipality is studied under demography, land use, mobility and economy. The obtained analysis is further compared to the Planning Norms and Standards 2015 to find out if it is growing in a planned manner or not. The increasing population and in-migration rate confirmed that Kageshwori Manohara is a growing city. However, the larger share of this urbanization is concentrated on the southern areas of the municipality that shares its boundary with the Kathmandu Metropolitan City. In this research, the municipality is divided into three clusters with three wards in each to ease the analysis of urban growth.

From the study, it was found that the Kageshwori Manohara is growing as a peripheral city of Kathmandu. The improved and easy road access between Kageshwori and Kathmandu is one of the major contributing factor to the urban growth of Kageshwori. Additionally, the cheaper land and construction cost is another important factor. Nonetheless, the urban form of Kageshwori does not follow any central idea and is rather growing organically in a sprawl type manner. The sparsely located settlements are causing the loss of agricultural land at a larger extent and do not meet the desired density as mentioned by the norms. The dependency of the municipality to Kathmandu is also quite high for urban services like health, education, job opportunities adding daily mobility as an important part

ABSTRACT

of daily lifestyles of the people living in the municipality. Due to the influential development, urban growth is seen only in the clusters closer to Kathmandu while the other clusters to the North still exhibit rural-urban characteristics.

While it is absolutely normal for a smaller city to depend upon larger for its services, some issues were discovered during the study which on the long run would make KMM difficult to sustain as a city. Some of the major issues being the economic dependency upon grants and the traffic congestion getting complex each day. Accordingly, it is also quite not sure whether the city will flourish due to its proximity to larger city or the growth of larger city will hamper the growth. However, in both the scenario it is important that Kageshwori adapt the planning principles so it can establish itself as a part of an urban agglomeration of Kathmandu Valley.

The major of the recommendations that has been formulated by the research is the empowerment of municipalities, promoting public transportation and implementing planning approaches with public participation.

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LIST OF ABBREVIATIONS

AD: After Death

BS: Bikram Sambat

CBD: Central Business District

CBS: Central Bureau of Statistics

DUDBC: Department of Urban Development and Building Construction

ENPHO: Environment and Public Health Organization

FCAN: Federation of Contractors' Association of Nepal

FY: Fiscal Year

GIS: Geographic Information System

Ha: Hectare

HH: Household

IUDP: Integrated Urban Development Programme

KMC: Kathmandu Metropolitan City

KMM: Kageshwori Manohara Municipality

KUKL: Kathmandu Upatyaka Khanepani Limited

KVDA: Kathmandu Valley Development Authority

MOFA: Ministry of Foreign Affairs

MOFAGA: Ministry of Federal Affairs and General Administration

MOUD: Ministry of Urban Development

NPHC: National Population and Housing Census

PPH: Persons Per Hectare

PPP: Public-Private-Partnership

SDGs: Sustainable Development Goals

Sq. Km: Square Kilometer

TIA: Tribhuvan International Airport

UN: United Nations

UNDESA: United Nations Department of Economic and Social Affairs

UNDP: United Nations Development Programme

VDC: Village Development Committee

CHAPTER 1 : INTRODUCTION

1.1 Background

Urbanization in simple words can be inferred as the increasing number of people living in urban areas. The major difference between rural and urban areas is the mode of economy from agriculture to service and subsistence based to surplus based. Yet, urbanization is not only about a simple increase in number of urban residents, but also involves a series of change from rural to urban styles in terms of industry structures, employment, living conditions and social public services (Chen M et al, 2014). It is the global phenomenon with the world urban population increasing from 746 million in 1950 to 3.96 billion in 2014 (UNDP,2017). Out of total population in the world, 55% lived in urban areas in 2018 and is expected to reach 68% by 2050 (UN DESA,2018).

The growth pattern of cities around the globe although differ according to their geographic location, history, political and economic conditions (Kaiser et al., 1995), they tend to follow similar patterns. Between 2000-2010, US cities grew on average by 10.7% (Gilles & Diego, 2013) and that of Spain grew by 18.1% (Gilles & Diego, 2013) both exceeding the national average growth rate of population. The twentieth century showcased the rapid urbanization period while the mid and late twenty first century is bound to face the issues related to the urbanization. Most of the developing countries experience spontaneous development patterns rather than planned growth as they fall outside the jurisdiction boundaries of the governing bodies of the urban area (Nallathiga et al, 2015). Nepal as a developing South Asian country, showcased the level of urbanization of 18.2% (Bakrania, 2015) with an urban growth rate of 3% (UN-DESA, 2014), and is expected that for a period of 2014-2050, Nepal will remain amongst the top ten fastest urbanizing countries in the world with growth rate of 1.9% (UN-DESA, 2014).

The trend of urbanization in Nepal is dominated by few large cities and primarily by Kathmandu Valley which has the largest cities and excessive population. While the population distribution is uneven, Kathmandu has the highest population density of 19,726 (MOUD,2016) per square kilometer (197 PPH) covering 9.7% (MOUD,2016) of the total urban population of Nepal. After the Nation's restructuring process in 2014, several new municipalities have been declared inside Kathmandu Valley together with which there are now 18 municipalities in the Valley. The creation of new cities is a

planning approach adapted in several regions around the world, in order to accommodate urban growth (Alghais & Pullar, 2018). The new municipalities in the periphery can be assumed as the outward extension of the urban population growth of Kathmandu city core. There are numerous factors of a city core like traffic congestion, housing shortages, lack of open spaces, over-crowding, pollution that push its inhabitants outwards. The declaration of new municipalities and definition of urban centers have long been debated in the context of Nepal since the recent declaration of most municipalities are politically guided and possess the urban-rural characteristics rather than purely urban. Lack of good governance and anthropogenic pressures are turning these new urban areas into a concrete jungle. Unmanaged urban expansion increases the costs of service provision, deepens spatial inequities, and imposes heavy economic and environmental burdens (Mahendra A and Seto K, 2019). On the other hand, it is also in these areas where there is an opportunity to manage urban growth before it becomes the permanent chaotic characteristics of that particular area. In the present context of Nepal in global scenario where it has become a part of Sustainable Development Goals, the need for proper development plans so as to make the city sustainable is acute. Sustainable development is essentially not only about the environment but rather about the capacity of a human society to enact permanent reform in order to safeguard the delicate balance between humans and their natural life support system (Hamm and Muttagi, 1998 A cited in Nallathiga et al, 2015).

1.2 Study Area

Kathmandu is a bowl shaped valley comprising of three districts namely Kathmandu, Bhaktapur and Lalitpur. The valley is administratively divided into 18 different municipalities and 3 rural municipalities. Kathmandu Valley basically is an urban agglomeration that epitomizes the extraordinary urban growth (Ishtiaque, et al., 2017) due to its political and economic importance. Kathmandu Valley with Kathmandu city as its core has its population of one million according to census 2011 and is projected to double by 2030 (Ishtiaque, et al., 2017). This unprecedented population growth at its core led to several urban problems at city core like traffic congestion, housing shortages, degradation of public spaces, pollution and reduction of safety. The peripheral urbanization around Kathmandu city thus commenced mainly to address the above mentioned issues of haphazard urban growth.

Kageshwori Manohara Municipality lies towards the north-eastern part of the Kathmandu Valley. It was declared as a municipality on Mangsir 16, 2071 B.S. by merging former 6 VDCs namely: Gothatar, Mulpani, Danchhi, Bhadrabas, Aalapot and Gagalphedi. The municipality is named after the historically and religiously famous Kageshwori Mahadev Temple located at Gagalphedi. The municipality also has several other temples, water spouts, monasteries, churches etc. The construction of National Cricket Stadium is also ongoing at Ward-06 of the municipality. The municipality consists of 9 different wards with the total population of 1,02,235 (Household Survey, 2019) and total number of households 26, 166 (Household Survey, 2019) in an area of 27.38 square kilometers.

Majority of the people in Kageshwori Manohara municipality belong to Chhetri, Brahmin, Tamang, Newar according to the Household Survey of 2019. The municipality at present depicts the urban to rural- urban characteristics varying from South to North. The population growth trend shows that the areas nearer to major centers of Kathmandu and Bhaktapur are developing at a higher rate than those of others. Once famous for agriculture, this municipality is alarmingly being urbanized which if not checked and balanced in time will deteriorate the urban landscape and environment of the municipality.

1.3 Problem Statement

In today's era, urbanization is a natural phenomenon. While most of the European and American countries are urbanized, countries in South Asia are in the phase of urbanizing. The cities of Western world now advocate for mixed use high density cities as more efficient and sustainable while South Asian countries are still developing organic and sprawl type urbanization.

Nepal lacks visionary planning in the sector of urbanization. The declaration criteria for municipality is long debated by senior planners as it is mostly politically guided rather than a planned one. Kageshwori Manohara is one of those newly formed municipalities of Kathmandu Valley that is facing the challenge of development versus environment. A new urban area always has the opportunity to be developed in a planned and sustainable way by learning from the past. A strong intervention in the current time to provide vision is needed to avoid the problems that haphazard urbanization possibly brings namely:

- Segregation of land
- Longer commuting period
- Societal imbalance between indigenous and migrant people
- Degraded urban ecology

1.4 Research Questions

The research primarily attempts to find appropriate answers for how cities grow and how cities should grow in modern times.

It seeks answers to the following questions:

- What are the physical, socio-cultural and environmental characteristics of new urban development?
- How overall macro level urban development affect the growth of a city and what influential factors contribute it?
- Why is it necessary to consider ecological sustainability in the process of new urban development?

1.5 Research Objectives

The main objective of this research is to study the dynamics in the development pattern of newly formed municipalities of the Kathmandu Valley and suggest possible ways to develop in a sustainable way. The general objectives have been listed below:

- To study the pattern of growth of a city
- To identify the relation between new urban development and positive growth of a city in terms of:
    - Land Use
    - Mobility
    - Infrastructures
    - Economy
- To establish the inter-dependency of new urban areas and present city core such that they support each other
- To suggest possible ways to develop new cities in a sustainable way

1.6 Scope and Limitations

1.6.1 Scope of the Research

The study includes the understanding of new municipalities of Kathmandu Valley as the peripheral growth of Kathmandu city core and not just a new urban area. The inter-dependency of existing city core and new urban development is explored in the study. The study focuses on the pattern of growth on different sectors and challenges faced by new municipalities. This research aims to fulfil the gap between understanding of development as mere physical development and the importance of inclusion of ecological, infrastructure and social development. The study explores the functionality of urban areas as a pathway towards its sustainability.

1.6.2 Limitations of the Research

This research tries to study the urban growth pattern in the newly urbanizing areas around Kathmandu Valley. With the addition of thirteen new municipalities in 2014, presently Kathmandu Valley has eighteen municipalities in total. However, the research is carried out in only one such municipality i.e., **"Kageshwori Manohara"** municipality. Each new area is developing with its own unique pattern of growth so this study cannot be generalized in detail for all new municipalities. But, again it is true for general overview as every development shows similarities in some cases. The types of data required to understand the development dynamics have been derived from literature review. As for the study of sustainable aspects, only basic and primary standards validated at National level has been chosen as the sustainability is a vague topic with varieties of definitions and standards existing at the present time.

The study focuses majorly on the rapidly urbanizing areas of the municipality and superficially on the other areas because dynamism is often characterized by urban areas rather than areas in urban-rural character.

The study is based on the quantitative data available from the municipality and qualitative data collected through questionnaire survey. It was necessary to validate the data already existed with the municipality provided the nature and time frame of the research.

CHAPTER 2 : LITERATURE REVIEW

2.1 The History of Urbanization

2.1.1 The Origin of Cities

Early cities developed in a number of regions, from Mesopotamia to Asia to the Americas. Ancient cities were notable for their geographical diversity as well as the diversity in their form and function (Lumen, 2014). The study of early urban sites show that some cities were sparsely populated political capitals, others were trade centers and still other cities had a primary religious focus. Thus it will not be completely fair to explain ancient urbanism by a single factor. Some cities like Alexandria and Antioch of the Hellenistic civilization, Carthage and ancient Rome and its eastern successor, Constantiople (later Istanbul) grew to be powerful capital cities and centers of commerce and industry, situated at the centers of growing ancient empires (Lumen, 2014). The development of city kingdoms by the Sumerians of Assyria were both fortresses and marketplaces for the agricultural products of the surrounding lands; the cities also had some light manufacturing and craft making typical of the Bronze age (Catanese & Snyder, 2014).

Theorists believe agriculture to be a pre-requisite for cities, which help preserve surplus production and create economies of scale (Lumen, 2014). According to Vere Gordon Childe, for a settlement to qualify as a city, it must have enough surplus of raw materials to support trade and a relatively large population (Wikipedia, 2020). Before the innovation of farming, hunters and gatherers had nomadic life. They moved from one place to another in search of wild fruits and vegetables along with the changes in seasons and food supply. As they had to keep on moving, they had very little possessions or private ownership. They had a very little or no social-communal life.

Some 1000-1200 years ago, the hunters learnt farming. They understood that they could even grow and harvest certain crops instead of just gathering them and started living in an agriculture based group settlements. Later, it was also discovered that several animals like cow, sheep, buffalo can be tamed for milk and other dairy products. Since, animals also needed grass and grains, they did farming too and exchange of goods started occurring. This further encouraged towards the production, storage and exchange of surplus foods that led to dense, settled populations and ultimately settlement growth. A good environment and strong social organization were established

as the foundation of a successful city. Cities may have held other advantages, too. For example, cities reduced transport costs for goods, people, and ideas by bringing them all together in one spot. By reducing these transaction costs, cities contributed to worker productivity. Finally, cities likely performed the essential function of providing protection for people and the valuable things they were beginning to accumulate. Many cities in the ancient world were planned, at least in the sense that their existence and their location were laid down consciously by some rulers or some group of merchants (Hall & Jones, 2016). Some cities even had plans with strong element of geometric regularity. In other words, it can be inferred that the cities existed because they were efficient than sparse settlements in multiple sectors.

2.1.2 Pre-Industrial Urbanization

The Pre-Industrial cities had important political and economic functions and evolved to become well-defined political units (Lumen, 2014). Preindustrial cities depend for their existence upon food and raw materials obtained from without; for this reason they are marketing centers (Sjoberg, 1955). They also serve as centers for handicraft manufacturing in addition to fulfilling their political, religious and educational functions. Some cities had a special characteristics like, Benares in India and Karbala in Iraq are best known as religious communities, and Peiping in China as a locus for political and educational activities (Sjoberg, 1955). However, the study of cities and urbanization is largely confined to Western world (Europe and America) due to the availability of resources. Ancient Rome had an estimated population of one million by the year 100 AD; Elizabeth London about 200,000 people (Hall & Jones, 2016). However, the cities were not bereft of problems related to economic and social organization: Rome had to be supplied with water from distant sources through aqueducts. In London, in the fourteenth century a man was hanged till death for burning sea-coal that caused air pollution.

2.1.2.1 Cities as political centers

While ancient cities may have arisen organically as trading centers, preindustrial cities evolved to become well defined political units, like today's states. The major contribution of the Romans was planned, city building as a symbol of Governmental power and presence (Catanese & Snyder, 2014). During this period, wealthy Roman leaders built huge monuments and public buildings to honor their empire's greatness. Each emperor built a forum for public meeting that served as the centers for the political

and business life of the city. After the fall of Roman Empire, when Barbarians rose to the power they either destroyed many of those Roman cities or used them as fortresses in their local wars.

By the thirteenth century, there were many towns in the western world where only few had more than 50,000 inhabitants. The discovery of gunpowder in the fifteenth century had an impact in the restructuring of walled cities, new outer walls were built at some distance from the cities to create a buffer zone for defense purpose. The seventeenth and eighteenth centuries (Baroque era in continental Europe) had cities with expressions of absolute regal or papal power. Instead of the medieval walled town, cities then were planned along broad avenues where mobile armies could deploy themselves. Here, the aristocracy and the new merchant class dominated the growth of cities, and determined their form (Hall & Jones, 2016).

2.1.2.2 Cities as Trade Routes and Market Centers

If agricultural development created the earliest forms of wealth for world societies, it was historical trade that encouraged new heights in human prosperity (Blaydes & Paik, 2017). Even before the industrialization, England and other European countries had large scale production that were not factory based. Not all cities of pre-industrial period grew as urban centers and those who did had the advantages of access or proximity to trade routes. Transport system since was primitive: by far the easiest way to move things around was by sea or river, using wind as the source of energy. The traders and merchants would travel from countryside to countryside for commerce because it was quite difficult for new business to start in established towns due to monopoly in market. While the city-states, or poleis, of the Mediterranean and Baltic Sea languished from the 16th century, Europe's larger capitals benefited from the growth of commerce following the emergence of an Atlantic trade (Lumen, 2014). The occupation for livelihood started shifting from only agriculture to manufacturing goods too. Textile cottage industries came into existence with agriculture as source of economy.

The transition from the Renaissance to the baroque period marked an important patterns emerging. The cities had become the places where trade and commerce occurred (Catanese & Snyder, 2014). A lot of efforts started to be put on to make the cities well planned and beautiful with the flourishment of economy. The cities with population more than 100,000 increased from 40 in 1700 AD to 300 in 1900 AD. This era left a

message to the entire cities that attempts could be made to make the cities beautiful which was later altered by Industrial Revolution.

2.1.3 Post Industrial Urbanization

The invention of steam engine in 1769 indicated the beginning of industrial revolution. It was in this era that for the first time in history, human labor could be accompanied or replaced by the use of machines. The cottage industries before industrial revolution were dispersed and out of towns into the open countryside. The usage of coal that started after 1780, changed the situation. The industries were to be located where availability of coal was easy because transportation at that time was quite expensive and not advanced. The first steam driven railway in 1830 made freer to locate the industries to some extent. Yet, the location mattered and towns near port or coalfields bloomed while the opposite remained stagnant industrially. Transportation held the major support system for industrialization. Thus, cities developed the transportation system with streets, railways, shipping lanes and canals. Older established medieval towns became centers of new factories and eventually became railway junctions soon after the railways arrived. Port towns became just as important as pure industrial towns. London became the fastest growing place from 1780 onwards. Industrial cities offer integrated infrastructure for the various plants in one location, which would regulate the operation of all existing processes (Alnouri, et al., 2014).

Migration became an emerging trend with industrial revolution. During nineteenth century, people from countryside started migrating towards industrial towns. People from poorer community who had least to lose and most to gain by coming to the city were the prominent migrants. For example, Irish flooded into Liverpool and Manchester and Glasgow after the failure of the potato harvest in 1845/6 (Mokyr, 2019). Cities as they had economic opportunities based on industries, were major attraction for people who failed at agriculture. The cities on the other hand though had economic opportunities lacked social arrangements. With industrial revolution, a new change was added to lifestyle of workers i.e., the journey to work. The public transportation system was yet not advanced and within reach of common factory workers. This made it necessary for workers to live within walking distance form their respective workplaces. The boundary of city was thus limited to the distance that the workers can commute on daily basis. A highest density of community was thus developed within this limit. But, the lack of basic hygiene and sanitation services in

these city core areas led to increased level of pollution and mere conversion into slums. Overcrowding grew steadily worse, both in the form of residents per acre and people per room. The spread of epidemics was also alarming taking away a toll of deaths. One of the global pandemics, Cholera outbreak occurred which was later identified as a water-borne disease and was spreading due to contagious single pump of water. Obtaining clean water was a constant problem in industrial towns. Some people used buckets to collect rain-water. However, the air was so polluted that this water would soon turn black (Simkin, 1997). The expected life span at the time of birth was 41 years in England and 45 years in salubrious Surrey during 1841 (Hall & Jones, 2016).

Thomas Carlyle wrote that England seemed an "enchanted" land that had been "cursed by the gods, flowing with wealth from improved agriculture and industrial invention" but had the terrible problem of poverty that such wealth had brought with it (Simkin, 1997). This kind of a situation could not be tolerated for long. The need for proper and effective administrative body with proper financing was felt that could act to ameliorate the problems of public interest. The Municipal Corporation Act 1835, The Public Health Act of 1848, Sanitary Act 1866 of England are some of the major legislative and administrative efforts made to concern the problems of city dwellers. From the mid-nineteenth century onwards, there were reactions by construction of industrial dwellings by philanthropic landlords to the slum problem of the Victorian city. They offered superior working-class accommodation and yet gave a return on capital. Local authorities adapted by-laws for the construction of new housing from the 1870s onwards in a wide ring around the slums. Uniform row of two-storied housing in the local building material (brick mostly) were constructed with streets having uniform minimum width for air and light. They also had a lavatory outside of the building.

The improvement in the living standards of workers helped boom the production and economy. The turn of the century witnessed the outward movement of wealthy people from the city core to found newer and more desirable housing. More workers were becoming white collar employees which allowed them to borrow money on credit and consider themselves as enlarging middle class. The improvement in their economic and social status left with an aspire to buy a house of their own with the aid of mortgage as the city core reflected problems of congestion and lack of open spaces. The process of peripheral development was aided by increased access to mobility. By the late

nineteenth and early twentieth centuries, suburbs housing the more affluent were common at the periphery of cities, while workers with low income were bound to live in the congested central areas. The patterns of urban flight and suburban sprawl so characteristic of contemporary American cities started a century ago but was fostered only by the invention of automobile.

2.1.4 The modern urban spread

The industrial cities faced a huge degradation of urban ecology and also experienced few steps taken to upgrade the conditions. However, with the growth of population and economy the cities tend to grow further. Till 1860s, densities kept rising within a radius of about 4.8 kilometers from the center of cities. These gardenless houses without public parks were however within 20 minutes walking distance from open fields. But by and large the period after 1870, a significant change in the development of British as well as American cities was seen according to industrial studies by the economist Colin Clark. Between 1870 and 1914, virtually all British and American cities acquired cheap and efficient transportation system as motor buses. Large cities like London even had commuter trains.

The effect of urban growth was noticeable, as can be seen clearly in the series of maps for these larger cities at different dates. The share of public transportation was profound in the growth of these cities. Early steam trains accelerated the process of cities' growth. The cities began to spread in all directions with inner areas still having higher densities. This was the time when early public-transport city existed. But, the reliability on trains was poor because the stops were widely placed and feeder services in the form of horse buses or trams had to be used which in themselves were only poorly developed. The result is a typically tentacle form of growth, with development taking the form of dribbles around each station. A new form of urban spread evolved commonly called as 'suburbanization'. In the US, when inner cities become too crowded, residents started migrating to the suburbs, which are communities that are adjacent to but outside of the city (Khan Academy, n.d.). The suburban areas are automobile dependent. Between the two world wars, the whole process of suburban growth and decentralization began to speed up changing the form of the cities. The forces behind it were however partly economic, partly social and partly technological while change in the technology of transportation still being its basic reason. Semi-detached housing units, detached residences in a larger plot became the symbol of higher economic status. The price of

land development had been cut down drastically so affordability of people went on increasing. It was easier for the average clerical or skilled manual worker to buy a house in 1930s than it is in the more affluent Britain of 80 years later (Hall & Jones, 2016).

A group of intellectuals were however alarmed at the process. According to planners and conservationists, the process could result in two bad effects: The consumption of majority of agricultural land at an unmatched rate and the larger commuting distances and times that was the result of decentralized urbanization only and not jobs. As cities grew larger and larger, as their suburbs sprawled farther and farther, it was argued that they imposed an increasingly unbearable burden to its inhabitants. Thus, a movement began to limit the urban growth initiated by professional planners, rural conservationists and others people concerned about the urban environment and also formed organizations for it.

2.2 Theories of Urban Growth

Cities offer a significant range of opportunities and life quality improvements to their residents. However, living in an urban areas and cities have never come without challenges. The physical shape of a city or urban and ways it expands directly affect the severity of these issues (Alghais & Pullar, 2018). Population growth of cities is economically important in itself as extremely large investments in building new housing and infrastructure must be made to accommodate the demographic growth of the cities (Gilles & Diego, 2013). Between 2000-2010, the 366 US metropolitan areas grew on average by 10.7% which exceeds the average growth of population which was 5.3% (ibid). In Europe, the areas surrounding most large cities have been radically transformed by spreading out over the last 20 years (Camagni, et al., 2002). The decline in environmental quality of the densely built city centers, traffic congestion, pollution, degradation of public spaces and safety; change in lifestyles due to increase in incomes, in favor of more spacious decentralized housing; the replacement of residential land use in the city center by tertiary activities; the fact that housing improvement in the city center costs more than new construction outside the city; and the housing supply strategies of real estate agents, which find less resistance in the more spacious out-of-town areas have been the cause of urban growth (ibid). Human capital and entrepreneurship also affect the growth of cities.

Based upon the study of urban growth history and several researches, a city growth follows one or more models of growth from the lists below:

2.2.1 Concentric Circular Model

The concentric circular model urban development also called as CCD model was probably first theory proposed on urban growth pattern. It was developed in 1925 by a sociologist, Ernest Burgress from the inspiration of development of Chicago (Goodwill, 2018). In this model, the growth starts with a central business district at the center of the city. It is the major economic hub of the city. The rent of living in this central area is highest and goes on decreasing upon moving away from the center but the transportation time and costs are added. Though the automobile friendly cities facilitate the development of economy outside city core at present times, it held true in the case of early cities and is still standing still in case of many cities. Another important thing to be noted is that the geographic nature can restrict the growth of cities. This kind of urban growth mostly occurred until 1930, because railway being the major source of transportation, factories needed to be located near downtown railway station and likewise the factory workers because of high living cost at core preferred to live far away in lesser dense areas.

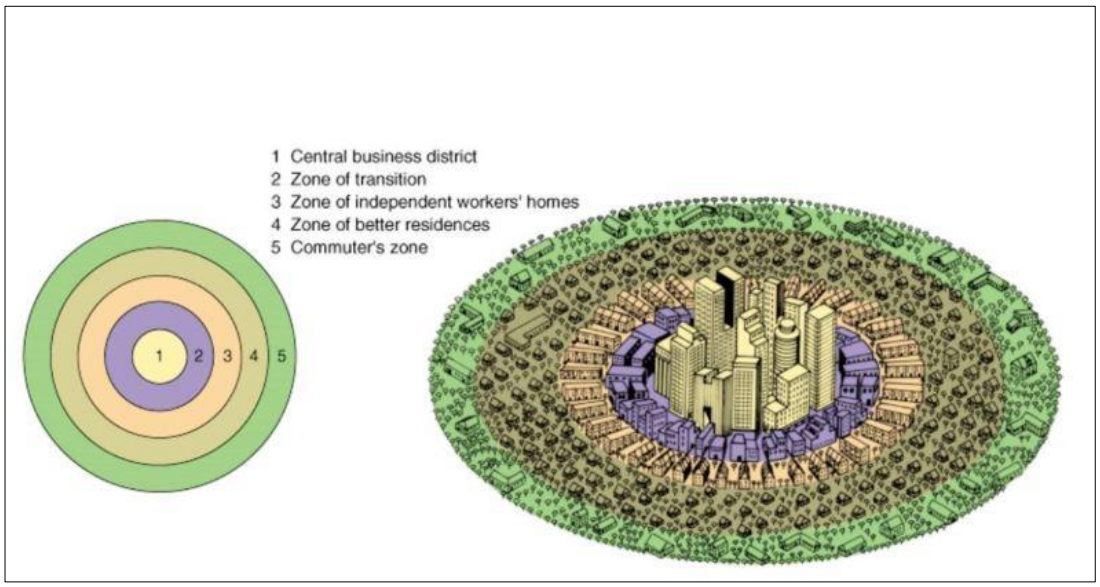


Figure 2-1 Concentric Circular Model

Source: PropertyMetrics.com

This model comprises of five different zones. The first is the city's central business district which is the economic hub of the city. The second zone is the transition zones where offices turn into factories while the third one is the traditionally residential areas

for low earning factory workers who wished to earn enough money someday to move out of this zone to other less congested areas. The fourth zone is another residential area but this one is for medium incoming people who can afford semi-detached houses. The last and the fifth zone is known as commuter zone where upper class families reside in larger plots and peaceful environment outside the chaos of city core. In simpler words, it can be depicted as increment in affordability of people was often associated with their preference to live farther away in larger plots compromising everyday travel distance and time.

2.2.2 Sector Growth Model

In the 1930s, Homer Hoyt published another variation of the concentric circle growth model called the sector growth model. The sector model recognized that growth tends to extend outward from the city center primarily along transportation lines and that specific types of development tend to cluster together in patterns (Goodwill, 2018). Many European cities, particularly British cities, exhibit this development pattern.

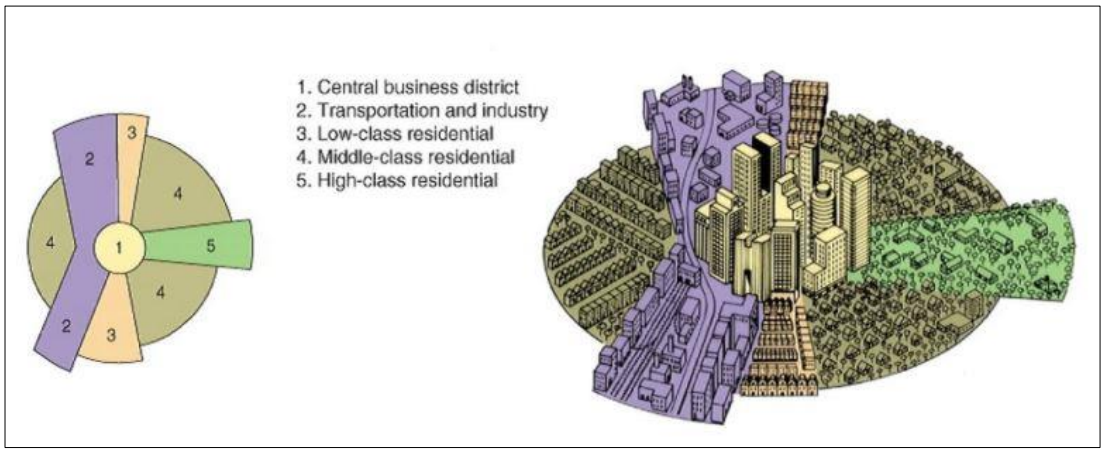


Figure 2-2 Sector Growth Model

Source: PropertyMetrics.com

Unlike concentric circle model, in this model residential units develop in a wedge shape cut out from the central business district. The settlements of low income workers develop along the major transportation corridors so as to ease the process of commuting to the workplace. The middle income workers live right next to the low income workers but are less congested as compared to the previous one. This group can afford the transportation medium and trip time that is demanded on everyday basis to travel to work from home and vice versa. A very small number of people move to very far away right from the central business district and are often the wealthiest people of the city.

Sector growth model is developed in a cluster form. It can be understood as a modified form of concentric model with difference that sector model allows outward progression of growth. This model is seen to be followed by British cities like New Castle and London. Calgary city of Canada and modern Chicago city of United States have also followed this model for growth and development.

2.2.3 Axial Growth Model

It is very clear from the study of history of cities growth that transportation is a key to urban growth. The axial growth model was developed in the same time as sectoral growth of cities and suggests that development occurs along the transportation lines leading out of the city center (Goodwill, 2018). The areas nearby the transportation system develop the most and upon moving farther away the areas become less and less developed resulting in the belt-type growth and development. Axial growth model is exhibited by almost all the developing countries. In Nepal too, the areas along the major highways like East-West highway, Araniko Highway are growing organically only because of their location along the major transportation lines. The places like Muglin, Khurkot are the examples of emerging urban areas developed in this model of urban growth.

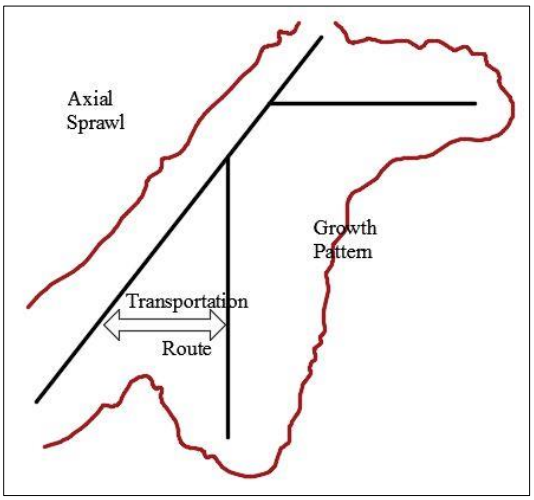


Figure 2-3 Axial Growth Model

Source: PropertyMetrics.com

2.2.4 Multiple Nuclei Model of Growth

The growth of cities aided by population growth, economic and technological advancements caused changes in the forms of urban growth. Cities became more

complex and new areas of economic generation were created. Harris and Edward Ullman published a model that attempted to explain the new complex shape of urban development. While rail transportation was at the center of previous models of urban growth, the multiple nuclei growth model considered the new disruptive technology of automobile transportation.

The multiple nuclei model identifies the growth of cities in cluster forms and there are more than one modes of economy. It suggests that new clusters grow for variety of reasons. Some may be specialized in the functions they bear for the city. However, the city still grows around the central business district. In this model, new suburbs are created outside the city core.

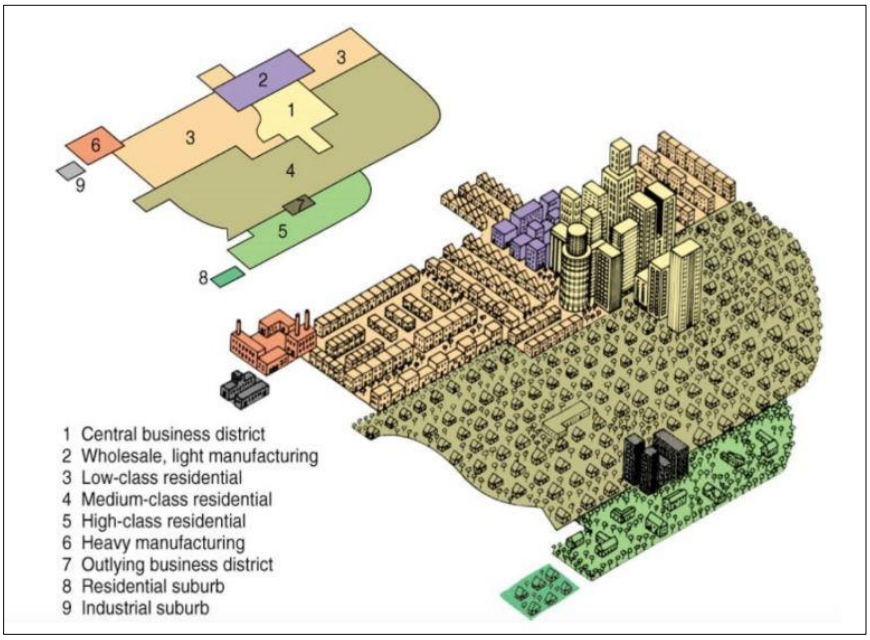


Figure 2-4 Multiple Nuclei Model of Growth
Source: PropertyMetrics.com

The pattern any city follows during its growth is subjected to be affected by social, economic and technological aspects. Before, rich and wealthy people wanted to live in more open spaces, in bigger houses away from the congestion of city core. Self-owned automobile was the necessity and they could afford it. But, coming to this age, where sustainability is an issue because of resources being scarce, this phenomenon is a subject of question. The revere phenomenon is seen nowadays in many of the large cities because moving outwards demanded longer time and effort. Urban planners and designers are trying to develop a more efficient and sustainable model for planned urban growth to happen.

2.3 Urban Growth in Nepal

2.3.1 A historical growth before 1950

Nepal has a predominantly agrarian economy and rural socio-cultural outlook and has historically a little experience in rational organization of human settlement and economic activities (Devkota, 2018). The idea of development of cities and towns as an engine of economic growth is relatively new in the context of Nepal Government.

While there is very little information about Kirats, who are apparently the first rulers of Nepal (Earlier Kathmandu Valley was called Nepal). It was Lichchhavis who ruled after Kirats brought art and architecture to Nepal (MOFA, 2020). Historians claim that during the Lichchhavi period, many settlements existed in the Kathmandu Valley that were developed as commercial centre known as 'dranga' (Basyal & Khanal, 2001). The consolidation of these drangas with time evolved into an urban settlements and later were referred to as capital towns. Some of the urban settlements outside the valley at the time were Nuwakot, Dolakha, Banepa and Panauti that are located in the adjoining hill regions around the valley (ibid).

The Lichchhavis were succeeded by Malla rulers in 1200 AD. The Malla period is regarded as the golden age of creativity as they built numerous temples and splendid places with picturesque squares (MOFA, 2020). The Mallas developed Kathmandu as an administrative and trade route between India and Tibet that made it a prosperous town. These famous palace squares of Kathmandu, Bhaktapur and Patan have been enlisted in the UNESCO World Heritage Sites as well. There were also numerous small states in the Western and Eastern hill areas, also named as Baisi and Chaubisi Rajyas (Rose, 2020). Their independence was sustained through a delicate balance of power based upon traditional inter-relationships and in some cases, common ancestral origins among the ruling families (ibid).

With the unification of the country in 1769 by Late King Prithvi Narayan Shah, central political system was established with center of administration moved from Gorkha to Kathmandu. The civil and military troops were sent to different places of the hills and Terai as Government' attempt to expand. The dispersed Government officials had objectives to assert sovereignty, appropriate taxes and make further military advances in Gorkhali imperial mission (Devkota, 2018). The Indian Railway linkage helped grow Terai even further. Places like Tansen, Pokhara and Bandipur started attracting

population and formed small towns (Amatya, 2011). New urban centers like Biratnagar and Birgunj evolved which continue to be a larger cities of Nepal till date. The overpowering of Shah Kings by Ranas in 1846 started a new period of isolation for Nepal with familial loyalty over loyalty to the crown or nation. The 104 years long Rana Period finally came into end in 1950s and sovereignty of the crown was restored. Nepal opened up to world only after that period

2.3.2 Contemporary Growth after 1950s

The end of isolation period in 1951, led towards new era of development for Nepal. The formal "development planning" started with the promulgation of periodic development plans from 1956 which conceived relocation and re-arranging of settlements (Devkota, 2018). The entire nation was divided into five development regions as a step towards decentralization practice. Each development region had a headquarter and regional hospitals along with different universities developed so as to achieve balanced growth and development. The plain land and lush green forests of Terai made it prospective site for urban as well as agricultural expansion. Heavy migration of people from hills to Terai was trending especially after the eradication of malaria and construction of East-West highway. The trade via free border with India also helped boom the urban centers in Terai. Rajbiraj and Tikapur located in Terai regions were the early planned cities of Nepal. These twin efforts marked the beginning of town development in the region. Kathmandu Valley, on the other hand as a capital city and economic center experienced an increasing influx of inhabitants. Pokhara Valley was also growing as a tourism and residential destinations.

Simultaneously, there has been several changes in the definition of urban centers. The census of 1961 defined urban area as "an area with a population cluster of not less than 5000 with an urban environment such as high school, college, judicial and administrative offices, bazaar, communication facilities, mills and factories" and named it as 'Sahar' (Basyal & Khanal, 2001). Nagar Panchayat Act of 1962 set criteria of minimum 10,000 and social services to be declared as 'Nagar Panchayat' (Pandey, 2013). Later, Municipality Act was formulated and again amended in 1997. According to the act, any Terai region with minimum 20,000 population and infrastructure facilities such as electricity, roads, drinking water and communications would be declared as Municipalities. The criteria for Hilly region was a little different in population as only 10,000 as minimum populations. The same Act further classified

Municipalities into 3 strata: Municipality *(Nagarpalika*), Sub-Metropolitan City *(Upa Mahanagarpalika)* and Metropolitan City *(Mahanagarpalika)*. The rural settlements that do not fulfilled the criteria of Municipality were termed as Village Development Committee *(Gaun Bikash Samiti)*. Municipal town meant it required a status of an independent administrative unit and management of all its functions and development activities (Pandey, 2013). Nepal recognizes municipalities as urban centers. Between 1952 and 2001, the number of urban settlements in Nepal grew from 10 to 58, while their share in the country's population increased from 2.6-14.4% (Boris & Madhav, 2006). The number of municipalities remained 58 for a long time till 2011. The drastic changes in political system has caused an increase in number of municipalities after 2011.

2.3.3 Current Urban Scenario of Nepal

The constitution of Nepal 2015 defines Nepal as 'Federal Democratic Republic'. As per the constitution, Nepal has three tiers of Government: Local, Provincial and Federal in ascending order of authority. Since the last democratic election held in 2017, Nepal consists of 753 local Governments (293 Municipalities *(Nagarpalikas)* and 460 Rural Municipalities *(Gaunpalikas)*) under 7 provincial Governments under a single federal Government. The local election that took place after twenty long years finally provided citizens to exercise their right to choose their own representatives. Each local government has its own chairperson. All the provincial Government has its own Planning Commission with National Planning Commission being a part of federal Government. The change in political and governance system is for the transfer of power from federal to provincial and local Government to ensure healthy and balanced growth all over Nepal.

These 293 municipalities are what Government recognizes as urban areas in the current scenario. The municipalities are further stratified as: Municipality, Sub-Metropolitan City and Metropolitan City. The designated local body has to fulfil certain criteria to be declared as so. The criteria have been listed below:

Table 2-1 Criteria for declaring Different tiers of Municipalities

Criteria	Municipality	Sub-Metro City	Metro City
Population	Mountain area=10,000 Hilly Area= 40,000 Inner Terai= 50,000 Terai= 75,000 Kathmandu Valley=1,00,000	At least 2,00,000 permanent residents	At least 5,00,000 permanent residents
Internal Revenue (Avg of last 5 years)	Rs 1 Crore (Mountain Region) Rs 3 Crore for others	25 Crores	At least Rs 1 Arab
Health Facilities	Min 50 bed Hospitals	1 Hospital with 100 beds and 200 in total	1 Hospital with 100 beds and 500 beds in total including special treatment
Open Spaces	Well defined with parks in each ward	With public gardens	Children and Elderly friendly parks
Urban Facilities	Solid Waste Management with landfill sites, Banking Institutions, Community Buildings with City Halls, Market Centers, Slaughter Homes, Cremation Center, Playground, City Development Masterplan, Bus park with waiting area and public toilets	Solid Waste Processing and Management System, City Hall, National Level Stadium, Gymnasium and Covered Hall, Electricity, Drinking Water and Communication Facilities, Major roads black topped, Higher level and	International Airport, Shopping Malls, Managed Vegetable Markets, International Level Stadium, Technical Education Facilities, International Level Hotels, Art Galleries, 75% of total road length black topped, Urban Greenery and Beauty

		technical education Facilities, Modern cremation centers and Slaughter Homes, Public Buildings with universal access, Tourism Standard Hotels, Motels and Resorts	

Source: Local Governance Operation Act, 2074

However, the Government's decision to declare Municipalities is much debated as it is taken as to be guided politically. In an article by Devkota K., he mentions that some of the so called Municipalities don't meet even the basic urban facilities criteria to be called as an urban area. The criteria set itself speaks only of total population and ignores the minimum population density which is considered to be an important factor in modern. In a chapter with the name 'Need for Concentration' by Jane Jacobs, she mentions that a dense settlement is required to perform any social or cultural activities. Sadly, this factor has not been considered in Nepal. The declaration of municipal areas without adequate preparation and consultation among local people and the lingering implementation practice has created dilemma on civil servants and local people (Devkota, 2015). It will not be unfair to state that most of the municipalities declared recently lack proper manpower and management strategies.

2.3.4 Urbanization in Kathmandu Valley

Kathmandu Valley is a rapidly urbanizing mountain basin in the Himalayas surrounded by the Himalayan mountain range and expanding in an area of 899 square kilometer (Ishtiaque, et al., 2017). The cities within the valley rank among the oldest human settlements in the central Himalayas. It shares the characteristics with many other rapidly urbanizing cities in the region including unregulated urban development, inadequate enforcement of land use policies, poorly maintained city infrastructures, the massive influx of people from surrounding rural areas and hinterlands, land speculation, excessive pressure of commercial activities and gaps in supply and demand for basic services (Ishtiaque, et al., 2017). Till 2014, Kathmandu Valley had five municipalities

(urban centers) namely Kathmandu, Lalitpur, Bhaktapur, Madhyapur Thimi and Kirtipur. After the nations restructuring, addition of 13 new municipalities in the valley indicates the trend of urbanization is high in the valley. The research by Ishtiaque et al suggests that in the last three decades, built-up areas of Kathmandu Valley has increased by 412% while agricultural land lost at the rate of 31%. It has become important to study the dynamics of urbanization and its sustainability in the valley to prevent further deterioration of urban environment.

2.4 Plans and Policies Review

2.4.1 The Physical Development Plan for Kathmandu Valley, 1969

The Physical Development Plan (PDP) of 1969 is the first approximation of the general regional physical planning methodology required to serve for the planning of regions throughout the country. It primarily was developed as a prototype under two major considerations. Firstly, the plan would serve directly as a development tool for the region to which it applies and indirectly as a program positively affecting the socio-economic development of the entire country (PDP, 1969). Secondly, the plan would be a pilot program- a regional physical planning model- which would provide the relevant experience necessary for future regional planning efforts in other regions of Nepal (ibid).

Kathmandu Valley was chosen as a prototype because of it being compact with high rate of development and proximity to the implementing agencies. It identified that the mixture of economic development through industry, commerce, tourism and agriculture would nurture the overall growth to the valley. The plan aimed to preserve the historical and cultural heritage, and to guide urban development through land use planning, with a particular aim to prevent sprawl in city fringe areas and ensure settlement densification (Thapa, et al., 2007). It adopted the multi-nucleated regional growth strategy with linkage of dispersed settlement in the valley, continuation of existing growth tendencies of the Kathmandu-Patan complex and the bi-polar development of Bhaktapur by reinforcing transportation linkages and expanding settlement (ibid).

2.4.2 National Urban Policy, 2007

The policy is expected to be a land mark towards farming positive directions in a planned, integrated and coordinated way in solving unplanned urbanization process and its challenges. It is the outcome of concerned intellectuals, experts and Government in

written suggestions and ideas for the balanced urban growth of Nepal. By the decade of 1970 urbanization process added challenges to the city population. The haphazard urbanization would be a problem was learnt from the western pattern of urbanization. National urban structure was shaky with almost all physical, social and economic infrastructures centered in Kathmandu Valley. The National Urban Policy of 2007 was formulated in such context with a vision to promote balanced growth.

The policy has three main objectives. First, to obtain national urban feature by developing infrastructures services and direct the investment. Second, to improve the living standard of the city inhabitants by developing healthy, secured and welfare city environment. Third, by consolidating local agencies in legal and institutional way and develop the cities in a coordinated way and develop the sense of partnership among the concerned agencies and make the city management influential.

However, it has been more than a decade after the formulation of National Urban Policy 2007. In between this period, drastic changes can be seen in the sector of urbanization in Nepal. After the successful introduction of federalism and election of local level almost after two decades, the urban scenario of nation has completely changed. The era has also shifted towards sustainable and efficient urban growth. The policy formed in 2007 naturally cannot direct the present urban growth. Additionally, by the constitution of Nepal, all kinds of national policy need to be revised every five years. Due to all the above mentioned reasons, Ministry of Urban Development currently is in the phase of formulating National Urban Policy 2076 which is expected to be completed by this year. The review of old policy is focused primarily in Public-Private-Partnership model in urban growth, regulation urban growth and urban services, maintaining the delicate relation of development with nature and promote sustainable development.

2.4.3 National Urban Development Strategy (NUDS), 2017

National urban development strategy is formulated with a time horizon of 15 years. Strategies have been conceived to achieve desirable condition in each major theme – infrastructure, environment, economy and finance. In terms of urban sector, the national objective is to strengthen the national and sub-national urban system. For the infrastructure sector, the strategies tend to increase national resource allocation on urban infrastructure development; promote private sector investment on basic services as well as higher order infrastructure; orient strategic investment for shared

infrastructure in urban regions through a cluster city approach; and build national/local institutional capacities for infrastructure development and service delivery. Strategies related to urban economy are geared towards enhancing the contribution of urban areas to the GDP and strengthening the economic base of urban areas so as to cover aspects of economic development, investment and finance. Creation of self-reliant and financially solvent urban areas is the objective of strategies in urban finance.

2.4.4 Planning Norms and Standards, 2015

Department of urban Development and Building Construction has prepared a single Planning Norms and Standards to use as a tool for standardizing the planning of urban development projects. The document has classified urban areas into five classes: Metro City, Sub Metro City, City, Sub City and Market Centers. The Planning Norms and Standards 2015 has three broad headings: infrastructure norms and standards, land use norms and standards and urban form norms and standards. Urban Infrastructures are further classified as Physical, Economic and Social Infrastructures. Similarly, Land Use comprises of Area where Natural Resource is Promoted and next where Settlement is promoted. The standards have been fixed under each one of the topic listed above. It aims to facilitate urban designers, planners and policy makers to identify and forecast essential requirements for any kind of urban area.

2.4.5 Land Use Policy, 2015

The policy identifies land as a scarce resource and aims towards optimum use and protection of land from rampant fragmentation. It has tried to ensure a hygienic, beautiful, well-facilitated and safe human settlement for a planned and sustainable urban development.

2.4.6 International plans and policies

2.4.6.1 Sustainable Development Goals (SDGs)

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future (United Nations, 2019). At its heart are the 17 Sustainable Development Goals (SDGs) with 169 targets, which are an urgent call for action by all countries - developed and developing - in a global partnership (ibid).

Nepal has also become part of SDGs. The eleventh goal of SDG i.e., Sustainable Cities and Communities aims to renew and plan cities and other human settlements in a way that offer opportunities for all, with access to basic services, energy, housing,

transportation and green public spaces, while reducing resource use and environmental impacts. For cities to be sustainable, it is crucial to bring harmony among three core elements: Economic Growth, Social Inclusion and Environment Protection. Several national and international agencies are working for the successful meeting of the goals in Nepal.

2.4.6.2 New Urban Agenda (NUA)

New Urban Agenda was adopted at the United Nations Conference on Housing and Sustainable Development (Habitat III). The agreement provides road map for sustainable urban development in our cities for next 20 years. It focuses for the sustainable cities and human settlements for all. It also takes into account the compliance with different other global documents working towards sustainable cities. NUA defines sustainability as one in which all people have equal rights and access to benefits and opportunities that cities can offer, and in which the international community considers the urban systems and physical form of our urban spaces achieve this. NUA attempts to overcome the sustainability challenges in terms of housing, infrastructures, basic services, food security, health, education, decent jobs, safety and natural resources through strategic development in market, land, investment and mobility. It provides insights in how plan, designs, finance, development, governance and management of cities may lead towards or away from sustainability.

2.5 Findings from the Literature Review

- The cities originated with the learning that when people or firms or industries are put together, they help increase the productivity of each other.
- The growth of cities is determined largely by four factors namely, population (in-migration), economy (trade), opportunities and transportation system.
- Historians and Theorists believe that a city grows when there is:
    - Concentration of people.
    - The mode of economy is more surplus based on industries and commerce.
    - Provides enough opportunities to pull in-migrants.
    - Well-Established Transportation System.
- In one sentence, cities exist and grow when they are efficient.

- City Planning started as a measure towards improvement of health system. Back then, the results were building sewerages, clean drinking water supply, planned residential plots etc. And now, it requires more of social inclusivity and mental well-being.
- Nepal has witnessed several planning approaches with changing rulers from ancient times till federal Government system at present. This political scenario, as it is comparatively stable is a prime time we start proper planning of newly urbanizing areas as well as services management in already urbanized areas.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1 Research Paradigm

Ontology- The ontological claim for the research is that the urbanizing areas around Kathmandu Valley are growing in organic pattern.

Epistemology- The area of Kageshwori Manohara Municipality shows conversion of open spaces into construction sites prior to the provision of urban utilities and services.

3.2 Logic System

The research has deductive Logic System. It first studies the general phenomenon and moves towards specific. Thus, firstly it accepts the theory of city growth as suggested by famous theorists that it grows outward from the core to periphery. On this basis, the Hypothesis of the research is that Kageshwori Manohara is an outgrowth of Kathmandu City core. Various data are collected and observation, analysis is done to reach the conclusion.

3.3 Methodology

3.3.1 Methodological Approach

The research followed mostly quantitative approach for numerical measurement and qualitative approach for in-depth contextual exploration. Hence, it would be more accurate to say that the research was conducted under mix methodological approaches.

3.3.2 Methods of Data Collection

a) Existing Data

The data that already existed were obtained via various documented sources. The municipal profile provided general data regarding the study area whereas Household Survey-2018/19 helped in acquiring a larger portion of socio-economic data. Data from National Census and Urban Base Map were also obtained. Similarly, certain data like migration number and trend, municipal building permit, taxation were extracted from the records of the Municipality Office.

b) Survey

Two different types of survey were done for the research. A questionnaire survey was done on the basis of random sampling to get data on mobility. To avoid duplication of data with Household Survey, only data that could not be obtained from existing data were structured. The questionnaire survey consisted of total 13 questions out of which

3 were open-ended and other remaining 10 closed questions with multiple choices given. It was conducted in dual medium i.e., via mail/online and in person as well. The data were collected in the first week of March 2020.

Another survey conducted was field survey in which the Transport Entrepreneurs operating public transportation system were questioned about the number of vehicles in the route, time period of operation and challenges etc. Total 8 Transport Entrepreneur's time keeper were asked in person during field visit and remaining 2 via their official website. The survey majorly was targeted to acquire data regarding mobility pattern of the residents.

c) Interview

An interview with the structural engineer of Municipality took place on 18th of February 2020. The major objective of the interview was to get insight into the vision, work plans of municipality in developing the area in a planned way and to know the challenges in implementing the plans. The interview was 34 minutes long with semi-structured questions. Due to unavoidable circumstance, interview could not be scheduled with the chief of planning section.

d) Researcher's Observation

In this study, observation by the researcher was done in the areas that are rapidly urbanizing since past few decades. This meant the Southern wards of the municipality were observed. Urban services, infrastructures, lifestyle of the people, housing pattern were observed and collected in the form of photographs and notes. Researcher's observation in the site helped in contextualizing the urban scenario of the study areas.

3.3.3 Methods of Data Analysis

The quantitative data before analyzing were collected and checked if any data required were missing. The data then were analyzed numerically and graphically in tables, bar-graph, pie chart and histogram. Data thus analyzed were compared to the past data to understand the pattern and with the standard to find out the gap between existing and desired or required practice. The qualitative data on the other hand were categorized and discussed to get its true meaning and connect the dots between theory and reality.

3.3.4 Evaluation and Justification of Methodological Choices

The study on growth pattern of the municipality required data from past as well as present. It was also equally important to identify the consequences of urbanization in

root level. This kind of research would have been incomplete if only quantitative or qualitative approach was taken. Thus, a mix approach of both was taken in the study. A recent household survey and study had compiled a huge data in its report. Hence, to avoid the unnecessary duplication of data, the existing data were taken as it is and survey conducted limiting the scope within the data that were not generated previously.

CHAPTER 4 : STUDY AREA

4.1 Introduction

Kageshwori Manohara Municipality situated in Northern part of Kathmandu valley in Bagmati Province, is one of the 13 newly declared municipalities in the valley. The Municipality is surrounded by Gokarneshwor Municipality in the West, Sindhupalchowk District in North, Shankharapur municipality and Bhaktapur District in the East and Kathmandu Metropolitan City in the South.

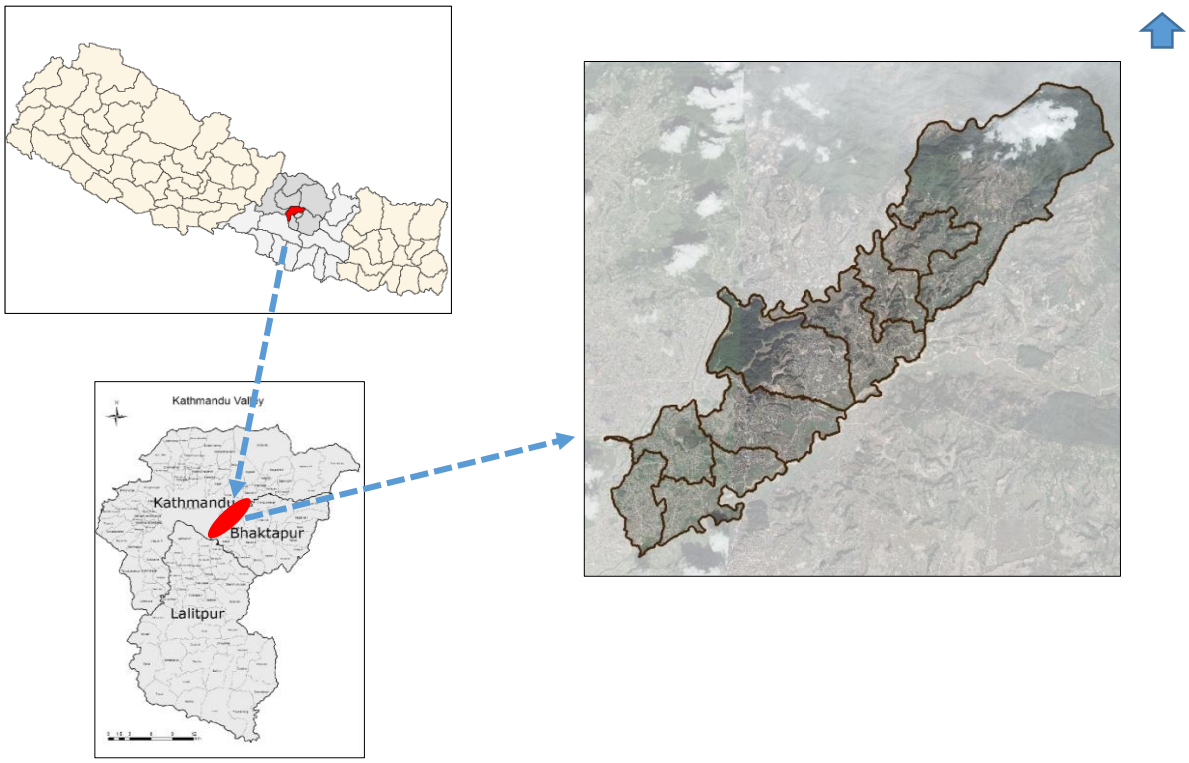


Figure 4-1 Location index of Kageshwori Manohara

Source: Municipal Profile

4.2 Administrative Boundary and Divisions

Kageshwori Manohara was declared as municipality in December 2014 by merging six former VDCs namely Gothatar, Mulpani, Danchhi, Bhadrabas, Aalapot and Gagalphedi. The municipality covers an area of 27.364 sq.km. (Municipal Profile, 2076). Administratively, it has been divided into nine different wards with its administrative center i.e., Office of Municipal Executive located at Danchhi that lies in Ward-5. The place can be referred as geographical center of the Municipality as well. The division of wards is numbered as 1 to 9 from North to South each ward having its

own independent ward offices. It has set its office in a rented building and its own building is proposed and the construction is supposed to commence soon.

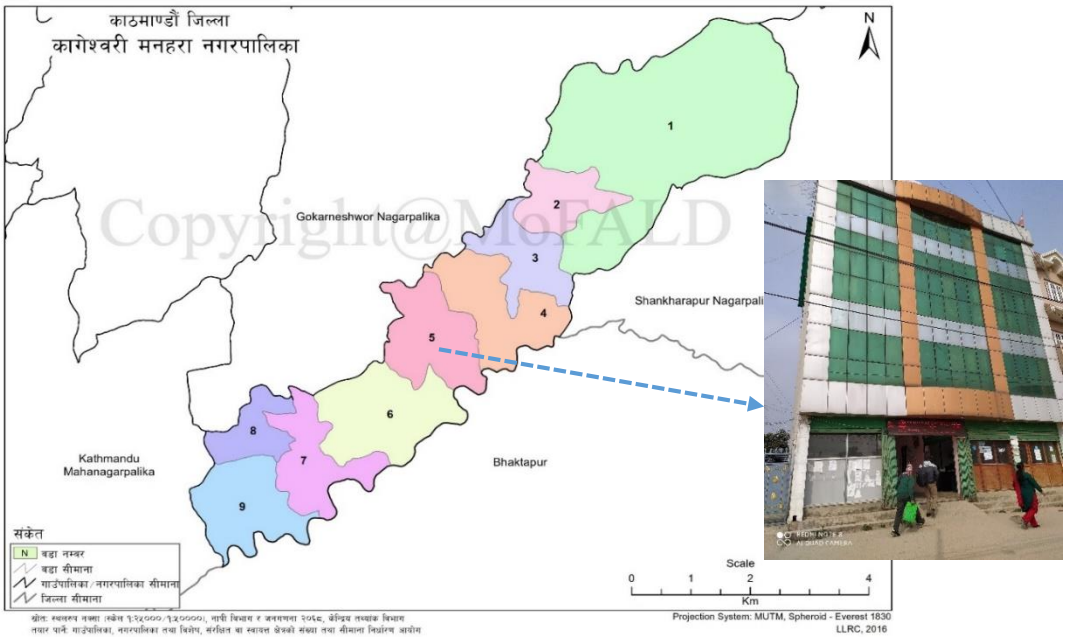


Figure 4-2 Office Building of the Municipal Executive

Source: MOFAGA

4.3 Regional Context

Broadly, on a regional context, Kageshwori Manohara is a part of Kathmandu Valley located towards the South-Eastern side of the valley. It lies between two major ancient historical urban and economic centers of Nepal, Kathmandu and Bhaktapur. The Municipality has linkage roads via Bagmati Corridor, Jadibuti, Chabahil and Bode from these urban centers. Chabahil-Lapsiphedi-Bhotechaur Road Section is also proposed that will directly link to Sindhupalchowk district. The boundary is well defined by two major rivers Bagmati in the West and Manohara in the East. The development works can be seen ongoing along the Bagmati corridor which is considered as a milestone in improving the connectivity among various places of Kathmandu Valley and also to ease the traffic congestion.

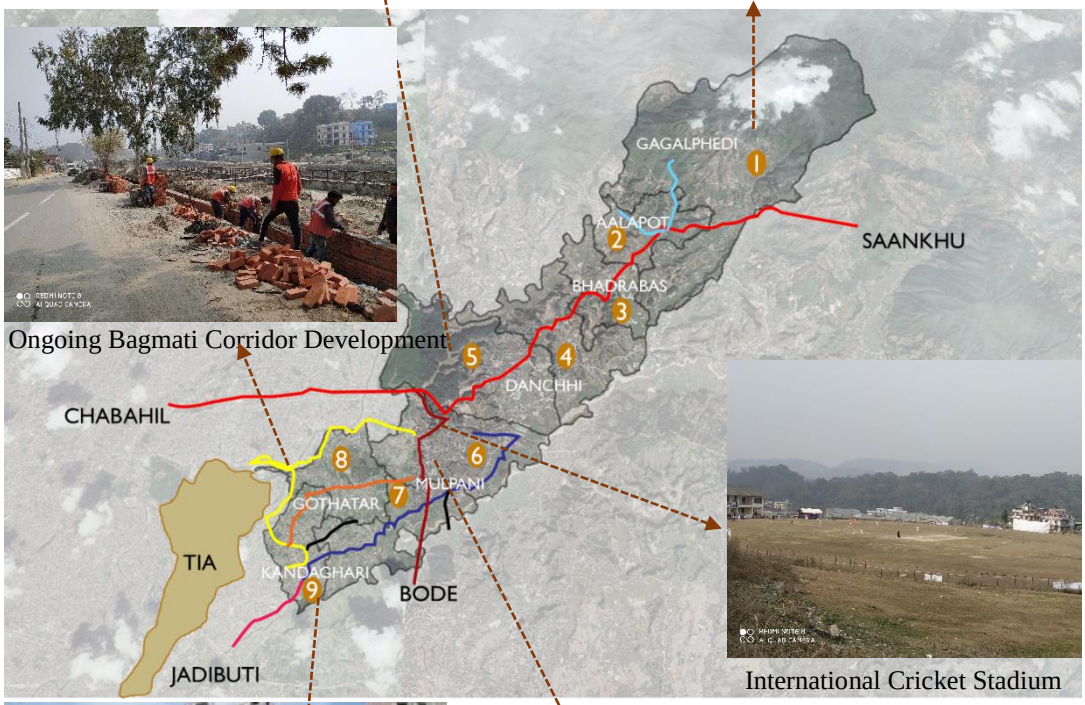
Another major regional context of the municipality is its shared boundary with Tribhuwan International Airport. Due to this proximity, the Municipality though does not have its own airport, is not distant to access the service. But, the spread of Airport in a larger area also restricts the linkage to Kathmandu.

The temple of Kageshwor Mahadev that lies in Ward 1, Gagalphedi attracts religious tourists and visitors. Another important religious place Salinadi, that lies in Saankhu is

also accessed via this Municipality. Gokarna Forest Resort that lies in Ward-5 is also mostly occupied by national and international tourists as it has the Golf Course Site. The construction of International Cricket Stadium is also ongoing in the Ward-6 of the Municipality.

Golf Course at Gokarna Forest Resort

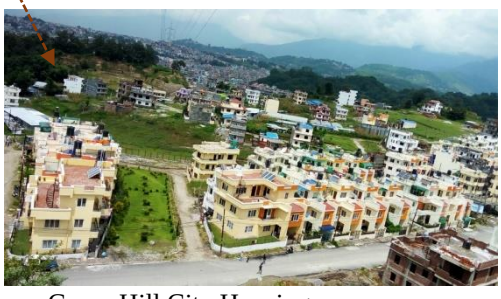
Kageshwor Mahadev Temple



Ongoing Bagmati Corridor Development

International Cricket Stadium

Sun city Apartments



Green Hill City Housing

Figure 4-3 Regional context of Kageshwori Manohara

Source: Various

In the past decade, the Municipality has seen a large influx of people for residential purposes. The 500 units Suncity Apartments at Ward 9 and 800 units detached housing plots of Green Hill City at Ward 6 can be regarded as response to the increasing housing demand inside the Municipality.

4.4 Historical Background

The municipality has got its name from famous temple 'Kageshwor Mahadev' which is located in ward-01, Gagalphedi and the famous 'Manohara' river. In the 20th chapter of the Nepal Mahatmya katha, the story of the Kageshwari temple is written. According to it, at the time of distribution of the immortal liquid, Lord Shiva took the shape of a crow and hid the liquid from the evil spirits in the hills of Kageswori Manohara. This resulted in the development of the Kageswori temple in the area. The name Manahara is believed to be given after King Manichud lost his Naagmani in the North-East hills of Gagalfedi. These stories are believed to be the the reason for the name Kageswari Manahara of the municipality. Excavations at some parts of the municipality has led to the findings of Lichchavi era bricks, coins in the area. This shows the historical importance of the municipality in the Lichchavi era (ERMC; NEST; GEOCOM INTERNATIONAL , 2019). It is believed that the people who are touched or hit by crow have to visit the temple. Every year at the time of Bhadra Shukla Ashtami, there occurs a fair at the Kageshwari temple. Pilgrims from various parts of the country and municipality visit the temple on this date.

4.5 Climatic and Geographical conditions

Kageshwori Manohara Municipality is located about 13 Km southeast of Kathmandu and lies between 85°36'E and 85° 46' 48"E longitude and 27° 41' 24" and 27° 52' 12"N. latitude. The highest altitude of the municipality is 2200 meters and lowest level is 1310 meters. Deciduous Monsoon Forest Zone (altitude range of 1,200–2,100 meters), one of five vegetation zones defined for Nepal. In Kathmandu valley, during summer the average maximum temperature during the months of July, August is 29.1°C and during winter average minimum temperature during December and January is 2.4°C. The average minimum winter temperature in Kageshwori Manohara municipality is 4.2°C and during summer the average maximum temperature is 27.7°C. The average annual rainfall in Kathmandu valley is 1400 mm, three-fourth of which falls in June, July and August. The wettest month is July with average rainfall 325.3 mm.

4.6 Demography

The total population of the municipality as per the Household Survey 2019 is 1,02, 235 with female population 49,596 and male population 52,634. Kageshwori municipality holds 2.39 % population of Kathmandu valley. The population of the current municipal area increased from 60,237 in 2011 to 1,02, 235 in 2019 population is almost double in the period of less than a decade.

According to survey, In the municipality, the highest percentage is of Chhteri which accounts 36%, followed by Brahmin 30%, followed by Tamang 9.8%.

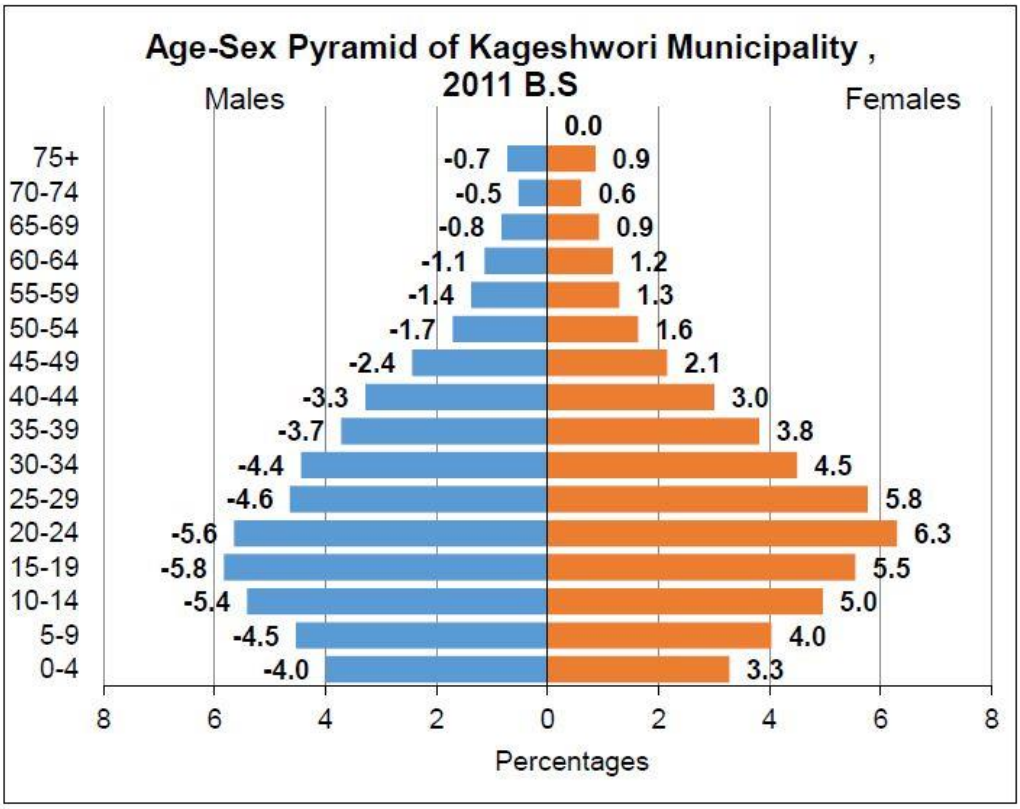


Figure 4-4 Population Pyramid of Kageshwori Manohara

Source: IUDP, Draft Report

CHAPTER 5 : DATA ANALYSIS AND FINDINGS

5.1 Urban Growth Trend

5.1.1 Population Increase

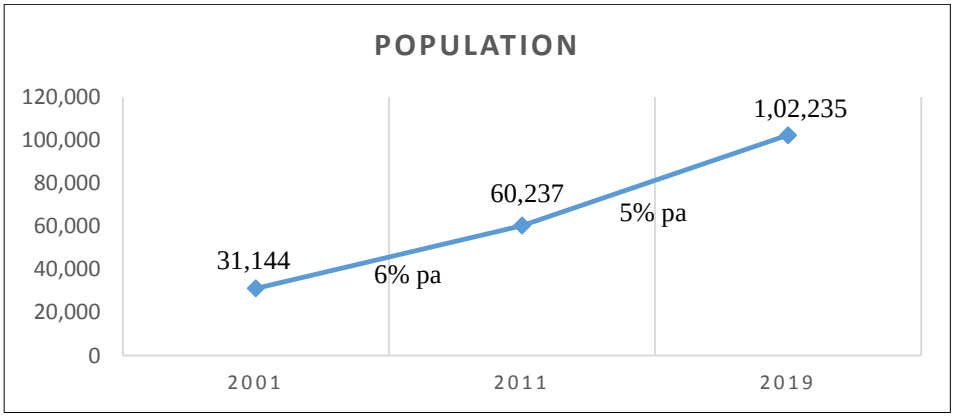


Figure 5-1 Population Growth of Kageshwori Manohara

Source: Municipal Profile and Household Survey

The increase in population within a designated area is one of the best indicators of urban growth. The number of population has increased from 31,144 in 2001 with the rate of 6% increment per annum to 60, 237 in 2011 as per Municipal Profile and the current population of the Municipality is 1,02, 235 as per Household Survey of 2019. In the last 8 years, population has increased with the rate of 5% per annum.

5.1.1.1 Ward Wise Population Distribution

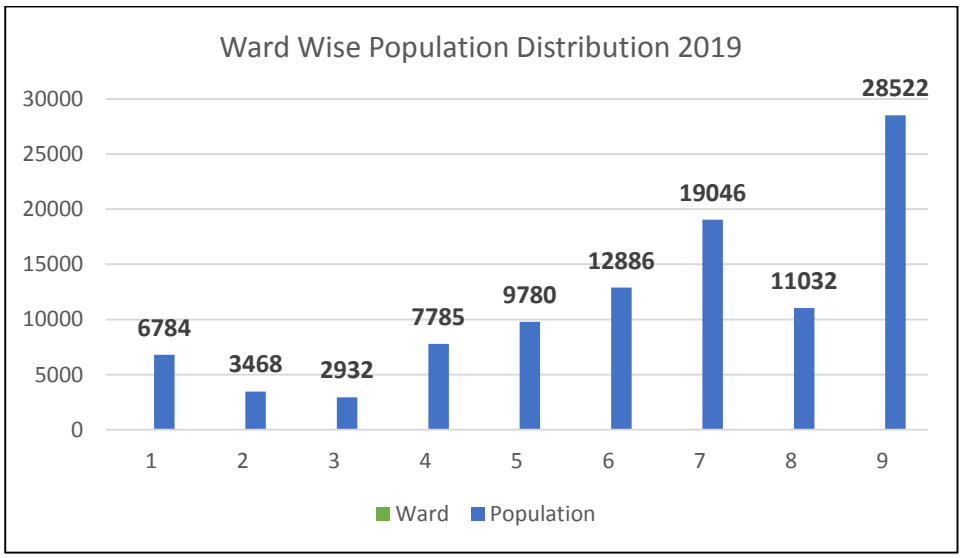


Figure 5-2 Ward Wise Population Distribution in 2019

Source: Household Survey 2019

The distribution of population is not even inside the municipality. Ward 9 has the highest population of 28,522 which is around 28% of the total population in 2019 followed by ward 7 comprising 18% of total municipal population. On the other hand, ward 3 has least population of 2932 which is only 2% of the total population. Thus, it is evident from the data that population is higher to the Southern Wards (7,8,9) than the Northern Wards (1 to 5).

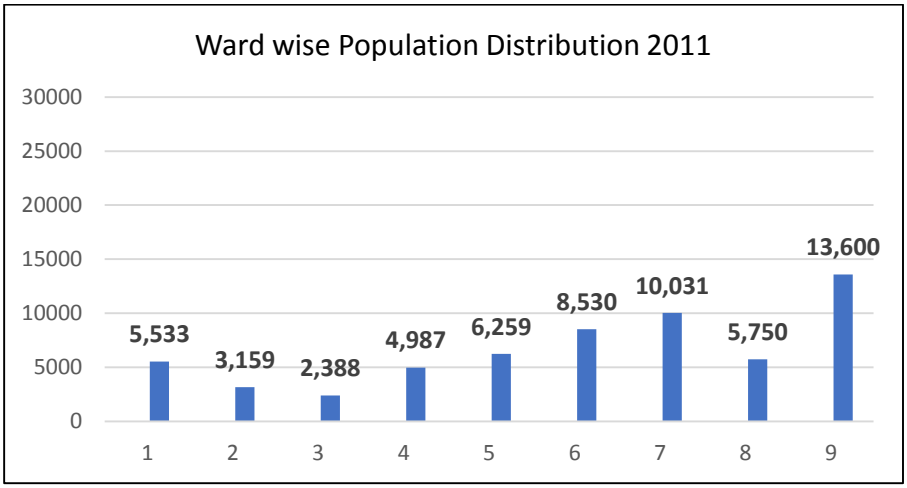


Figure 5-3 Ward Wise Population Distribution in 2011

Source: Municipal Profile

These areas showcase higher number of population from past data too. In 2011 also, ward-9 constituted 22% of total population and had highest population. Wards 6 and 7 constituted 14% and 16% of the total population respectively. Comparing the data from above two figures, it is evident that ward 8 has gained its population recently while 6,7 and 9 wards were populated highly already in 2011. To further ease the analytical study of population distribution, the municipality can be divided into three clusters each with three wards as shown in the picture below:

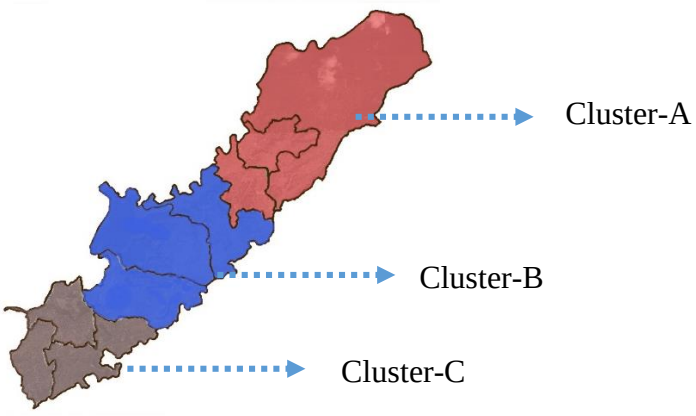


Figure 5-4 Clustering of Municipality

If we consider the municipality into three clusters with wards 1, 2 and 3 as cluster A, wards 4, 5 and 6 as cluster B and wards 7, 8 and 9 as cluster C, we can easily see the maximum distribution of population in cluster C that lies in the Southern part of the municipality and adjacent to Kathmandu Metropolitan City. The concentration of population is lesser in cluster B and least in cluster A.

5.1.1.2 Ward Wise Population Density

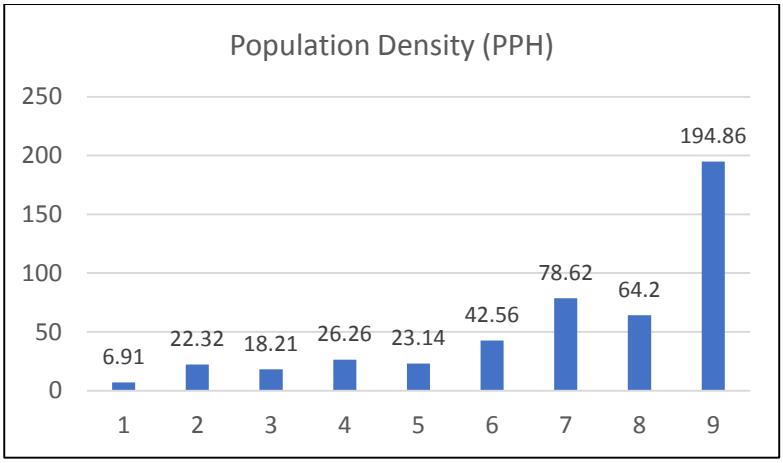


Figure 5-5 Ward Wise Population Density in 2019

Source: Household Survey, 2019

The data shows that Ward 9 not only has the highest number of population but also highest density with 194.86 People Per Hectare (PPH) which is almost five times higher than the average gross population density of the municipality, 37.36 PPH. It is followed by ward 7 and 8. The average net density of the municipality is 108.9 PPH. The average net densities of Cluster A, B and C are 15.8, 30.6 and 112.56 respectively. The 500 units high rise apartment located at Ward 9 has also contributed in the high density of the ward. Here again the density of people is highest in cluster C and least in cluster A.

5.1.2 Migration Trend

The migration has social, economic and political impacts on a city. One of the important part of sustainable growth thus is the maintenance of societal harmony among the local and migrated residents. Coping with migration based growth comes with its own challenges and opportunities. National Housing and Population Census calculates migration rate from the absentee population in the country.

Household Survey of 2019 reports 69.4% of the total households have emigrated to the Municipality. From the Vital Registration Record of the Municipality, total 3658 persons have emigrated to Kageshwori Manohara and 406 have immigrated from the place in the time period between 2073-04-01 to 2076-11-04. After the formation of

Municipality, for every one person immigrated from this place, 9 people have emigrated to the place. The increase in population is not just the result of own growth inside Municipality. It is actually because of the high migration of people from different districts of Nepal.

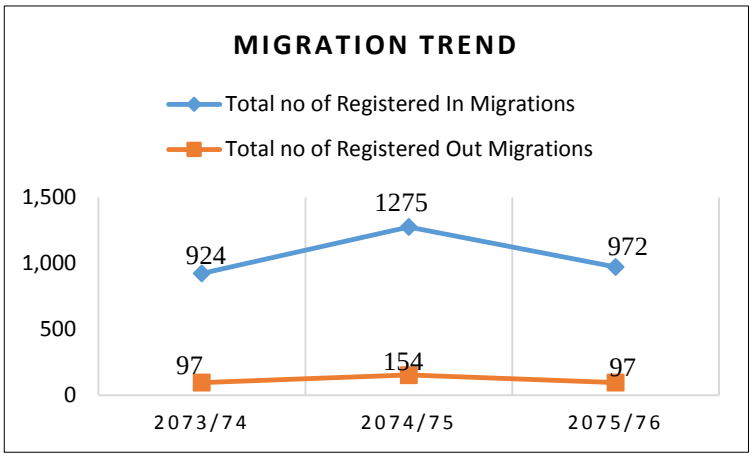


Figure 5-6 Migration trend of the Municipality

Source: Municipality

The data of Vital Registration was available at Municipality only from Fiscal Year 2073/74. Analysis of migration trend from past three fiscal years indicate In-Migration is quite higher than Out-Migration. Both kinds of migration were noticed to be higher in the fiscal year 2074/75 with 1275 In-Migrants and 154 Out-Migrants. In-Migrants increased at the rate of 37% from FY 2073/74 to FY 2074/75 and then again decreased at the rate of 23% from FY 2074/75 to 2075/76. Similarly, out-migrants increased at the rate of 58% in between FY 2073/74 and FY 2074/75 which decreased by same percent in between FY 2074/75 and FY 2075/76.

5.1.2.1 Ward Wise Migration

The migration trend in not even in all the wards of the municipality.

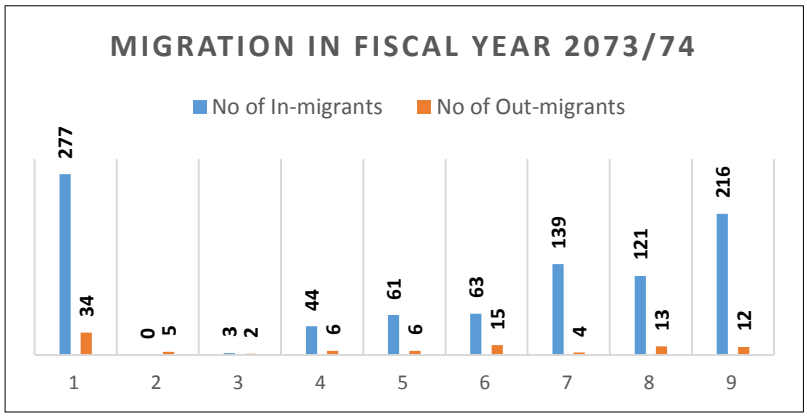


Figure 5-7 Ward Wise Migration in FY 2073/74

Source: Municipality

The ward wise migration data of Municipality in the Fiscal Year 2073/74 shows highest number of in-migrants as well as out-migrants in Ward 01. Almost 30% of the total In-Migrants was welcomed by the Ward. It is followed by Ward-09 that covered 23% of the total In-Migrants. The Out-Migrants number is almost nominal in comparison to the In-Migrants. After Ward-01, maximum in-migration is seen towards 7,8,9 wards or the Southern Wards of the Municipality.

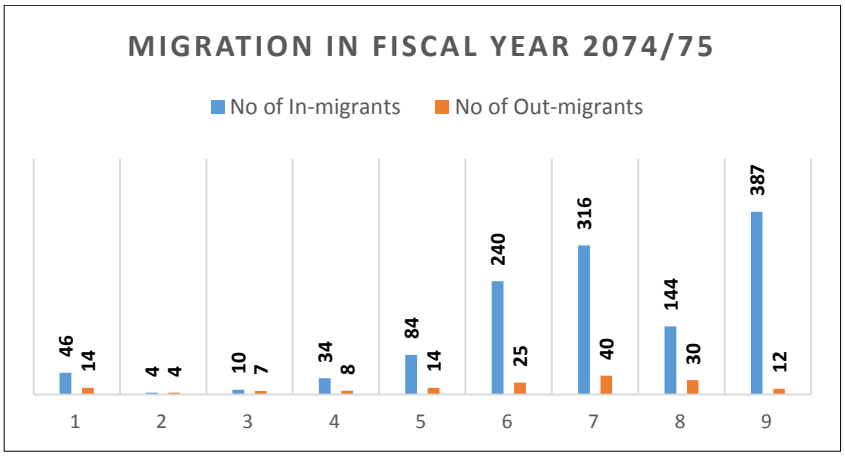


Figure 5-8 Ward Wise Migration in FY 2074/75

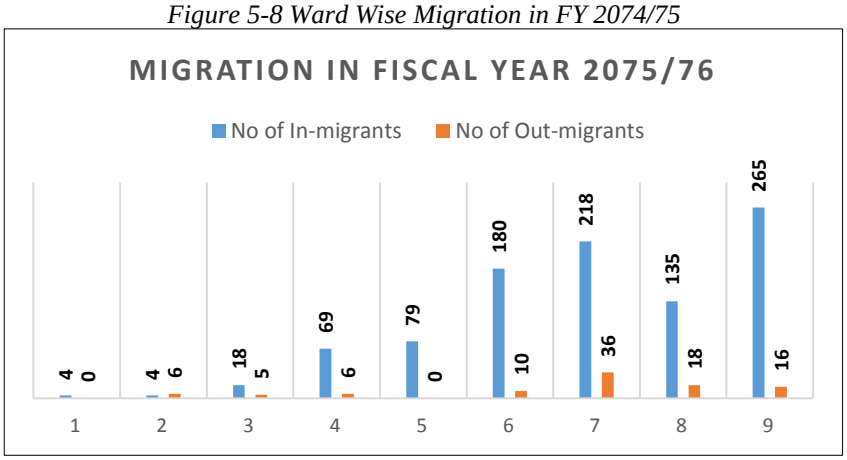


Figure 5-9 Ward Wise Migration in FY 2075/76

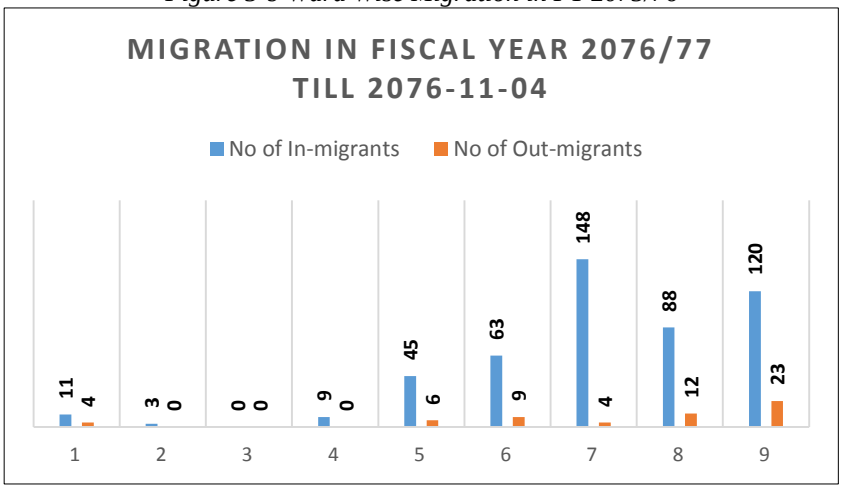


Figure 5-10 Ward Wise Migration in FY 2076/77 till 2076-11-04

Source: Municipality

The scenario is quite different for the rest 3 FYs. The Migration in ward-01 is seen to drop drastically. The total percentage of In-Migration was witnessed to be dropped to around 3 to 4% in the successive fiscal years. This unusual trend during FY 2073/74 might have connection to the Gorkha Earthquake that occurred in 2015. Sindhupalchowk, one of the most affected areas lies next to Ward-01. Being neighboring district, it is likely that residents of Sindhupalchowk might have shifted towards less affected areas either they already owned a land there or migrated for future living while residents of Ward-01 shifted to even more less affected areas.

On the other hand, 7, 8 and 9 wards continued to gain more number of in-migrants in all the successive FYs. Ward-09 in the FY 2074/75 constituted total of 30% in-migrants, 27% in FY 2075/76. Ward too entertained 11% in-migrants in FY 2074/75 and 13% in 2073/74. Even the data of current fiscal year indicates higher number of in-migrants in wards 7, 8 and 9.

Table 5-1 Percentage of Emigrated Households in Kageshwori Manohara Municipality

Wards	N/A %	No%	Yes%	Grand Total
1	3.7	81.1	15.2	1,512
2	1.6	87.2	11.2	752
3	0.73	77.2	22.1	683
4	2.67	55.1	42.2	1,796
5	5.01	19.8	75.2	2,397
6	7.72	18.8	73.5	2,942
7	9.86	17.3	72.9	4,901
8	2.91	15.9	81.2	3,026
9	1.99	13.0	85.1	8,154
Grand Total	**4.59**	**26**	**69.4%**	**26,166**

Source: Household Survey, 2019

The figure above elaborates the composition of total households in each wards on the basis of migration. The Wards 9,8,7,6 and 5 have higher percentage of immigrated households while other wards 1, 2 and 3 have lesser percentage. The percentage of immigrated households is higher than the average of municipality's overall immigrated households in the Southern Wards. Since the Southern wards are the ones that are most populated, what can be said is that the municipality has gained population through

migration than that of its internal growth. Out of total migrated households 95% (Household Survey, 2019) have emigrated from district other than Kathmandu.

5.1.2.2 Reasons for in and Out Migration

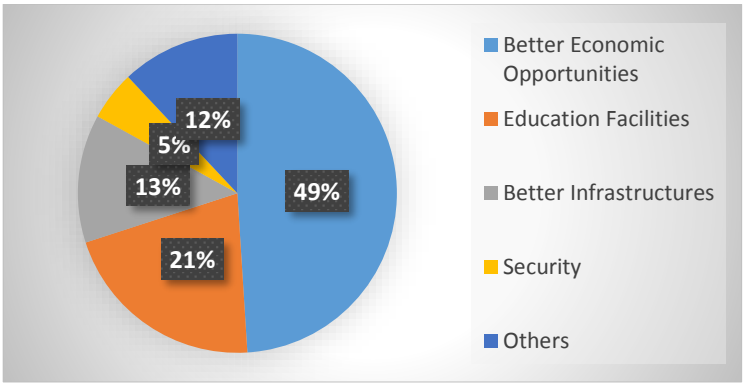


Figure 5-11 Reasons for In-Migration

Source: Household Survey, 2019

People have migrated to the Municipality for better live opportunities. Majority of the migrated households (49%) accept better economic opportunities as the driving factor. The migration actually occurs in different stages. Firstly, people migrate to the bigger cities like Kathmandu for benefits mentioned above and with the increment in their economic status, they tend to move out to the fringe areas due to the relatively cheaper land and housing prices.

Similarly, total 18% of the Households had absent family members out which 30% went for higher studies and remaining 70% for foreign employment (Household Survey, 2019).

The study of migration trend and pattern shows that the Municipality has higher number of immigrants as compared to that of emigrants. This scenario is quite opposite at National level. According to the data NHPC 2011, the immigration rate of Nepal in 2011 was 10.77 per 1,000 populations while emigration rate was 0.46 per 1,000 population marking the net international migrate rate to be -10.32 per 1000.

The data clearly indicates the rise in population is majorly due to inter municipal migration rather its natural internal growth. It also establishes relation of rural-urban migration between two or different municipalities as well as two or more countries. The wards closer to Kathmandu was and still is densely populated with higher number of people migrating to the place even today. The Survey showed that in each Wards 7, 8 and 9 almost 85% of total Households have migrated from other places. So, it indicates

towards the Municipality as urbanizing and likely to receive more migrants in the near future.

5.1.3 Land Use Change

It is learned from the history and literature of city growth that with the increase in urbanization rate, land use also changes. The open and agricultural land gets changed into buildings and urban structures with growth of the city.

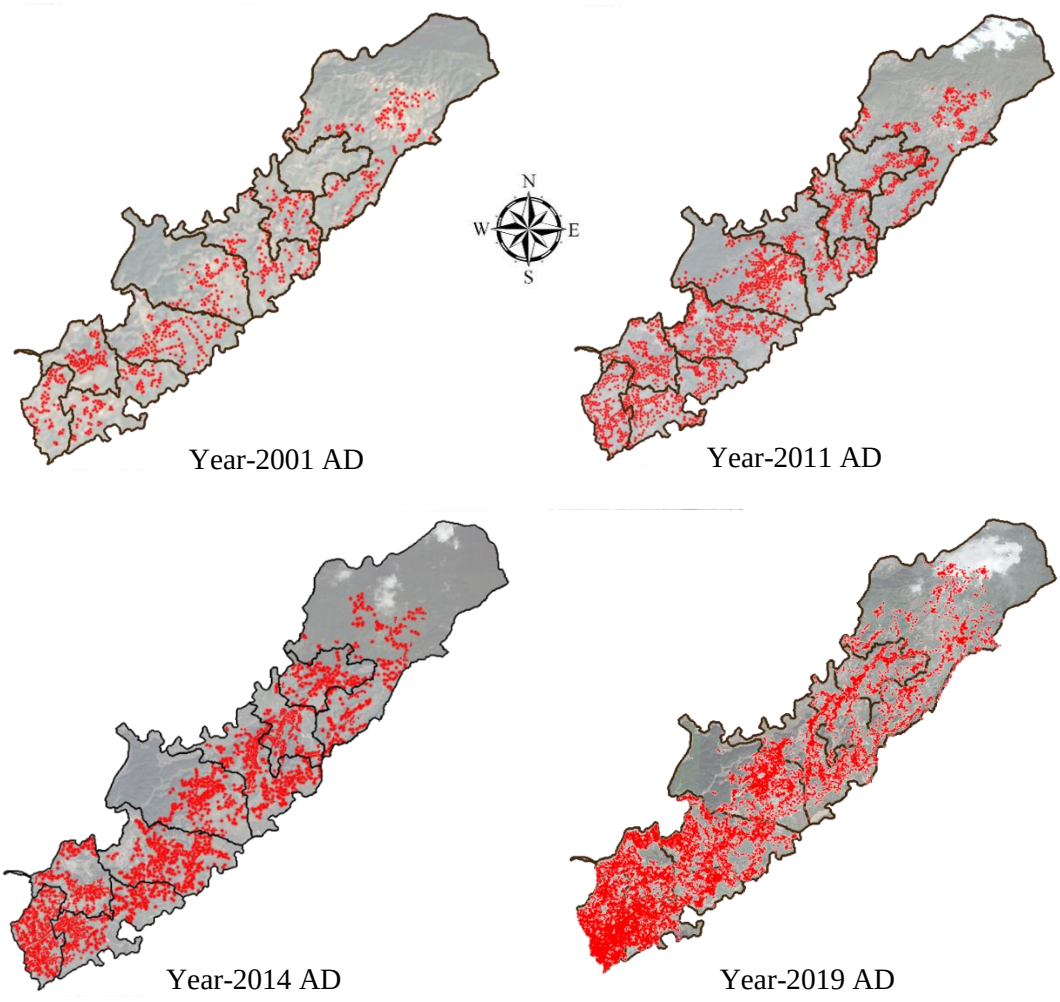


Figure 5-12 Increase in Built-up areas over last two decades

Source: Google Earth and Urban Base Map

Table 5-2 Increase in number of Households

Year	Total no of Households
2001	6351
2011	14,329
2019	26,166

Source: IUDP, Draft Report and Household Survey,2019

The above images are the satellite imageries depicting the building footprints of Kageshwori Manohara Municipality from 2001 AD to 2019 AD. The number of households have increased from 6,351 (Municipal Profile, 2075) in 2001 AD to 14,329 (Municipal Profile 2075) in 2011 AD and again to 26,166 (Household Survey, 2019) in 2019 AD. The number of households have almost doubled in a span of each ten years.

More urban growth is seen in the Southern Wards. The cluster C is seen to be highly compact. The concentration of building footprints is lesser in cluster B and least in Cluster A. The type of settlement growth is varying from North to South. Towards South, the intensification of buildings is seen quite noticeably whereas the middle areas of the municipality are both intensifying as well as dispersed buildings are noticed to be emerging. The North-most areas depict new kinds of slow growth of buildings. The wards 7 and 9 that are close to Kathmandu Metropolitan City are seen to be mostly intensifying.

The urban growth can be inferred as to be concentrated in the Cluster C i.e., the wards closer to Kathmandu. As discussed earlier in demography, this cluster has the highest share of population, highest share of in-migrants and also dense settlements. Similarly, Cluster-B is developing at a pace slower than Cluster C while Cluster A depicts slow urban growth with lesser building footprints, least population and least in-migrants. So, the trend of urbanization is higher to lower from South to North. On this basis the clusters can be referred as Urbanized, Urbanizing and Rural Fringe areas to the clusters C, B and A respectively.

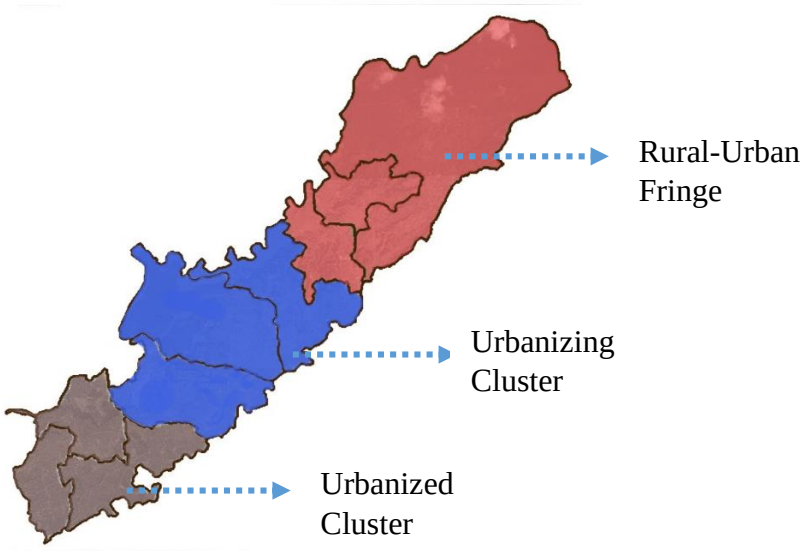


Figure 5-13 Urban Hierarchy

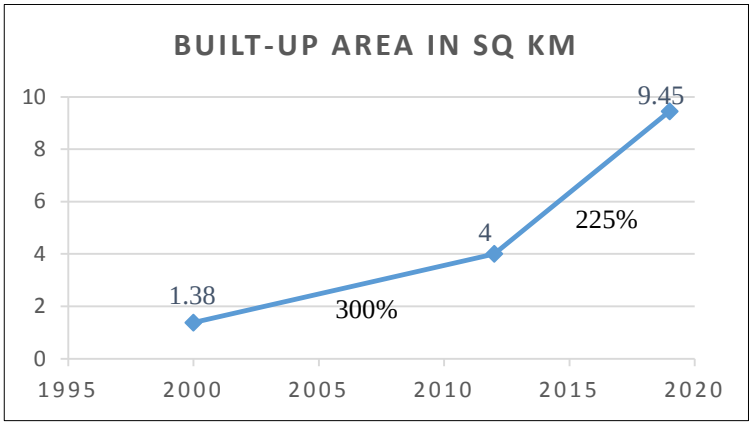


Figure 5-14 Total Built-Up Area in 2000,2012 and 2019

Source: IUDP, Draft Report

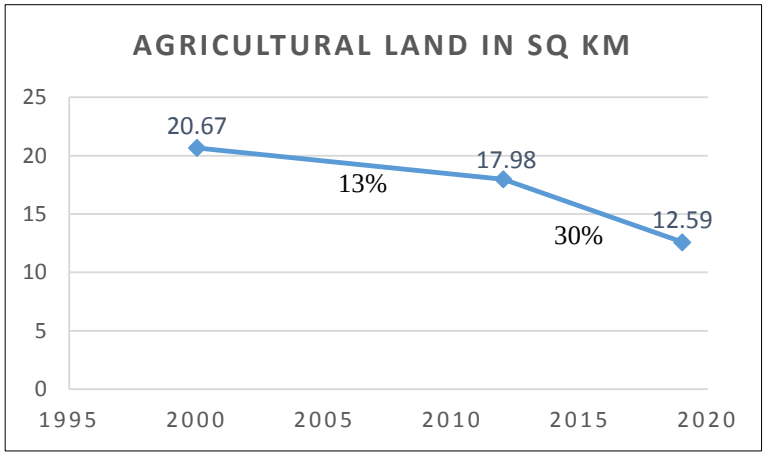


Figure 5-15 Total Agricultural land in 2000,2012 and 2019

Source: IUDP, Draft Report

The total Built Up Area of the Municipality has increased from 1.38 sq.km. in 2000 to 4 sq.km. in 2012. It increased by 300% in the time period of twelve years. The increment continued and reached to 9.45 sq.km. Between 2012 to 2019, the Built up increased by 225%.

Meanwhile, the agricultural land has been decreasing. The municipality had 20.67 square kilometers of agricultural land in 2000 which accounts to 75% of the total land area. It decreased to 17.98 sq.km. in 2012 accounting to total 13% decrement in agricultural land and again decreased by 30% in between 2012 to 2019 and has reached to the area of 12.59 sq.km. in 2019. Currently, only 46% of total land area of municipality is used for cultivation. The above data clearly shows the urbanization occurring at the cost of agricultural land.

Table 5-3 Land-use Composition

Land Use	**Percentage of land**
Built-Up Area	34.3%
Cultivated	46.94%
Protected	11.28%
Forest Area	5.71%

Source: IUDP, Draft Report

However, the major land area is still either cultivated or protected or forest area and only about 34% is built up. The remaining land is at high probability of turning into built-up areas with the trend of urbanizing. Thus, it is still not too late to enforce planning approaches to develop it into a better city.

5.2 Factors Behind Urban Growth

There are various causes of urban growth. Natural increase in population, migration, industrialization, commercialization, advancement of transportation and communication, availability of educational and recreational facilities are some of the factors to name a few causes of urban growth. Another important nature of urban growth as seen is the development of peri-urban areas around major city center. The development of a CBD influences development of several supporting services at a farther distance from its center. Closeness to major infrastructures plays a crucial role in a locality's development (Boris & Madhav, 2006).

The valley with its major cities like Kathmandu, Lalitpur and Bhaktapur is prime economic center of the Nation. In the period between 2002 to 2012, Valley's population grew by 61.2% (Shrestha et al, 2014) causing the subsequent expansion of the built-up area to the peripheral landscapes. The formation of new municipalities subsequently occurred with the outward growth of Kathmandu city core. Kageshwori Manohara is one of the 13 newly formed municipalities of Kathmandu Valley. The other newly formed municipalities of the Valley are Tokha, Nagarjuna, Tarkeshwori, Buddhanilkantha, Shankarapur, Gokarneshwor, Dakshinkali, Chandragiri in Kathmandu district, Changunarayan and Suryabinayak in Bhaktapur, Godawari and Mahalaxmi municipalities in Lalitpur district. All these new municipalities can be understood as the peripheral growth of Kathmandu city core as they have been

developing along with the time and with the growth of central urban area.

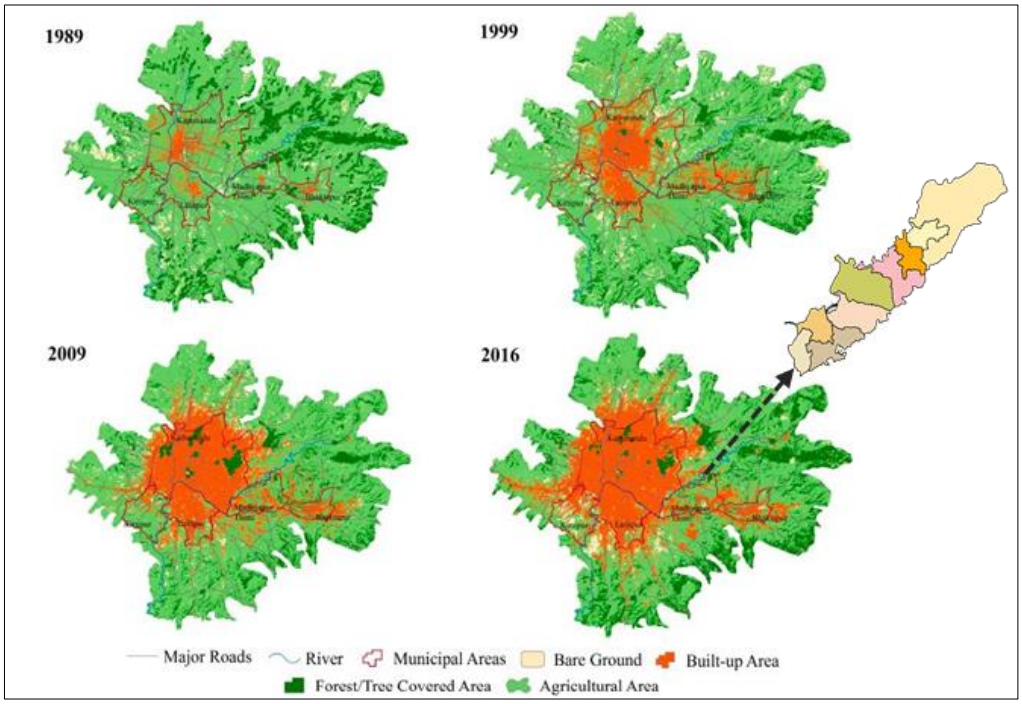


Figure 5-16 Urban Growth of Kathmandu Valley

Source: Ishtiaque, et al., 2017

The figure above shows the growth trend of Kathmandu Valley. The total built up area in 1989 was 5% which has increased to 26% by 2016 (Ishtiaque, et al., 2017). It is seen to be expanding rapidly outwards after 2009. Till 2016, the intensification at center and spread outwards both can be seen. It is in 2014 the new municipalities were added to the Valley. Schematically, the geo-location of newly formed municipalities can be described with the help of picture below.

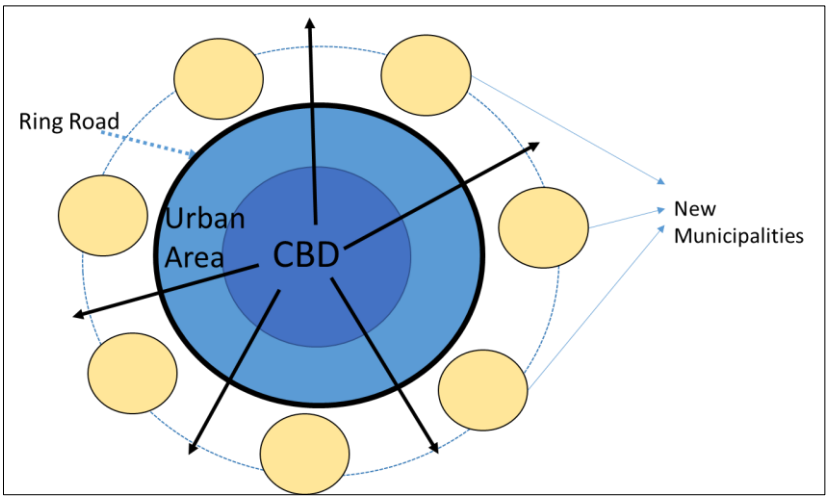


Figure 5-17 Schematic Diagram of Growth of the Valley

The formation of new municipalities is seen mostly on the edges of the Kathmandu CBD. They lie in the proximity of a major urban center and developing as the CBD is expanding outwards. These cities co-exist with the Kathmandu city. The schematic figure almost looks like a diagram of a solar system with Sun in its center where all the planets hold their own individual characteristics and quality but are however related to the Sun for the existence and flourishment of lives within them.

Few decades back Kageshwori Manohara was a rural area close to major cities and facing urbanization in the areas sharing proximity to the major cities. This entire process of rural-urban transformation can be better understood via study of satellite images and supporting data that has been discussed earlier. From the population data, it is evident that the Kageshwori Manohara Municipality is growing through migration rather than its natural growth. On a larger context, entire Kathmandu Valley is growing outwards. The peripheral areas of the city core are the newly formed municipalities of Kathmandu Valley. Thus, Kageshwori Manohara can be regarded as the expansion of Kathmandu in Concentric Circular Development model of urban growth theory. Additionally, the study also shows high rate of urbanization in Cluster-C that lies in the proximity of Kathmandu and also has well established transportation network which meant that the people can easily commute to their work to Kathmandu while still living in the Kageshwori Manohara for residence.

Another factors behind urban growth of the city is the fact that these areas felt outside municipal jurisdiction until 2014 and so cheaper land and housing cost. From the questionnaire survey, it is found that the Land Price which is currently in the range of 20-40 lakhs per anna in Wards closer to Kathmandu while that inside Kathmandu Metropolitan City starts from minimum 50 Lakhs per anna. But, the construction tax is almost 40% cheaper than that of Kathmandu Metropolitan City. Where Kathmandu Metro City charges tax of Rs 25 per square feet for a residence with plinth area of less than 1000 square feet, and another neighboring municipality Thimi charges Rs 15 while Kageshwori Manohara charges only Rs 13 per square feet. The Household Survey, 2019 has found that 84% of the buildings inside Kageshwori Manohara are residential and from questionnaire survey it is found that 60% of the respondents commute to Kathmandu on a daily basis either for job or education services. These two data connect the dots and infers that the Municipality is developing as a residential unit for people

who have migrated to Kathmandu for better lifestyles but cannot afford housing inside the core area due to its high prices. These discussed data support the impression of Kageshwori developing under the influence of Kathmandu city's growth.

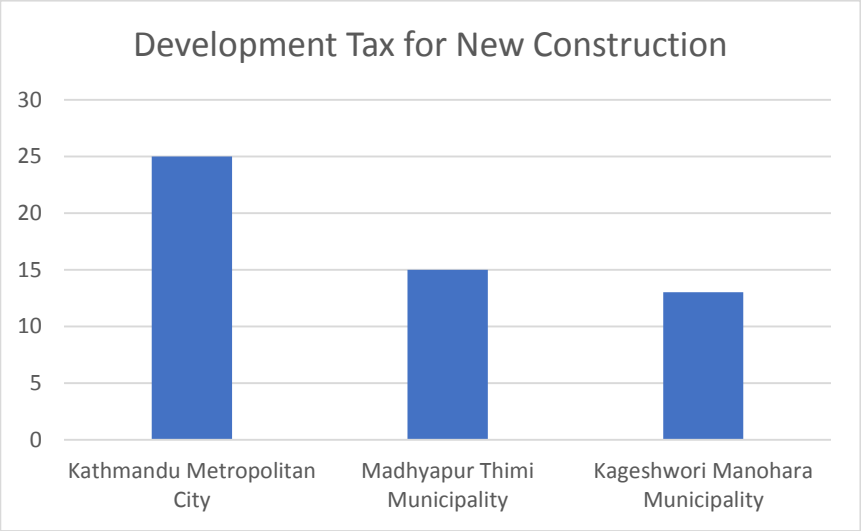


Figure 5-18 Development Tax for new construction in different Municipalities

Source: Respective Municipalities

Additionally, some areas of Ward 6 and 9 lie under the proposed Smart City whereas some parts of Wards 4, 5 and 6 on proposed outer ring road. The proposal of Smart Cities has been initiated by the Government to cater the urban growth of Kathmandu. This further laid a foundation of planned developmental approach and improved accessibility to the Municipality. As a result, developers and citizens gained interest in purchase of land or residing permanently in the Municipality.

In one sentence, what can be said is the Municipality is urbanizing with the spill-over effects of Kathmandu City and Valley to cater the urban growth of the valley.

5.3 Urban Development Pattern

5.3.1 Urban Form

The physical patterns, layouts, and structures that make up an urban center are collectively called the urban form. As the most basic canvas upon which settled human societies are built, urban forms are critical to both our daily lives right now and our interpretations of past cultures. Basically, it is either organic form that had developed on its own without any specific pattern or a planned one that may be in different forms. To better understand the urban form of Kageshwori Manohara, the municipality is divided into three clusters with three wards in each. The building footprints are overlaid with road network and zoomed for bringing clear vision of the form.

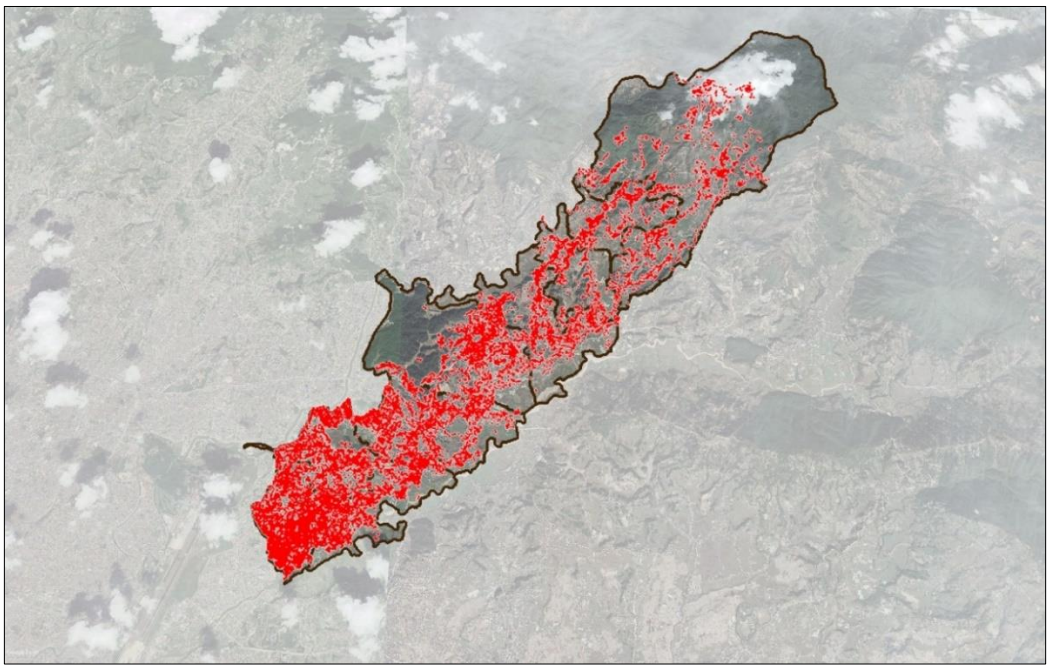


Figure 5-19 Settlement Pattern of Municipality

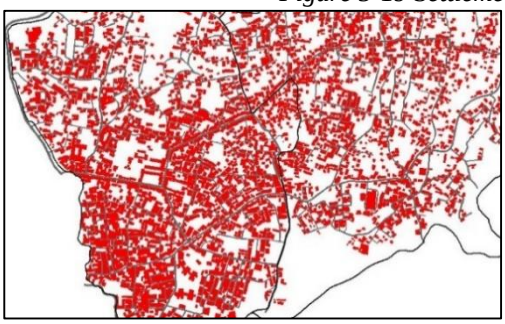


Figure 5-20 Settlement Pattern of Cluster-C

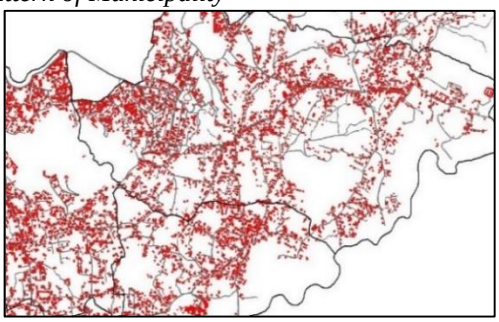


Figure 5-21 Settlement Pattern of Cluster-B

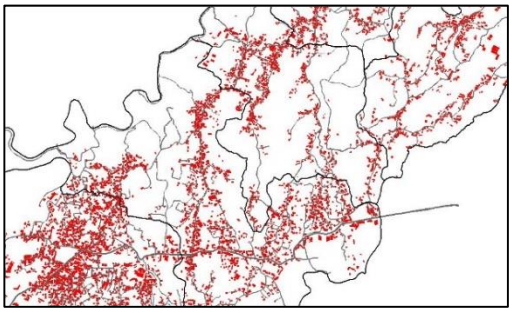


Figure 5-22 Settlement Pattern of Cluster-A

Source: Urban Base Map, 2019

The study of urban form shows that it does not follow any pattern or geometric shape. The growth is rather organic form where there is no pre-thought centralized idea on where to place buildings, roads, parks and open spaces. Buildings are seen to be coming along the road networks in axis type manner. However, the settlements and road network both are quite dense in Cluster-C than other two clusters. Thus, it can be inferred that the urban form of Kageshwori Manohara is undergoing axial growth theory of urban development.

However, the study of Kathmandu Valley as a whole show that the valley is outgrowing and the new municipalities lie in the peripheral areas of Kathmandu city core.

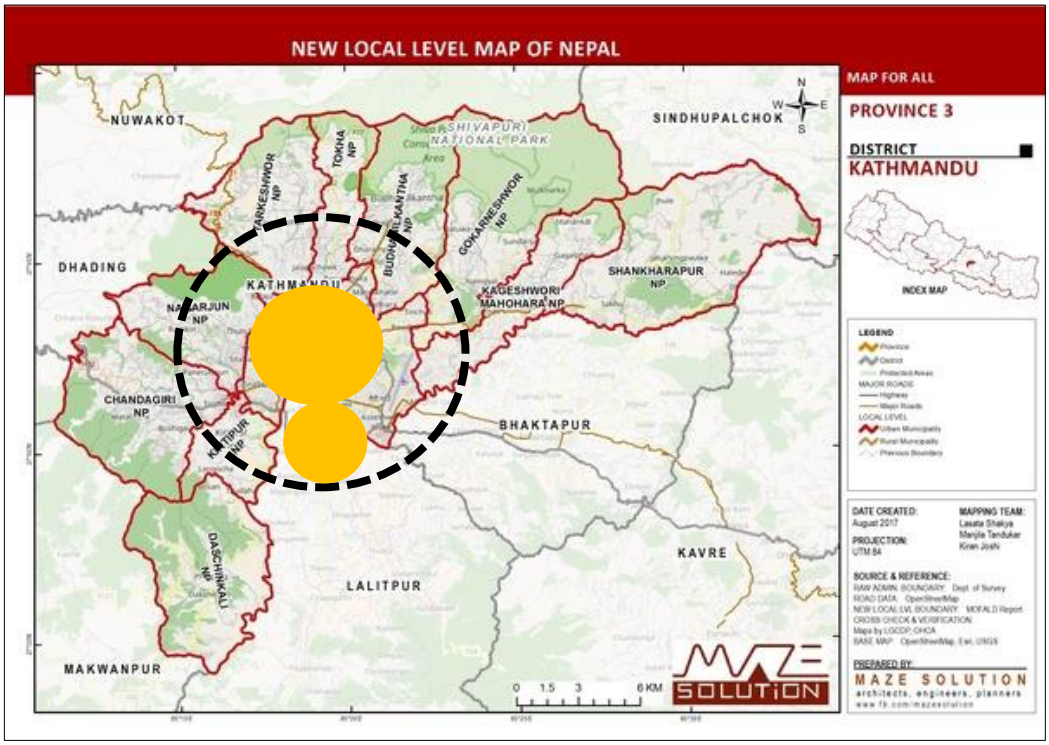


Figure 5-23 Growth Pattern of Kathmandu Valley

Source: Maze Solution

As shown in the figure above the new municipalities lie on the peripheral areas of established cities namely Kathmandu and Lalitpur. The pattern quite shows the Concentric Circular Growth Model of urban theory where cities grow out from the Central Business District (CBD). The density goes on decreasing as moving to the periphery from the center. Also, the land price decreases and people use automobiles to commute to their daily workplace that is still located to the center. Kathmandu Valley shows this kind of growth. But, as mentioned earlier, individually Kageshwori Manohara exhibits urban growth in the areas where there is established road network or conversely road networks have developed wherever there is growing settlements. Thus, is undergoing axial growth.

So, more appropriately, it is understood that Kageshwori Manohara is undergoing Concentric Circular Model of urban growth on a regional context with respect to Kathmandu city whereas Axial Growth when studied in isolation.

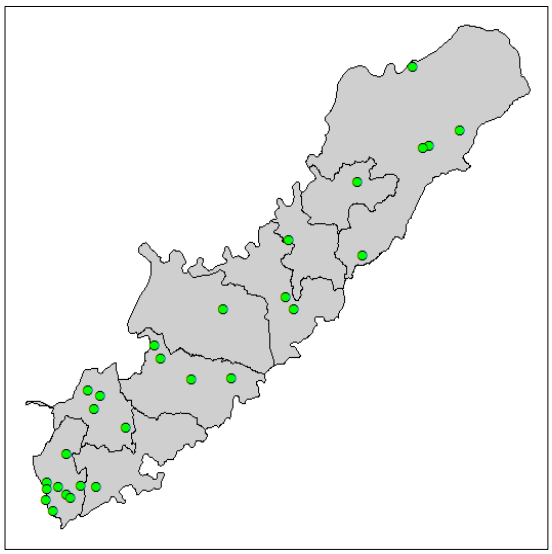


Figure 5-24 Location of Open Spaces

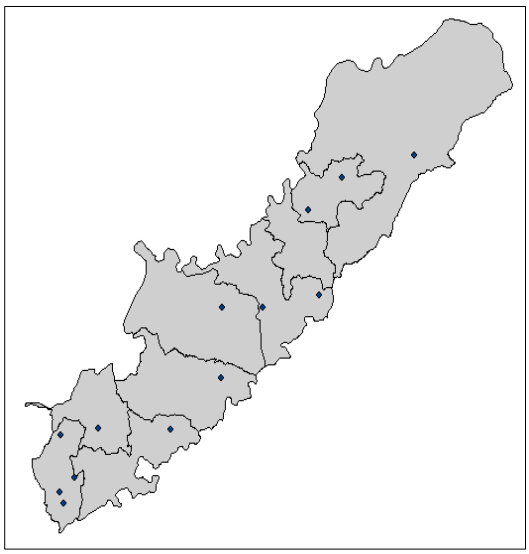


Figure 5-25 Location of Market Centers

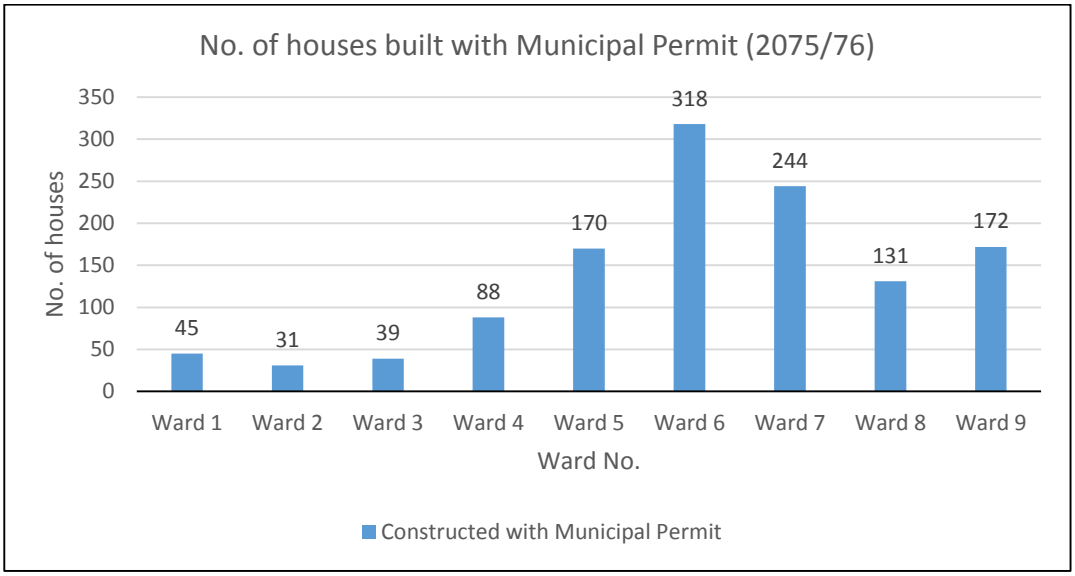
Source: Urban Base Map

The urban base map of municipality has identified open spaces and market centers inside the municipality. Nevertheless, these spaces are in a need of proper management and development.

5.3.2 Building Construction

Construction sector is one of the leading factor in urbanizing cities. Real estate and construction sectors can have greater impacts on urban economies, either in positive or negative ways depending on how they are managed in particular contexts (Balaban, 2012). Nepalese Construction Industry contributed around 10 to 11 percentages to GDP and it uses around 35 percent of government budget (FCAN, 2015). It is estimated that this sector is creating employment opportunities to about one million people so it generates employment next to agricultural sector in the country (FCAN, 2015).

The buildings consume a lot energy in the process of construction and operation. In Kageshwori Manohara, mostly residential buildings are constructed. Even though the form of the city is silent on its planning, the quality of building construction is regulated by the enforcement of Building Bye-Laws that has been prepared by the municipality complying to the Building Bye-Laws for Kathmandu Metropolitan City and Urbanizing VDCs-2064 developed by KVDA.



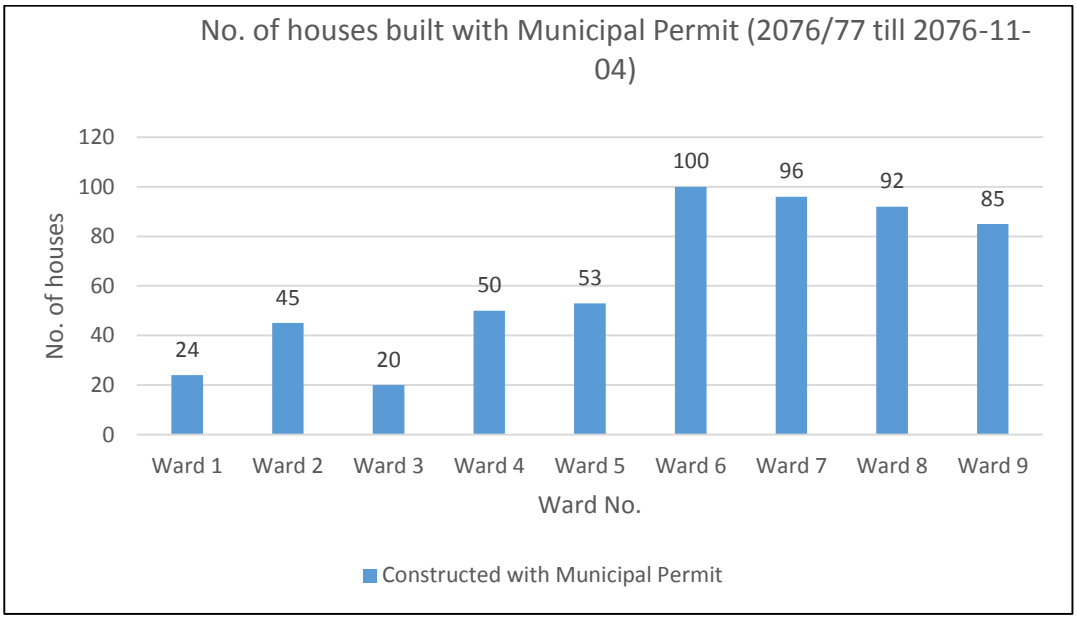


Figure 5-26 Total number of Building Permits in FY 2075/76 and FY 2076/77

Source: Municipality

In both the fiscal years, it is seen that maximum number of building permits have been issued for ward 6 which is under Cluster-B in the consideration of the municipality. While Cluster-C as discussed earlier is the urbanized one with dense settlements among the three clusters, maximum new construction is seen to be taking place in one of the wards of Cluster-B. This is quite an important data figure which shows that the trend of urbanizing is now shifting towards the Cluster-B, which is termed already as an urbanizing cluster in this research. So, the spread of urbanization is continuing from South to North and currently the middle cluster is the one that is urbanizing rapidly. It can also be said that the urban cluster is still receiving new construction but the

currently the urbanizing cluster is at peak. The Cluster-A on the other hand has been experiencing least new construction in both fiscal years.

The Cluster-B has received 46% of the total building permits issued in FY 2075/76 where ward-06 alone received 25% of the total permits. Similarly, in FY 2075/77 till 2076-11-04, Cluster-B received 35% of total permits and Cluster-C received 48% of total permits. In both FYs, Cluster-A received least i.e., 8% and 15% of total building permits respectively.

Figure 5-27 Commercial Buildings along major roads

Figure 5-28 Mixed Use Buildings seen in Ward 5

Figure 5-29 Plots developed in Ward 8

Figure 5-30 Settlements in Ward 9

5.3.3 Infrastructures

Road Network

Road network acts like a framework of city growth and is one of the greatest communal assets of urban areas. This is one of the basic level of transportation system in urban areas. Such infrastructure covers 15–20% of the whole city area and in city centers over 40% of the area (Marović, et al., 2018). For landlocked countries like Nepal, road network holds higher level of importance of road network to promote import-export based economy. In this, China's "One Belt One Road" project is perhaps the most

ambitious the world has ever seen. This will see the construction of roads, railways, ports and other transport systems to connect major cities across Asia with those in the Middle East and Europe (The One Brief, 2016). There are different classifications of road network like National Highway, Strategic Road Network, Feeder Roads, Urban Roads etc.

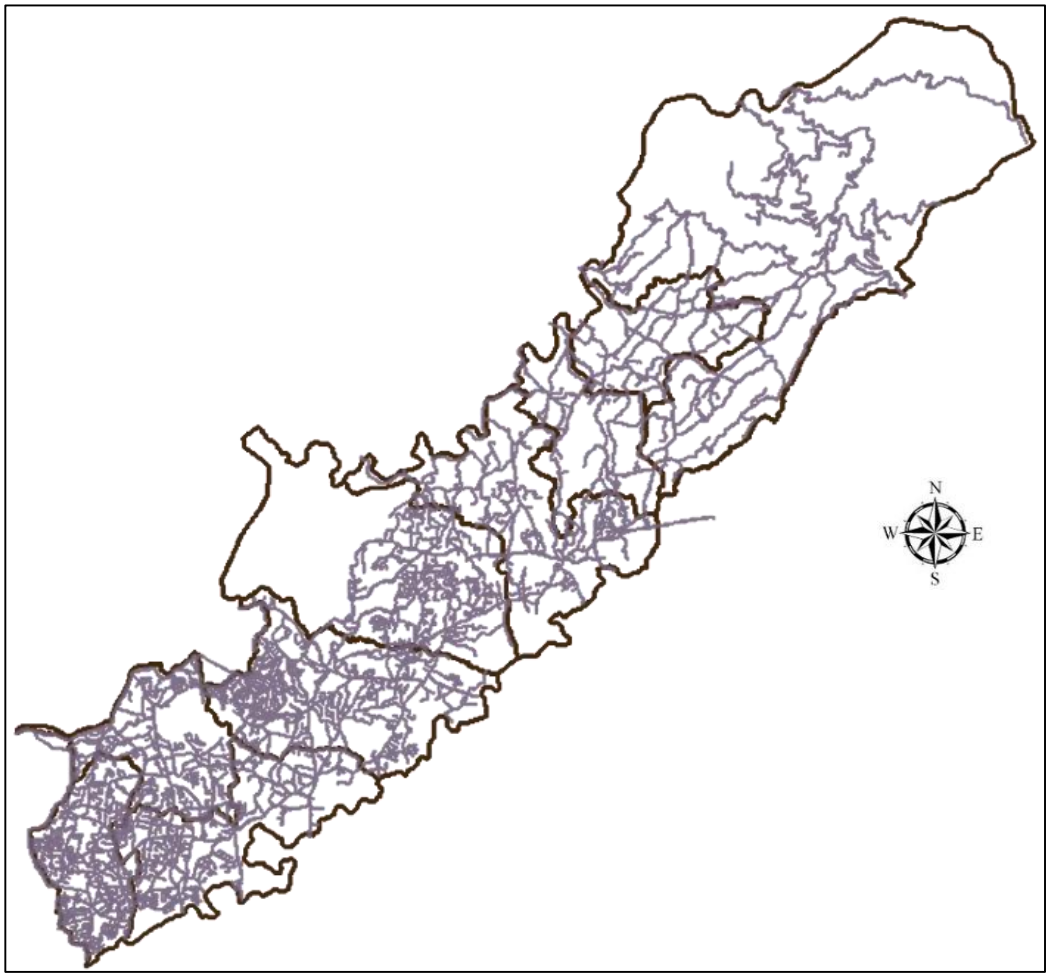


Figure 5-31 Road Network Inside Municipality

Source: Urban Base Map

The road network has been developed in all the wards of Kageshwori Manohara Municipality. The GIS Mapping of road network as shown in the picture above shows density of road higher towards Wards 8 and 9 which goes on decreasing on moving towards other remaining wards. The development pattern of road network is similar to urban development form as the road does not follow any regular geometric pattern and the density is more in Cluster-C and least in Cluster-A. According to IUDP Draft report, total 382.88 kilometers of road has been constructed with the average road density being 4.72 kilometer per square kilometer of land area. The composition of road according to road surface type and road width has been shown in the table below:

Table 5-4 Road Composition according to Surface Type

Road Surface Type	Percentage (%)
Black Topped	14.23%
Earthen	36.94%
Gravel	14.29%
Stone Paved	0.02%
Track	5.47%
Others	29.05%

Source: IUDP, Draft Report

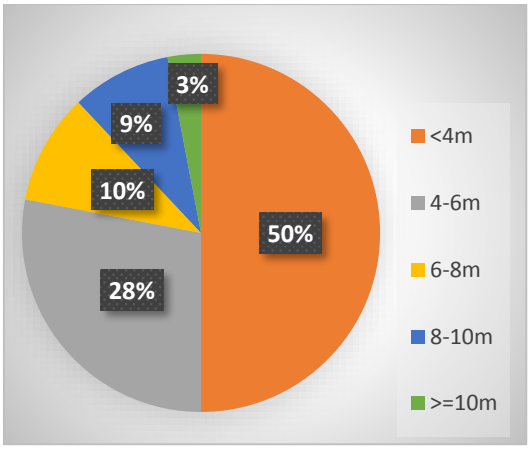


Figure 5-32 Road Composition according to width

Source: MTMP, 2016

Maximum section of the road inside Municipality is Earthen with Width of the road less than 4 meters. Only 14% of the total road is black topped and only 50% road is 4 meters wide or above which is the minimum guidelines as mentioned in the Building Bye-Laws 2075 BS.

Some of the observations captured by the researcher in different areas of the municipality have been presented in the pictures below.

Figure 5-33 Road in Wards 8 and 9

Figure 5-34 Chabahil-Thali Road Section

Figure 5-35 Ongoing Construction Works in Bagmati Corridor

The figure 5-31 is the picture of road inside settlement of Ward 8. This is one of the roads that links Wards 8 and 9 with Kathmandu. The road does not have any provision of footpaths and proper drainage. The picture right to it is that of Chabahil-Thali Section. It is National Feeder Road and the widening work is under progress since a long time. This is the only road that allows both Inter and Intra Municipal access to Wards 1, 2, 3, 4 and 5. Back in 2018, local people even protested because they were forced to live with air pollution for a longer time due to delays in construction work. Figure 5-33 shows the development works that is taking place in Bagmati Corridor. This road section is believed to improve accessibility to the Municipality via Kathmandu and also to reduce congestion.

Drinking Water Supply

Clean and reliable drinking water supply is one of the essential services to be provided in the city areas. In the modern times, with global climate change issues, the accessibility to reliable and clean drinking water has become a challenge in itself. Households of Kageshwori Manohara depend on different sources for drinking water that has been discussed hereafter.

Table 5-5 Percentage of Households with Different Sources of Drinking Water

Source of Drinking Water	**2011**	**2019**
Piped Water Supply	21%	41%
Tube Well/Boring	35%	21%
River	3%	1%
Others	41%	37%

Source: Municipal Profile and Household Survey, 2019

Major source of Drinking water has shifted from Tube-Well in 2011 AD (Municipal Profile) to Piped Water Supply in 2019 AD (Household Survey, 2019). Currently, 41% of the total households inside Municipality have access to piped water supply. Three major drinking water projects are running in Kageshwori Manohara. The largest is Danchhi Bhadrawas Drinking Water User Committee which has benefitted 1600 households of Wards 3, 4 and 5. Similarly, 800 households have been benefitted from Aalapot Drinking Water Management Society in Ward 2. The third project is Satghatte Drinking Water User Committee operating in former Nanglebhare VDC and benefitting 400 households.

Nevertheless, The Household Survey 2019 has found that only 25% of households find piped water supply as sustainable and so majority of the households (almost 60%) find boring or tube well as reliable and sustainable source of drinking water. Additionally, none of the water supply projects mentioned above has purification system which is also a reason behind its non-reliability source of drinking water.

Sewerage System

Sewage treatment is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater. Physical, chemical, and biological processes are used to remove contaminants and produce treated wastewater that is safe enough for release into the environment.

Table 5-6 Sewerage System through different methods

Methods	**Percentage**
Surface Drainage	48.2%
Septic Tank	20.57%
Drain in vegetable garden	16%
Others	15.23%

Source: Household Survey, 2019

Majority of the households (48%) in Municipality practice waste water disposal to surface drainage. Around 20% households dispose combined sewer to Septic Tanks. There is no facility for treatment of wastewater or fecal sludge available in the Municipality (CWIS TA Hub,South Asia/ENPHO, 2019). It is disposed either to Manohara River or Hanumante River directly. There is a need of treatment process before disposing the waste water into the natural environment. The absence of filtration practice will eventually cause the air, water and soil pollution.

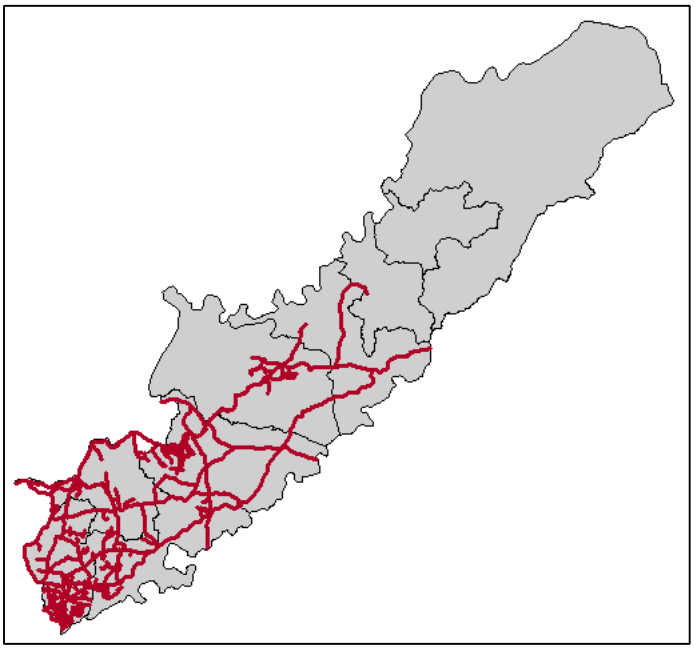


Figure 5-36 Sewerage Connection inside Municipality

Source: Urban Base Map, 2019

Figure 5-37 Disposal of Wasterwater into Manohara River

The Kathmandu Valley Wastewater Management Project has included plan to construct Interceptor Sewerage in Manohara River form which Gothataar area of Ward 9 will be benefitted. In June 23 2019, a public consultation was conducted with residents of Ward 9 by Kathmandu Upatyaka Khanepani Limited (KUKL) about approval for wastewater sewerage pipe laying on bank of Manohara River from Ward 9 and the work shall be conducted with local co-ordination.

Figure5-34 shows the sewer lines of the Municipality. It shows that Cluster-C have more households with sewer connection than Cluster-B. All the three wards of Cluster-A have no municipal sewer connection. Ward 2 has highest use of septic tanks for waste water disposal with 68% households practicing it (Household Survey, 2019).

Solid Waste Management

Solid waste management is an issue in many of the large cities of the world. It includes the activities of separation of wastages, recycling, dumping etc.

Methods	**Percentage**
Municipal Collection	84.8%
Burn or Bury	12.89%
Composting	7%
River	0.19%

Source: Household Survey, 2019

All wards have access to Municipal Collection of Solid Waste. Thus, maximum (84.8%) of the solid waste is managed by Municipality through door-to-door collection although there is no landfill site within the premise of the Municipality. The collected solid waste is disposed in co-ordination with the Kathmandu Metropolitan City. The concept of self-management through composting or burn/bury is popular only among 12.89% and 7% respectively. Even in this modern age, a small percentage of households (0.19%) dump the solid waste generated into river. Estimated total waste generation from the municipality is 36.48 tons/ day with assumption of 0.32 kg/capita/day (Municipal Profile).

Health Facilities

Table 5-7 Different types of Health Facilities Available inside Kageshwori Manohara

Ward	**Hospitals**	**Health Posts**	**Clinics**	**Pharmacy**	**Ayurveda**	**Total**
1	-	1	-	2	-	3
2	-	2	-	-	-	2
3	-	1	-	-	-	1
4	-	1	2	3	-	6
5	-	1	5	3	1	10
6	1	2	-	-	-	4
7	-	-	2	8	-	10
8	-	-	1	1	-	2
9	1	3	6	6	-	16
Total						**54**

Source: Household Survey, 2019

The Table above lists ward wise different kinds of health facilities available. In the entire Municipality, only wards 9 and ward 6 has hospital available. However, the health facility enlisted as hospital by Urban Base Map are actually health care centers (Mulpani Primary Health Care Center and Gandhi Tulasi Manohara Community Health Care Center) and do not meet the criteria to be named as hospitals. It can be inferred

that the Municipality does not have any hospital service. Thus, residents visit nearest hospitals in the adjacent municipalities. People share health services with other municipalities like Gokarneshwor, Bhaktapur and Kathmandu. From the questionnaire survey, 100% responded that they visit Kathmandu for specialized and better health care services.

Educational Facilities

Table 5-8 Educational Facilities available in different Wards of the Municipality

Wards	Primary School	Lower Secondary	Secondary	Higher Secondary	College	Total
1	-	2	2	1	-	**5**
2	2	-	3	-	-	**5**
3	-	-	1	2	-	**3**
4	3	1	1	-	-	**5**
5	-	-	5	1	1	**7**
6	1	-	2	1	-	**4**
7	1	2	7	-	1	**11**
8	2	-	4	1	-	**7**
9	-	4	4	1	-	**9**
Total	**9**	**9**	**30**	**6**	**2**	**56**

Source: Household Survey, 2019

The Municipality has considerably satisfying number of schools till Secondary level. With only six number of higher secondary schools and two colleges the Municipality lacks infrastructures and services for higher education. There are no universities and technical schools inside Kageshwori Manohara.

It is found from the questionnaire survey that majority (80%) of the respondents prefer Kathmandu for better educational services which is followed by 13% who acquire educational services from inside Kageshwori Manohara Municipality.

5.3.4 Economy

Occupation

A large portion of households (41%) have service as occupation which is followed by Business or Trade for around 23% of total households. Agriculture is taken as occupation only by about 13% households. This is a matter of contradiction because IUDP Draft Report identifies majority of land area (46%) as cultivated area but only 13% of total households take it up as occupation. This either means the agriculture is still traditional or the industries and businesses are agro based in the Municipality.

Table 5-9 Households Occupation

Occupation	**Active Population Involved (%)**
Service	41.88%
Business/Trade	22.68%
Agriculture	12.83%
Labor	8.61%
Industry	4.83%
N/A	1.18%

Source: Households Survey, 2019

Household Income

Majority of the households have monthly income in the range of 10,000 to 30,000. Around 60% of the households have income in this range. From the household Survey Report, the mean monthly household income was found to be 23, 827 and mean average expenditure in a month was Rs 3974. As reported by Nepal Rastra Bank, the monthly average household income of urban areas is Rs 31, 935 (ciecdata, 2015) and that of rural areas is Rs 22, 225 (ciecdata, 2015) making the average monthly income of households in nation being Rs 30,131 (ciecdata, 2015) in the year 2015. In that respect, the monthly average household income of Kageshwori Manohara is less than the average national as well as urban areas income but higher or comparable to the monthly income of households in rural areas of Nepal.

Table 5-10 Monthly Households Income

Monthly Income Level	**Households (%)**
10,000 and Less	15.41%
10,001-30,000	60.11%
30,001-80,000	21.27%
80,001-1,80,000	2.22%
1,80,001-3,80,000	0.78%
3,80,000-8,80,000	0.16%
8,80,000 and Above	0.06%

Source: Households Survey, 2019

Property Ownership

56% of the total households live in a self-owned houses whereas only 37% of the households live in rent. The dwelling ownership is quite high as compared to National Average. Relating it to the total emigrated households, what can be inferred is that

people after upgrading their financial status move inside the Municipality for residential purposes.

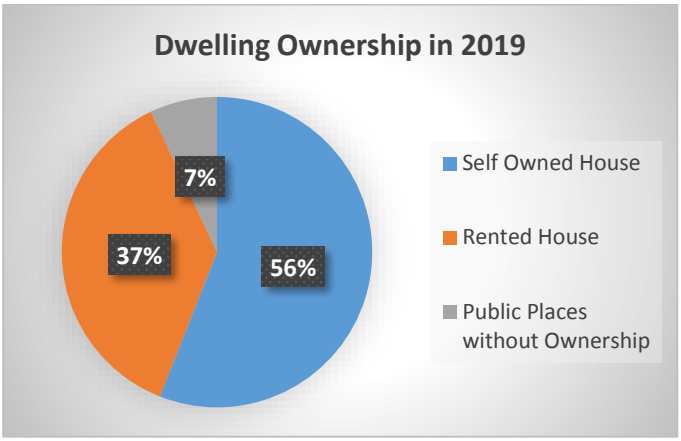


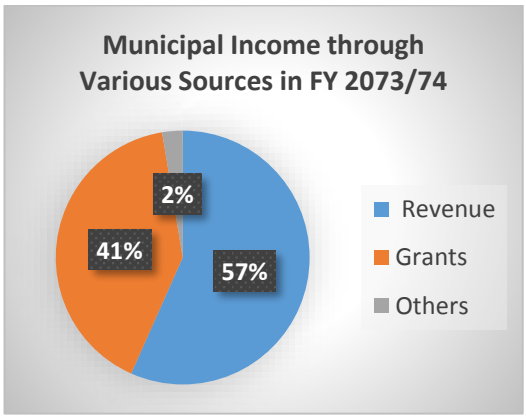
Figure 5-38 Dwelling Ownership

Source: Households Survey, 2019

Municipal Income and Expenditure

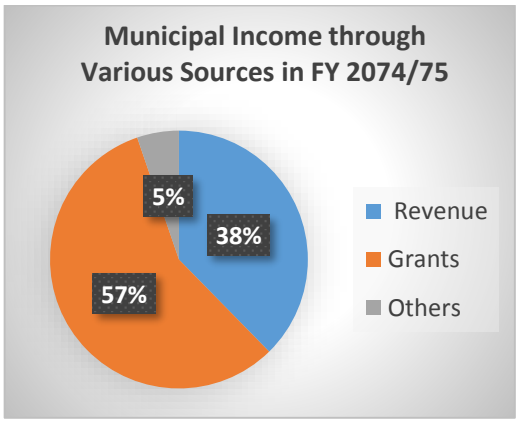
It has merely been 5 years since declaration of the area as a municipality. As a local Government in itself, municipality develops its yearly budget which is presented in the municipal conference and then validated. The composition of total income of municipality in different fiscal years is important sector in the study of its growth.

Kageshwori Manohara has different income sources like through Own Source Revenue, Grants by provincial and federal Government and different other agencies and also through people's participation. The share of grants is seen to be quite high in the total municipal income.



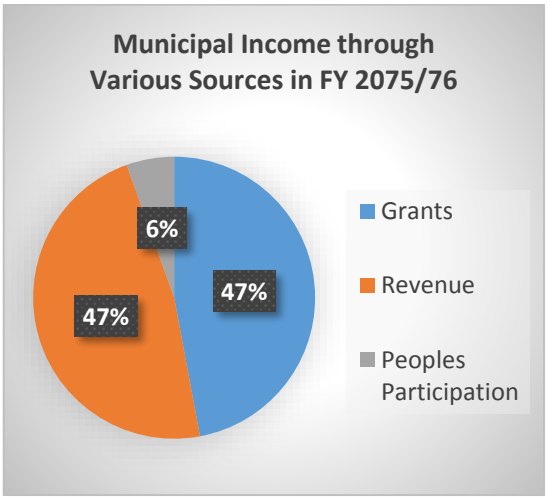
Total Budget= Rs 33,85,96,208

Figure 5-39 Municipal Income in FY 2073/74



Total Budget= Rs 71,50,76,834

Figure 5-40 Municipal Income in FY 2074/75



Total Budget= Rs 1,10,19,31,469

Figure 5-41 Municipal Income in FY 2075/76

Source: Municipality

The collected data of three fiscal years show the total budget of the Municipality increasing with each successive FYs. It increased by 111% from FY 2073/74 to 2074/75 and again by 54% in between FY 2074/75 to 75/76 indicating the alleviating development of economic activities in the municipality. However, the major source of income has always been grants from central and provincial Governments in all these three FYs. The grants consisted 41% of total municipal income in FY 2073/74 increasing to total of 57% in the successive fiscal year. The percentage of grants in the last fiscal year again dropped to 47%. The fiscal year of 2074/75 must have included major developmental works in its annual budget and program that was possible only when supported through grants.

The share of grants in total income is seen to be equal to the revenue in last fiscal year. Of the total revenue collected, 14% is alone from the tax collected from building permit according to the Municipality. It indicates towards the necessity for municipality to find its new and reliable sources of income so as to decrease its dependency on the grants.

In the last FY, out of the total expenditure, 49% was spent on social program whereas 35% on public construction works and remaining 11% on institutional works.

5.3.5 Mobility

Public Transportation

Different public transportation providing linkages within municipality and with neighboring municipalities have been listed below:

Table 5-11 Number of public vehicles operating in different routes

Means of Transport	No of vehicles	Route	Transport Entrepreneur
Mini Bus	24	Saankhu-Thali-Daanchi-Chabahil-Dakshinkali	Baba Gokarneshwor Yatayat (P) Ltd
Mini Bus	10	Ratnapark-Mitrapark-Gaurighat-Maakalbaari	Baba Gokarneshwor Yatayat (P) Ltd
Mini Bus	27	Pepsicola -Jadibuti-Thapathali-Jawalakhel-Balkhu	Saarwajanik Nepal Yatayat (P) Ltd
Traveler	30	Birendrachowk-Kandaghari-Jadibuti-Baneshwor-Ratnapark	Gothataar Yatayat (P) Ltd
Mini Bus	5	Birendrachowk-Jadibuti-Chabahil-Machhapokhari-Kalanki	Gothataar Yatayat (P) Ltd
Mini Bus	17	Birendrachowk-Jadibuti-Kotheshwor-Chabahil-Machhapokhari	Gothataar Yatayat (P) Ltd
Mini Bus	20	Mulpani Pipalbot-Kandaghari-Jadibuti-Koteshwor-Chabahil/Ratnapark	Madhya Upatyaka Bus Byawasayi Sangh
Mini Bus	30	Bode-Mulpani-Chabahil-Ratopul-Puraano Buspark-Ringroad	Om Shiva Darshan Yatayaat (P) Ltd
Mini Bus	31	Mulpani-Kandaghari-Jadibuti-Thapathali-Thankot	Riddhi Siddhi Yatayat (P) Ltd
Mini Bus	26	Babachowk-Gothataar-Khahare-Jadibuti-Putalisadak	Nepal Yatayat (P) Ltd
Mini Bus	35	Harharmahadev-Kandaghari-Jadibuti-Tripureshwor-Balkhu	Nepal Yatayat (P) Ltd

Source: Field Survey, From respective Timekeepers

Study of public transportation system is necessary to understand the mobility patter of the residents. The Table 5-11 above shows the routes and total number of buses operating inside the municipality. As seen above, all the vehicles offer inter municipal mobility i.e., they move from Kageshwori Manohora or via it to different municipalities as last stop. There is no dedicated intra municipality vehicular services. Buses from the same inter municipality route serve local mobility also. Most of these vehicles run from 4:00 am in earliest to 8:45 pm as last trip as known from the field survey. On an average, 90% of the total number of vehicles operate on daily basis running from 3 to 5 trips whereas the remaining 10% are kept stand by or sent for timely maintenance.

Figure 5-42 Bus in Chabahil-Saankhu Route

Figure 5-43 Mini Bus in Mulpani Bus Park

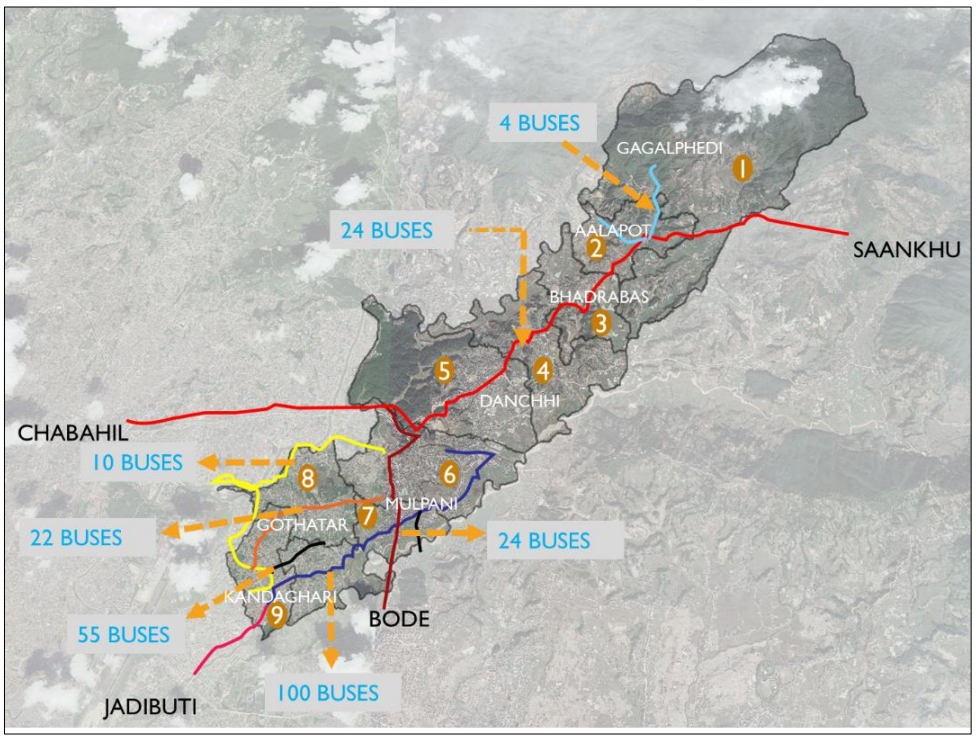


Figure 5-44 Public Transportation Routes

The figure above is the mapping of different public transportation routes and number of vehicles operating each day in the routes. A larger number of vehicles are seemed to be operating in the Southern Wards. Only 28 buses run to provide linkage to Wards 2, 3, 4 and 5 out of which only 4 buses reach Ward 1. On the other hand, almost 215 buses run linking Wards 6,7,8 and 9 with Kathmandu and Bhaktapur on a daily basis. The transportation routes are well connected with almost 7 times more vehicles operating in the Southern Wards of Kageshwori Manohara.

Private Vehicle Ownership

The usage of private vehicles for transportation have increased in the recent years. In the last fiscal year alone, 1.17 million vehicles were registered in Bagmati zone which is 36.4 percent of the total registered vehicles across the country and almost 97% of them are private vehicles (The Rising Nepal, 2019). The increasing number of private vehicles have created pressure on existing road infrastructure and traffic management.

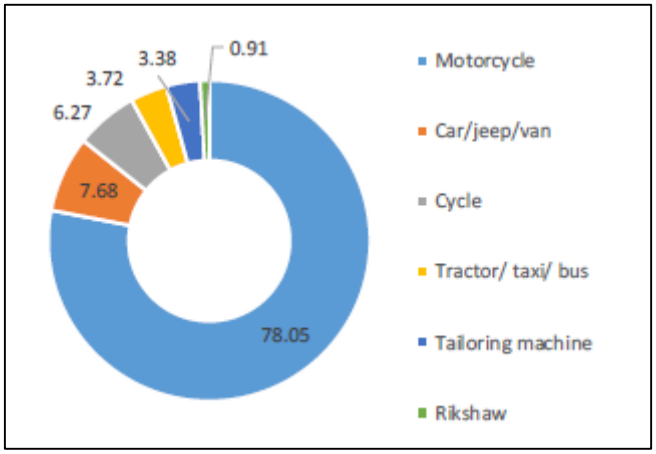


Figure 5-45 Vehicle Ownership

Source: Household Survey, 2019

Household Survey, 2019 shows that 78% of the households of the municipality own two-wheelers and around 7% own four-wheelers. Private vehicle is mostly used by working group and public vehicles are mostly used by students, women and teens of their travel.

The high ownership of private vehicles can be linked to the sparsely timed public transportation services operating inside municipality. As seen in figure 5-40, the vehicles usually carry passengers more than their seating capacity because of which residents with increasing affordability prefer to travel via their own vehicles. The increasing number of private vehicles may be one of the reason for traffic jams.

Pattern of Mobility

Daily Commuting Pattern

In 1994, Cesare Marchetti, an Italian physicist, described an idea according to which, people have always been willing to commute for about a half-hour, one way, from their homes each day (English, 2019).This principle has shaped the urban features in many ways. The value of land is governed by its accessibility—which is to say, by the reasonable speed of transport to reach it (ibid).

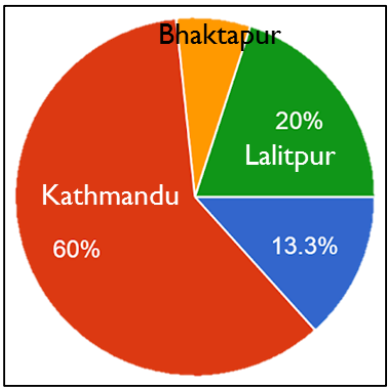


Figure 5-46 Travel Destination of Daily Commuters

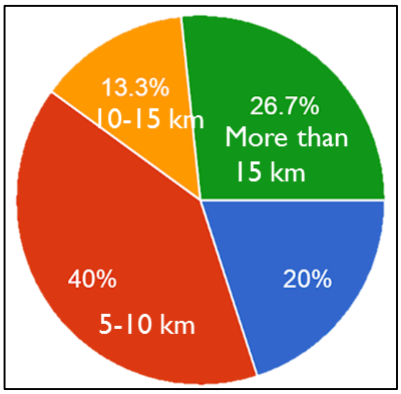


Figure 5-47 Daily Travel Distance

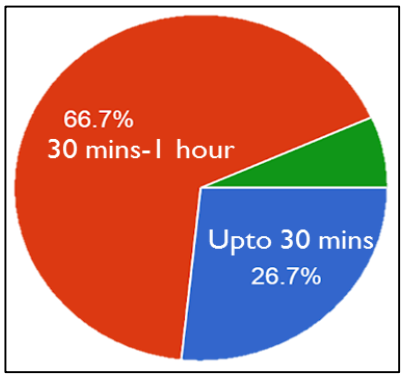


Figure 5-48 Daily Time Spent on Travelling

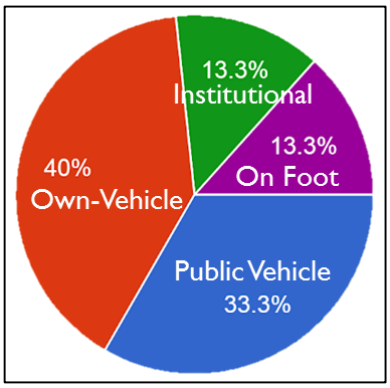


Figure 5-49 Mode of Travel

Source: Questionnaire Survey

The above figures are the responses of the respondents who commute on a daily basis. It is clearly visible from the pattern that most of the people travel to Kathmandu spending 30 minutes to one hour in a trip daily on their own vehicle. Although, the

Household Survey 2019 found 78% households with two-wheeler, only 40% of the people are found to be travelling via private vehicle. 90% of the respondents agreed that they face traffic jam on their way out of which 63% face in Jadibuti-Koteshwor section and remaining 37% on Mitrapark-Gaushala section. And so these two road sections are very critical and has been increasing the commuting time period of the residents either the travel is via public buses or private vehicles.

Mobility for Services

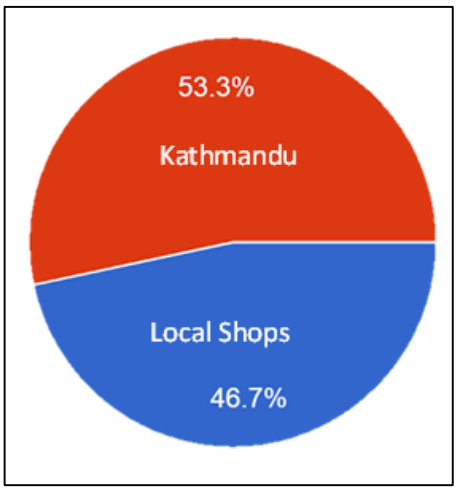


Figure 5-50 Destination for Shopping

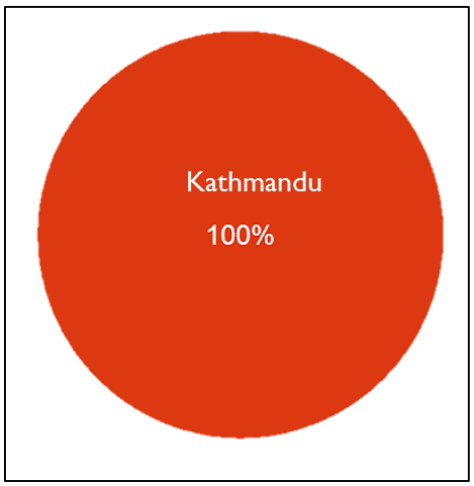


Figure 5-51 Destination for Health Services

Source: Questionnaire Survey

Upon studying the mobility of people for shopping, it is found that 53% of the people go to Kathmandu for the service while 47% go local shops. This data can be understood as the municipality developing its own market centers and restricting mobility merely for buying goods.

The scenario is not same with the health facilities. As the municipality has no hospital, 100% of the respondents prefer to go Kathmandu for better health services. Although, the nearby Gokarneshwor municipality has facilitated hospital, respondents still prefer to go Kathmandu. They prefer so because they believe at last for specialized care, patients are usually referred to some re-known big hospitals of Kathmandu.

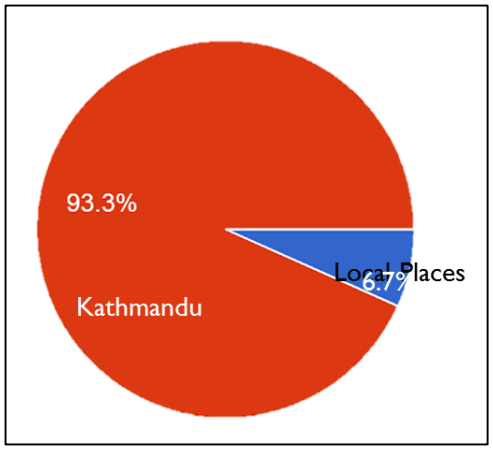


Figure 5-52 Destination for Education Services

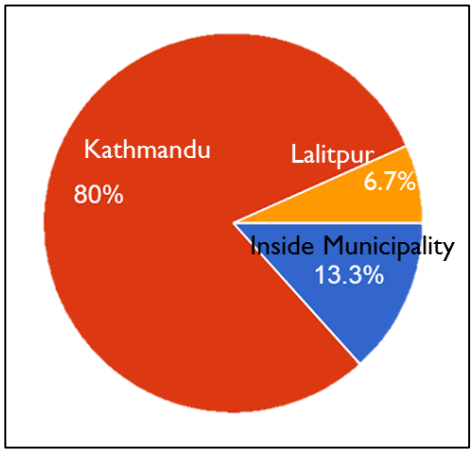


Figure 5-53 Destination for Jobs

Source: Questionnaire Survey

The dependency of the municipality with the Kathmandu is again noticed for entertainment and educational services. With 93% people visiting Kathmandu for

entertainment purpose and 80% for educational, the municipality seems to be lacking far behind in these urban services.

These data on mobility pattern provides stronger impression of Kageshwori Manohara being dependent upon Kathmandu for most of the urban services. Because it lies close to a larger economic center it is obvious that the mutual give and take of services will always exist among these different municipalities. It is quite natural and seen in the cities like Mumbai provides most of the urban services to the cities in its periphery like Thane, Navi-Mumbai and Vasai-Virar.

5.4 Sustainability of Kageshwori Manohara as a City

Sustainability is broadly defined as the ability to maintain at certain rate or level. The concept of sustainability evolved gradually with the population increase and limitation of available resources. Several documents have been developed so as to guide the future of development towards sustainability. United Nations define sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." Other agencies like European Union, Environment Defense Fund (EDF), Global Reporting Initiative (GRI) have respectively developed their principle and working philosophy towards sustainability.

However, there is more or less understood definition of sustainable development. There are four pillars of sustainable development- Economic Growth, Social Inclusion, Environmental Protection and Good Governance.

The most prominent document is 'Sustainable Development Goals' (SDGs). It has been prepared with 17 goals and 169 targets for the time period of 2015-2030 that is adopted by all UN countries. The goals are conceived as an urgent call for action by all countries - developed and developing - in a global partnership.

The eleventh goal of SDGs 'Make cities inclusive, safe, resilient and sustainable' provides guidelines in the urban sector. The UN has defined 10 targets and 15 indicators for achieving this goal. The targets have been listed below:

Target 11.1: Safe and Affordable Housing

Target 11.2: Affordable and Sustainable Transport Systems

Target 11.3: Inclusive and Sustainable Urbanization

Sustainable urbanization rates

Urban planning management

Target 11.4: Protect the World's Cultural and Natural Heritage

Target 11.5: Reduce the adverse effects of natural disasters

Target 11.6: Reduce the environmental impacts of cities

Solid waste management

Urban air pollution

Target 11.7: Provide access to safe and inclusive green and public spaces

Open spaces in cities

Safe spaces in cities

Target 11.A: Strong national and regional development planning

Target 11.B: Implement policies for inclusion, resource efficiency and disaster risk reduction

Target 11.C: Support least developed countries in sustainable and resilient building

Similarly, New Urban Agenda (NUA) represents a shared vision for a better and more sustainable future – one in which all people have equal rights and access to the benefits and opportunities that cities can offer, and in which the international community reconsiders the urban systems and physical form of our urban spaces to achieve this. This international document was adopted in Habitat III conference held at the city of Quito in 2016. It also works closely in co-ordination with the Goal 11 of SDGs.

While there are several agencies working in the localization of SDG and NUA, Nepal has independently developed 'Planning Norms and Standards 2015' which is currently the only document that provides guidelines for the planning of a city. It provides guidelines in the areas of land use, infrastructures and urban form. The close analysis of SDG, NUA and Planning Norms and Standards provides the sense that the national document criteria are all for the sustainability of the city. Sustainability is a broad topic in itself and so it was necessary to define the limitations in this research. The term

'Sustainability' in this research is thus taken as the fulfillment of the criteria as mentioned in the Planning Norms and Standards 2015.Validating the National document's indicators under the broad topics of international documents, the sustainability of Kageshwori Manohara as a city has been studied.

a) Land Use Analysis

SN	Types of Land Uses	Norms	Standards	Present condition and Gap
1	**Natural Resource Area**	**Around 45 to 55% of land shall be separated for natural resources, environmental sensitive areas and recreational purposes in which settlement shall not be allowed.**		Around 46% of the total land area is still open and used for cultivation.
	Urban Agriculture	Fragmentation of land not allowed and incentives provided to the owners for the preservation of these areas	Minimum 0.2 hectare of land parcel, Promotion of agro tourism	Defined as areas for future expansion zone in Bye-Laws 2064. No defined zoning practiced yet, proposed in IUDP Draft Report
	Urban Forest/Environmentally Sensitive Areas	No construction allowed in areas and buffer zone like floodplains, landslide and other hazard prone areas	20m to 25m buffer zone around environmentally sensitive areas	Environmentally Sensitive areas have been identified
	Recreational	2 to 6% of the total area separated for parks and recreational activities like botanical garden, playground, barren	Bicycle track and foot trail-single lane Parks with playground at a distance of 0.4 -0.8 km from the communities	Mulpani Cricket Stadium ground and Golf course areas

		land, sandy area, orchards, golf course, zoo park etc		Though abundant open spaces but not developed as parks
	Water Bodies	Construction around water bodies not permitted Waterfront recreational activities allowed within setback	Setback of 4 to 25m depending on the flow and type of water bodies to be provided	20m setback from centerline of Bagmati and Manohara rivers
2	**Settlement Promoted Areas**	**Around 45%-55% of land shall be separated for future development in which settlements with urban infrastructures/services shall be allowed.**		
	Residential cum commercial	Around 10 to 15% of land use shall be separated for mixed use	Density of 150-300 PPH allowed and encouraged at a stretch of 300-400m strip from the center line of the main road on either side.	No density requirement in bye-laws.
	Residential	Around 20-30% of the land to be separated for residential purpose	High density encouraged within 1.5 kms away from the city center.	FAR of 1.75 does not promote desired density.
	Industrial	Around 5-10% of the land shall be separated for industrial purpose	Located in fringe with green belt around and access to urban core.	No zoning practiced yet

	Institutional	Around 5-10% of the land separated for institutional purpose.	Around the perimeter of low density residential.	No zoning practiced yet
	Others	Around 12-15% land separated for infrastructures and services like roads, landfill site, parking lots, bus stations etc.		No zoning practiced yet

b) Infrastructure Analysis

SN	Types	Norms	Standards	Present condition and Gap
1	Road	All or 90% of household are within 0.5km from motor able road.		Road access in all wards but only 14% black topped and 50% less than 4m wide. Provision of footpaths lacking.
2	Water Supply System (With storage and treatment facilities)	100% households have metered house connection with 24hrs storage facility and treatment plant.	Quantity: 120 lpcd 25% of the total treatment capacity stored or 7-10 thousands liter	Only 41% households have tap water connection. No water treatment facility available.

				Daily standard water demand= 1,22,68,200 liters
3	Sanitation (Sewerage System)	Full coverage by public sewer system Treatment Plant Public toilets (Male, Female, Universal access)	2 Nos of treatment plants 1 Public toilet at a distance of 5 km along the main road.	Direct discharge to rivers, no treatment facility. Ward 9 to be benefited from KUKL's project.
4	Integrated Solid Waste Management Sanitary Landfill Site	Household level waste separation Collection point Transfer Station Large Landfill Site	Community or door-to-door collection 1 collection point at a radius of 200m 1 transfer station for 1 city if the final disposal within a distance of 10km	84% household depend upon door-to-door collection. Separation of degradable and non-degradable waste not practiced at household level. No own landfill site.
5	Electricity	National grid supply line and alternative energy	100% power access coverage	99% Coverage. (Satisfactory) Wire Management is needed.
6	Telecommunication	Landline/mobile and Public Telephone Booth (PTB)	100% coverage 1 TB at a distance of 2.5km along the main road	87% households have access to mobile phones. TB data not found.

7	Climate change center/ Disaster Management Center	City Level	1 Ha along with suitable open area	Lacking.
8	Educational Institution	Primary Higher Secondary Graduate/Post Graduate University	Primary schools 1 per 3000 population Higher Secondary 1 per 7500 1 per 25,000 1 per 40,000	9 primary schools 36 Secondary Level schools 2 colleges No university
9	Health Institution	District Zonal	1 per 50,000 with 25-50 beds 1 per 1,00,000 with 50-100 beds	No hospitals inside Municipality
10	Library	Community Level National Level	Library with community hall: One for 15,000 population	1 Community Level 1 E-library proposed 7 Community libraries required as per population.
11	Fire Stations	City Level (5 to 7km radius)	1 fire station per 1,00,000 population	Dependent upon KMC.
12	Religious Institutions	Incineration/cremation areas	0.4 ha per site	1 Crematorim found (Source:IUDP)
13	Museum	Regional Level	0.5 Ha per site	No Museum
14	Art Gallery	Regional Level	0.5 Ha per site	No Art Gallery

15	Old age home, orphanage, center for differently able people, sanatorium	Regional Level	1 per 20,000	No such facilities 5 required as per population
16	Security	Police Post Police Station Police Headquarter	1 per 10,000 population 1 per 40,000 population 1 per 1,00,000 population	5 nos of police stations found.
17	Science and Innovation Center	Regional Level	1 per 50,000	No such facilities. 2 required as per population.
18	Convention Hall	City Level	1 per 1,00,000 population (2 ha)	No Convention Halls. 1 required as per population.
19	Sports Complexes	Regional Level	1 per 1,00,000	International Cricket Stadium
20	Movie Hall	Multiple halls	5 seats per 1,000	No Movie Halls
21	Vegetable Market	Neighborhood Level	1 wholesale, 1 retail and 1 slaughter house for 6,000 population	
22	Parking Space	Public parking with two, three and four wheeler (vertical parking included)	1 parking lot per neighborhood (1 neighborhood=3,000 population)	No designated parking space.
23	Petroleum	Storage and distribution	1 gas go down for 40,000 population	No storage

				3 required as per population
24	Transportation System	Inter and Intra city bus terminal	1 parking lot for 200 buses and 200 trucks 1 parking lot for 200 buses	No bus terminal. Inadequate public vehicles operating in Northern wards.
26	Airport	National/International		Tribhuvan International Airport next to Municipal Boundary

The above matrix shows the status of Kageshwori Manohara in following the guidelines provided in the Planning Norms and Standards. The municipality yet has not practiced zoning for land use regulations but is proposed in IUDP Draft Report. Although there is defined regulations for Building Construction, a centralized idea for planning is missing. As seen in the matrix above, the city has enough population to be called as a Sub Metro City but the density of settlements is not fulfilled. The sparse settlement development of Kageshwori is happening at the cost of agricultural land. Also, the provision for community parks and open spaces has not been included in any kinds of development works taking place right now which is essential to make the city sustainable in a long run.

The comparison of urban services and facilities inside the municipality is insufficient and is highly dependent upon Kathmandu for the services. While there can always be sharing of services between a larger urban center and a developing city, still there are some basic infrastructures like water supply, waste water treatment and solid waste management which needs to be done at all municipal levels. For the services like health and education, it can depend upon neighboring cities for advanced facilities and higher education but the basic services are expected to be accessible at grass root level locally.

The higher share of income through grants too does not promote sustainability of a city. So it has become very necessary for Kageshwori Manohara to identify the income generating reliable sources.

5.5 Findings from Data Analysis

- Kageshwori Manohara is a growing city.
- Although the population of Kageshwori qualifies itself as a Sub metro city as categorized by the Planning Norms and Standards 2015, it lacks the infrastructures and services that are expected to be provided by the city. Nevertheless, it has been obtaining the urban services from the nearest city of Kathmandu which is the largest urban center of Nepal and needs to develop the infrastructures.
- It is developing as a residential zone for people who work in Kathmandu but cannot afford housing expenses of Kathmandu or who want to live in less congestion areas but can commute to their workplace in their private vehicles.

- The growth of Kageshwori Manohara is highly influenced by the growth of Kathmandu city and valley.
- The findings can be better summarized with the help of thematic diagram shown below:

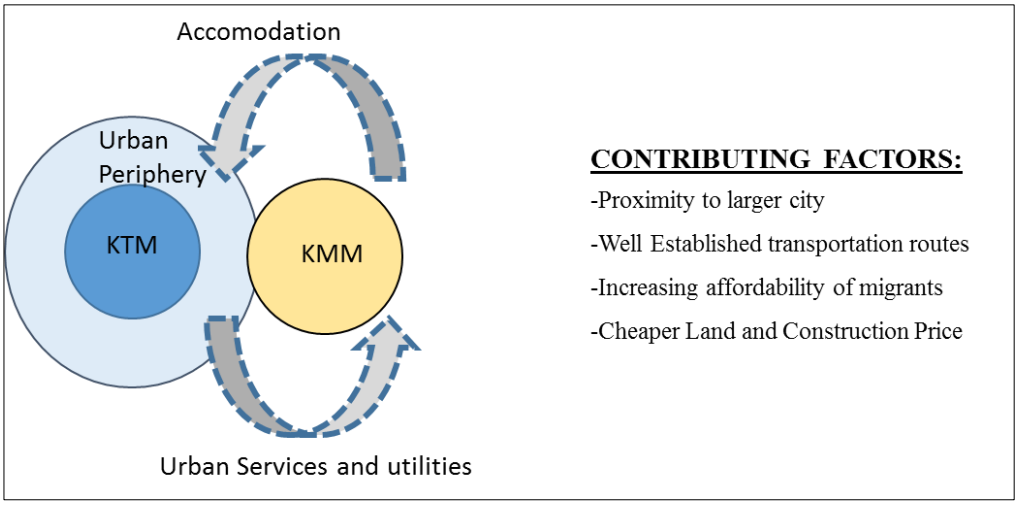


Figure 5-54 Relationship of Kageshwori with Kathmandu

CHAPTER 6 : PROBLEMS AND RECOMMENDATIONS

6.1 Problems

The new municipalities in the peripheral zone of Kathmandu Valley are developing due to the widespread growth of Kathmandu. These areas have been declared as an independent municipal body in order to regulate the urbanization which would have been jeopardized if remained as rural municipalities. The growth of a city into sub urban areas that fall outside the boundary of municipal government is quite natural as that can be seen in the most American and European countries but it comes with the cost.

Some of the problems of Kageshwori Manohara in particular have been discussed below in relation to the development pattern and its sustainability.

6.1.1 Sprawl type Development

The built up areas are increasing at the loss of farmlands. The settlements thus grown exhibit a low rise low density development and do not follow any pattern. Rather, it is growing organically without consideration of any planning guidelines. The settlements lack communal spaces and developed urban facilities. Provided that the trend continues, within a certain time framework it will have posed two big threats to the municipality. First, the arable lands will have been all destroyed and secondly the built areas will have converted into slums with poor urban environment.

6.1.2 Poor Environment and Sanitation

The continued worsening of situation in terms of land, air and water will have negative effects to the people residing in the municipality as well as the aesthetics of the place. The absence of separation of degradable and non-degradable solid waste at household level is not only creating additional pressure to the land fill sites but also gradually degrading the fertility of soil. The sewerage is being discharged directly without treatment into the Manohara river thus adding to the water pollution. This kind of activities that cause environment degradation and beauty of the place may also discourage permanent migrants to Kageshwori Manohara.

6.1.3 Lack of Urban facilities

Urban areas are expected to provide different urban facilities to ease the livelihood. Kageshwori Manohara lacks sufficient infrastructures like road network, drinking water supply, community buildings, parks, hospitals, schools and colleges. It is developing merely as a residential unit and is dependent on nearby municipalities majorly

Kathmandu for such facilities. Although, there may always remain the sharing of services with the larger urban area, it is necessary that the Kageshwori Manohara develop at least its basic infrastructures and services within reach. In the long run, this dependency will cause the unsustainability of the municipality as a city and question its autonomous existence.

6.1.4 Transportation System

Transportation can be regarded as the skeleton system of the city. It provides easy access to different areas which in return helps to grow the city. The study of mobility pattern of Kageshwori Manohara has showcased the everyday commute to work as a major part of residents' lifestyle where they travel to other municipalities on a daily basis. Additionally, inter municipal transportation system is required on the context of regional linkage. However, the municipality lacks sufficient and reliable public transportation system. This fact has caused 78% of the households to own private vehicles for everyday commute to their work. The increasing private vehicles have led to congestion on the major nodes like Jadibuti and Mitrapark where Kageshwori Manohara is linked to neighbouing municipalities. Moreover, the available public vehicles are limited to the Southern Wards and Northern Wards have very less number of public vehicles operating in their route. In the modern era, the city without proper public buses are not considered sustainable as the large number of private vehicles consume more space, pollute air more and so on.

6.1.5 Insufficient Municipal Resources

Good governance is must for sustainable development of a city. The municipal income of Kageshowori Manohara is majorly dependent upon grants by central and provincial government. Around 50% of the total income of municipality is generated through grants. The need to develop a reliable internal source of income is acute for the municipality.

The municipal office is also lacking sufficient manpower. With no urban planner in the organization, the municipality is unable to make a comprehensive plan for its development. The execution of planning approaches made by central level also becomes challenging in absence of a planner.

6.2 Recommendations

The continued growth of Kageshwori Manohara is an obvious expectation. The pattern of the growth and its influential factors suggest the municipality will continue to urbanize along with the peripheral urbanization of Kathmandu. So, Kageshwori will always be a peripheral or satellite or edge city to Kathmandu. It is important to note that these kinds of peripheral cities show their own dynamics in growth. There are two possibilities on what kind of growth the municipality will demonstrate in the times ahead.

a) Kageshwori Manohara may continue to undergo influential growth and depending upon Kathmandu for major of the services. It may cease to exist as a separate administrative body.

   Example: Gulariya is a city only 34 km from one of the large cities of the country, Nepalgunj. The development is so centered in Nepalgunj that Gulariya's growth has been halted for a longer period now.

b) Kageshwori Manohara will create employment opportunities, make economically stable and develop some of the needed services within its own boundary so as to ease the dependency on Kathmandu. But, on a regional context it will still be a part of larger urban agglomeration while administratively being a different municipal corporation.

   Example: Noida is a satellite city of Delhi. Noida has flourished so much especially after operation of Metro Railway to Delhi that even the headquarters of large multi-national brands have shifted to Noida in a more spacious and well planned plots. The real estate economy has also boomed in Noida.

In either of the case, it is obvious that Kageshwori Manohara Municipality is a part of a larger urban center. The satellite cities like Noida have developed quite well under the influence of larger city Delhi whereas some cities of Nepal like Gulariya could not grow because the larger city Nepalgunj existed nearby. Similar case is demonstrated by Birgunj where its growth has been restricted due to the growth of Janakpur. Thus, it is not always a case that the existence of CBD influences positive urban growth in its periphery. But, the current growth trend shows that Kageshwori Manohara is growing because of its proximity to Kathmandu. So, it is most likely that the second case of possibilities explained above will occur in the near future.

Taking these possibilities into considerations, this is the right time for Kageshwori Manohara to plant the seeds of urban planning and development so that it shall retain its beauty and sustainability no matter which of the above scenario occurs in the future.

Consideration of urban dynamics is important in order to model the way cities evolve as a result of the collective interactions of individuals and the urban environment (Alghais & Pullar, 2018). A study has revealed that the planned form of development saved around 20-45% of land resources, 15-25% of costs for providing local roads and 7-15% for water and drains (Burchell et al, 1992 as citied in (Camagni, et al., 2002). After the study of urban growth pattern and identification of issues, some of the major recommendations for sustainable growth of Kageshwori Manohara has been deliberated below:

6.2.1 Land and Building Regulations

a) Zoning

Zoning provides guidelines for urban growth and management followed in most developed countries like USA, Australia, Canada and Germany. However, single use zoning which is widely practiced currently in Nepal is criticized to result in urban sprawl, decay, environmental pollution, racial and socio-economic segregation in Northern American cities like New York (Wikipedia, 2020). Learning from the past experience, its high time for Municipality to propose multiple use land zoning so as to give property its maximum value.

Mixed uses like commercial shops, gymnasium in lower floors and residential or office in upper floors can make streets feel safer at all hours while also fostering commercial activity and giving cities vibrant character. The travel-to-work time is also reduced that sustainability benefits with energy, time and communal feeling also.

b) Density fixation

Jane Jacobs in her essay ‘The Need for Concentration’ points out that there is a close relationship between concentration of people in a settlement and convenience or diversity. By density, it must not be misunderstood with everyone put into elevator apartment houses to live or into any other one or two types of dwellings. Planning Norms and Standards 2015 mentions 150-300 PPH as desirable density in cities. It is easier and cost efficient to develop urban facilities and infrastructures in dense settlement rather than a sparse one. The residential areas can be distinguished as high

to medium density zones. Currently, the Bye-Laws of Kageshwori Manohara is silent on the aspect of density. The minimum size of plot is fixed to be 80 square meter round the municipality but the maximum plot size in missing. Also the current FAR of 1.75 is needed to be revised as it is promoting sparse settlements. Imposing vacant land tax is also another measure to achieve desired density in certain areas.

c) Building Permits

The practice of infrastructure guided development is required to stop haphazard building construction in areas with inadequate urban services. Municipality needs to take initiation of infrastructure development prior to settlement development to ensure that the place does not get converted into slums in near future. Only licensed property developers must be allowed to develop housing with obligatory rule of designating certain percentage of its development for social welfare like allocation of affordable housing, construction and maintenance of community parks, road construction etc. This practice can be encouraged by providing incentives like density and FAR bonuses, levy on construction tax.

6.2.2 Transportation development

Often road infrastructure for transportation consumes larger areas of land. 25% of the total urban areas in Europe and 30% in United States are dedicated for road construction (Camagni, et al., 2002). The mobility consumption and morphology of urban development are related to each other.

a) Promote Public Transportation

Local transportation improvements are often justified on the basis that they promote city growth (Gilles & Diego, 2013). Urban public transportation systems like Bus Rapid Transits, low fare or no fare public buses have been introduced in cities like Kansas and Salt Lake City to minimize the traffic congestion, fuel and time efficiency of residents. The movement known as The everyday commute to workplaces has been a part of daily lifestyle for the residents of Kageshwori Manohara municipality and it is most likely that it will persist as it is normal for larger economic center to attract people from smaller towns. The Northern wards of Kageshwori Manohara need more public transportation routes to ease intra and inter-city movement. The public transportation system should be made cheaper, reliable, faster and disable friendly. For this, the Government should work on subsidizing taxes of public vehicles association.

b) Discourage Private Vehicles use

The intensified use of private vehicles with rapid population and job growth leads to excessive traffic congestion in urban areas (Downs, 1995). Kageshwori Manohara with around 78% of households with private vehicles is causing serious traffic congestion and longer jams in major road junctions which is most likely to worsen in future. Congestion tax and limitation on the annual vehicle registration inside Municipality can be some measures to discourage use of private vehicles. Even the allowed private as well as public vehicles should be electric fuel based and pollution free.

6.2.3 Environment friendly development

Ideally, environmental planners need a 'Mother Nature Model' because there are certain limits that the environment itself imposes on development (Godschalk, et al., 1995). The development practiced must be such that it causes minimum intervention to the nature and produces lesser carbon foot print. Environmental costs for urban growth are mostly in terms of land consumption and mobility generation (Camagni, et al., 2002).

Preservation of water bodies, wet-lands must be labelled as top priority in setting development plans and activities. Actions must be taken so as to make the place open sewer free zone. Separation of degradable and non-degradable solid wastes at household level not only decreases the amount of wastage to be transported to landfill site but also the decomposed wastage in kitchen garden can be utilized as manure. In larger context, the degradable wastage can be converted into natural fertilizer business and others re-used or re-cycled. A strict rule must be imposed to promote least use of non-degradable materials like plastics. Other initiations might be promotion of electric vehicles, alternative energy sources etc.

6.2.4 Empowering Municipalities

Municipalities are the key players in the development since they are the local Governments formed under public mandate. As an implementer of development plans, municipalities empowerment is must in the entire planning process. There is a need of participatory approach under the leadership of municipalities to enhance development in public interest.

In the present time, lots of confusions can be felt in terms of role of different tiers of Government in development. Municipality as a local Government must co-operate with state and federal Governments to proceed in planning activities. For this, there are

several phases on which Kageshwori Manohara should empower itself. Dependency upon grants as major part of economy is not desirable in the long run. Although local Governments have fewer options to generate their internal revenue, there is a need to identify new and reliable income sources. Establishment of industries, urban agriculture, tourism promotion can be such new sources which the municipality has potential to develop. Additionally, the Municipality office needs technical manpower such as urban planners and architects who can understand and interpret the planning approaches during the execution of development plans. The urban development plans prepared at Municipal level by Municipal staff is more likely to understand the local context and develop the most suitable plans.

CHAPTER 7 : CONCLUSION

The study of development pattern of Kageshwori Manohara reveals the fact that the municipality is one of the rapidly urbanizing municipalities of Kathmandu Valley. The analysis also indicates that the demand for infrastructure and urban services is largely being fulfilled by Kathmandu city as its own services are inadequate. In other words, Kageshwori Manohara is growing as a satellite city of Kathmandu. Moreover, the form its growth has exhibited is a sprawling type development.

Though administratively different, Kathmandu Valley can be studied as one urban center of which the new municipalities are peripheral growth of Kathmandu. This kind of out growth is natural as this trend has been exhibited by different large cities of the world like Los Angeles of USA and Gujarat of India. On a broader context, Kageshwori Manohara is almost like a residential zone for the largest economic and urban center of the country, Kathmandu. Most of the residents have in-migrated whose migration history shows that the migration was targeted for Kathmandu for better economic opportunities and ultimately to the peripheral areas for permanent residential purpose because the city core is quite expensive with congestion adding up travel to work as a part of daily lifestyle. The urban form is haphazard and settlements are developing without prior development of infrastructures like road network, community spaces, drinking water supply etc. This type of development pattern is undesirable as in the long run it pushes the city towards unsustainability in wider (environmental, social and economic) factors.

Provided that this trend continues, it is sure to get converted into slum areas and decayed city in days ahead. This anticipation holds true because Kathmandu city was in the similar stage as that of Kageshwori Manohara a few decades back. Lack in execution of development plans in Kathmandu has added up the chaos and congestion of it and in the present stage urban management in Kathmandu has become quite challenging. Learning from the past experience of Kathmandu, this is very correct time to initiate the visionary development plans so as to manage the urbanized areas and promote sustainable development measures for urbanizing areas.

The new municipalities are in peer pressure of development versus planning. But, it is equally true that these municipalities have opportunity to plan for desired changes before the chaos becomes the permanent identity of the city. A participatory model of

planning approach under the leadership of municipality can develop the most suitable planning approaches for the municipality. As a local government, it is necessary to include people's participation in planning activities to preserve the unique character of the city and bring about social inclusion, feeling of ownership and satisfaction among the citizens. Not only in planning activities, the municipality must simultaneously develop strategies to improve the economic level of the residents as well as municipal corporation itself. A slight intervention in the conventional planning techniques certainly can lead towards desired development pattern and sustainability of Kageshwori Manohara municipality which in regional level is what we need for the prosperity of Kathmandu Valley.

Further Research

Planning is a continuous process with its philosophies evolving over the time. While this study takes the case of single municipality of Valley, it can be regarded only as one single step for further related researches. Further research that can be recommended for related field are:

- Planning of a city for pandemics outbreak like recent COVID-19
- Restructuring of the nation and its impacts on development of new municipalities
- Urban agriculture and agro based industries as major income source for urbanizing areas with agriculture base

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ANNEXES

ANNEX A: List of comments in the thesis defense

ANNEX A: Research paper presented in IOE Graduate Conference, 2020

ANNEX B: Sample of questions in Questionnaire Survey

ANNEX C: Thematic Maps of KMM

ANNEX A: LIST OF COMMENTS IN THE THESIS DEFENSE

SN	COMMENTS	RESPONSE	REMARKS
1.	It is said in the presentation that the definition of sustainability is vague. It implies this thesis is vague. Make correct choices of words.	Addressed in pages 69 and 70	
2.	Compare the net density of study area and urbanized area only with the standards.	Addressed in page 37	
3.	Do not miss to deal with the regional context on the strategy of development for Kathmandu Valley.	Addressed in page 32	
4.	Kageshwori Manohara is exhibiting axial growth model theory in isolation which is true but the urban form on regional context is also needed to be explained.	Addressed in pages 47 and 50	
5.	Kageshwori Manohara has TIA as a geographical barrier yet, it lies within the urban periphery of Kathmandu and not outside.	Addressed in page 80	
6.	It would have been better if the word 'Sustainability' was not included in the topic.	Noted	
7.	Do not jump into recommendations directly from issues. Issues have been presented in data analysis. State problems and then recommend.	Addressed in page 81	
8.	Give factual and relevant examples.	Addressed in page 81	

ANNEX B: PAPER PRESENTED IN IOE GRADUATE CONFERENCE 2020

IOE Graduate Conference, 2020-Summer
[Placeholder for Publication Information]

The Growth Pattern of new municipalities around Kathmandu Valley: A Case of Kageshwori Manohara Municipality

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Abstract
Cities offer a significant range of opportunities and life quality improvements to their residents. The decline in environmental quality of the densely built city centers, traffic congestion, pollution, degradation of public spaces and safety; change in lifestyles due to increase in incomes, in favor of more spacious decentralized housing; the replacement of residential land use in the city center by tertiary activities; the fact that housing improvement in the city center costs more than new construction outside the city; and the housing supply strategies of real estate agents, which find less resistance in the more spacious out-of-town areas have been the cause of urban growth, a study by Camagni in 2002 suggests.

Kathmandu Valley from its historic period has been the political and economic capital seat of the country. With the increasing global trend of urbanization, Valley is also growing with Kathmandu city regarded as one of the fastest urbanizing cities of South Asia. The impact of urbanization currently is not only limited within the core of Kathmandu but rather has spread in the suburb areas. Kageshwori Manohara municipality which fell under rural areas just half a decade back is now an independent municipal corporation. However, the growth pattern of Kageshwori Manohara as a city is seen to be highly related to the growth of Kathmandu city. Sharing its boundary with Kathmandu in the Southern areas, the urbanization of Kageshwori Manohara is highly dominated and concentrated in these areas. In other words, what we can say is the development of Kageshwori Manohara is a peripheral growth of Kathmandu in which the wards connected geographically to Kathmandu holds the largest share of what we call as urban growth of the municipality.

Keywords
Urbanization, growth pattern, outgrowth, satellite city

1. Introduction

Urbanization in simple words can be inferred as the increasing number of people living in urban areas. Yet, urbanization is not only about a simple increase in number of urban residents, but also involves a series of change from rural to urban styles in terms of industry structures, employment, living conditions and social public services (Chen M et al, 2014). It is the global phenomenon with the world urban population increasing from 746 million in 1950 to 3.96 billion in 2014 [1]. Out of total population in the world, 55 percent lived in urban areas in 2018 and is expected to reach 68 percent by 2050 as per UNDP-2017.

The growth pattern of cities around the globe although differ according to their geographic location, history, political and economic conditions [2], they tend to follow similar patterns. The city may be looked on as a story, pattern of relations between human groups, a production and distribution space, a field of physical force, a set of linked decisions or an arena of conflict [3]. Nepal as a developing South Asian country, showcased the level of urbanization of 18.2 percent [4] with an urban growth rate of 3 percent [1]. The trend of urbanization in Nepal is dominated by few large cities and primarily by Kathmandu Valley which has the largest cities and excessive population. While the population distribution is uneven, Kathmandu has the highest population density of 19,726 (MOUD,2016) per square kilometer (1972 PPH) covering 9.7 percent (MOUD,2016) of the total urban population of Nepal. After the Nation's restructuring process in 2014, several new Municipalities have been added to the Kathmandu Valley, together with which there are now 18 municipalities in the Valley. The

creation of new cities is a planning approach adapted in several regions around the world, in order to accommodate urban growth [5].It surprises no one to hear that it is impossible to explain how a city should be, without understanding how it is but perhaps it is surprising to accept the reverse that an understanding of how a city is depends on a valuing of what it should be [3]. The new municipalities are simply the outward extension of the urban population growth of Kathmandu city core. There are numerous factors of a city core like traffic congestion, housing shortages, lack of open spaces, over-crowding, pollution that push its inhabitants outwards. The declaration of new municipalities and definition of urban centers have long been debated in the context of Nepal since most of the new municipalities possess the urban-rural characteristics rather than purely urban. Unmanaged urban expansion increases the costs of service provision, deepens spatial inequities, and imposes heavy economic and environmental burdens (Mahendra A and Seto K, 2019). On the other hand, it is also in these areas where there is an opportunity to manage urban growth before it becomes the permanent chaotic characteristics of that particular area.

2. Research Question

This research aims to find appropriate answers to the following question:

- How cities grow and how should cities grow in modern times?

3. Research Objective

The major research objective of this paper is to study the urban growth pattern of one of the newly formed municipalities of Kathmandu district, Kageshwori Manohara municipality.

4. Methodology

The research aims to study the pattern of urban growth of the city which falls under the pragmatic paradigm. The strategy adapted is a case study strategy as the study tries to find how the new cities of Kathmandu Valley are growing but has chosen a single city i.e., Kageshwori Manohara municipality for the study. The research explored the pattern of city growth around the world and also studied the theories of urban growth to establish a relation between actual growth scenario of study area with the desired growth pattern of a city as suggested by theories. Thus, deductive logic system was adapted.

The type of data required to study the pattern of urban growth were collected from literature review. It required both quantitative as well as qualitative data and analysis methods. A good set of documents were obtained from municipality which mostly generated quantitative data. Researcher's observation was congregated during the site visits in photographs. A list of key informants was made and interview conducted to further know about the study area. In addition to this, questionnaire survey was also done to understand the people's perception on urban facilities that are expected from any city.

5. Study Area

Kageshwori Manohara municipality, situated in the Northern part of Kathmandu valley in Bagmati Province, is one of the 13 newly declared municipalities in Kathmandu district. The Municipality is surrounded by Gokarneshwor Municipality in the West, Sindhupalchowk District in North, Shankharapur municipality and Bhaktapur District in the East and Kathmandu Metropolitan City in the South.

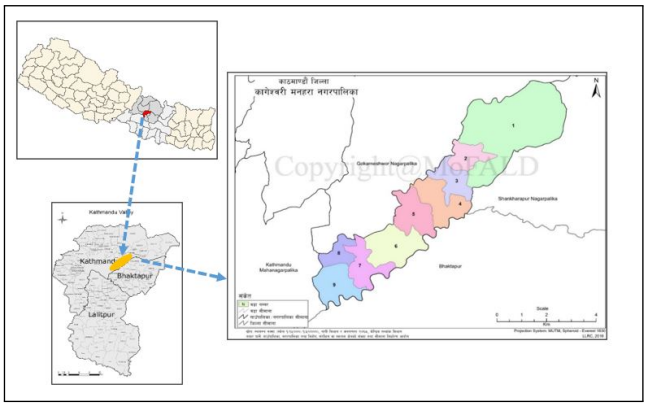

Figure 1: Location Map of Kageshwori Manohara

Administratively divided into 9 wards (Wards 1 to 9 in ascending order from North to South), Kageshwori Manohara was declared as municipality in 2nd December, 2014. It has population of 1, 02, 265 with 26,166 households according to Household Survey 2019. The growth rate of population is found to be 5 percent per annum in the period of 2011 to 2019

(Municipal Profile and Household Survey, 2019).

6. Results and Analysis

6.1 Land Use

It is learned from the history and literature of city growth that with the increase in urbanization rate, land use also changes. The open and agricultural land gets changed into buildings and urban structures with growth of the city. The similar phenomenon can be noticed in Kageshwori Manohara municipality.

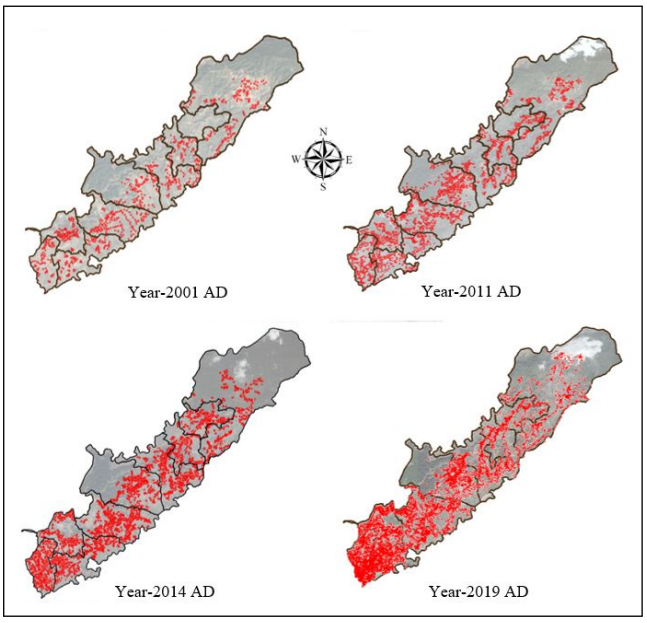

Figure 2: Increase in Built-up Areas in last two decades

The comparative study of satellite images of Kageshwori Manohara in different years of last two decades reveal the fact that Kageshwori Manohara is a growing city. The number of households increased from 6,351 in 2001 AD [6] to 14,329 households in 2011 AD [7]. At present, as per Household Survey, 2019, the number of households has reached 26,166. The growth of kageshwori Manohara is further justified by the increasing built-up area and decreasing agricultural land as demonstrated in the figures below.

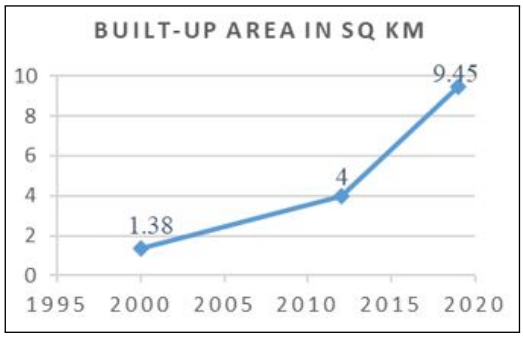

Figure 3: Total Built-Up Area in 2000,2012 and 2019

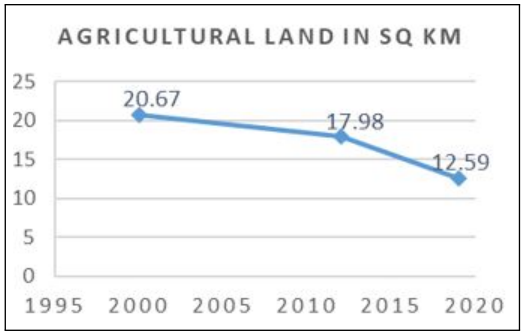

Figure 4: Total Agricultural Area in 2000,2012 and 2019

The total built up area of the Municipality has increased from 1.38 sq.km. in 2000 to 4 sq.km. in 2012. It increased by 300 percent in the time period of twelve years. The increment continued and reached to 9.45 sq.km. Between 2012 to 2019, the Built up increased by 225 percent. Meanwhile, the agricultural land has been decreasing. The municipality had 20.67 square kilometers of agricultural land in 2000 which accounts to 75 percent of the total land area. It decreased to 17.98 sq.km. in 2012 accounting to total 13 percent decrement in agricultural land and again decreased by 30 percent in between 2012 to 2019 and has reached to the area of 12.59 sq.km. in 2019. A sparse settlement can be noticed in 2001 AD all over the Kageshwori Manohara. By 2011, an uneven urbanization can be noticed feebly with denser settlements in the southern wards (6,7,8 and 9 wards) of the municipality. After declaration of municipality in 2014 AD, the urban growth is seen to be increased tremendously and by 2019 AD, the southern areas have urbanized to a much larger extent as obtained from the satellite imageries. The type of settlement growth is varying from North to South. More urban growth is seen in the Southern Wards i.e., wards 6, 7, 8 and 9. Towards South, the intensification of buildings is seen quite noticeably whereas the middle

areas of the municipality are both intensifying as well as dispersed buildings are noticed to be emerging. The North-most areas depict new kinds of slow growth of buildings. The wards 7 and 9 that are close to Kathmandu Metropolitan City are seen to be mostly intensifying. The southern areas of Kageshwori Manohara shares its boundary with the largest economic center of the country, Kathmandu. The study of land use and urban growth gives the impression of influential growth in the areas with the proximity to Kathmandu city.

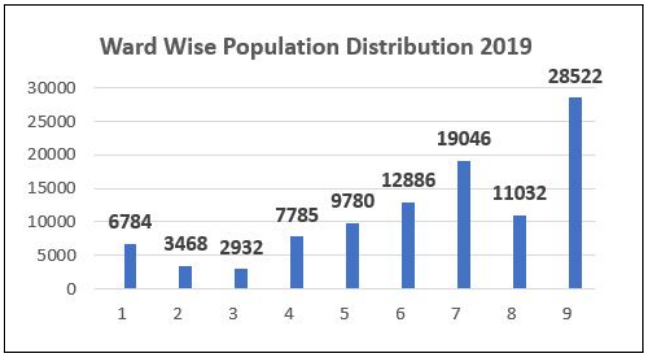

Figure 6: Ward Wise Population Distribution in 2019

6.2 Demography

Population Growth

The increase in population within a designated area is one of the best indicators of urban growth. The number of populations has increased from 31,144 in 2001 with the rate of 6 percent increment per annum to 60, 237 in 2011 as per Municipal Profile and the current population of the Municipality is 1,02, 235 as per Household Survey of 2019. In the last 8 years, population has increased with the rate of 5 percent per annum.

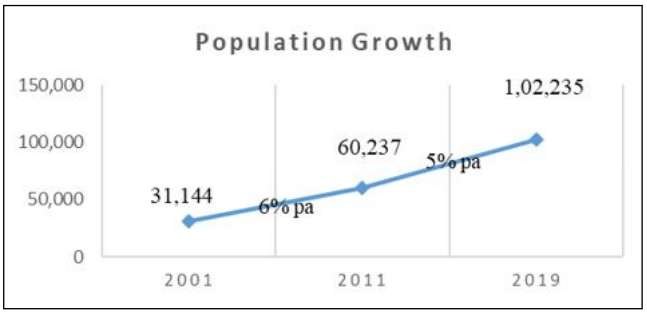

Figure 5: Population Growth of Kageshwori Manohara

Population Distribution

Similarly, the distribution of population is not even inside the municipality. Ward 9 has the highest population of 28,522 which is around 28 percent of the total population in 2019 while ward 3 has least population of 2932 which is only 2 percent of the total population. Thus, it is evident from the data that population is higher to the Southern Wards (6,7,8,9) than the Northern Wards (1 to 5).

Population Density

The data shows that Ward 9 not only has the highest number of population but also highest density with 194.86 People Per Hectare (PPH) which is almost five times higher than the average population density of the municipality, 37.36 PPH. It is followed by ward 7 and 8 in population density. The 500 units high rise apartment located at Ward 9 has also contributed in the high density of the ward.

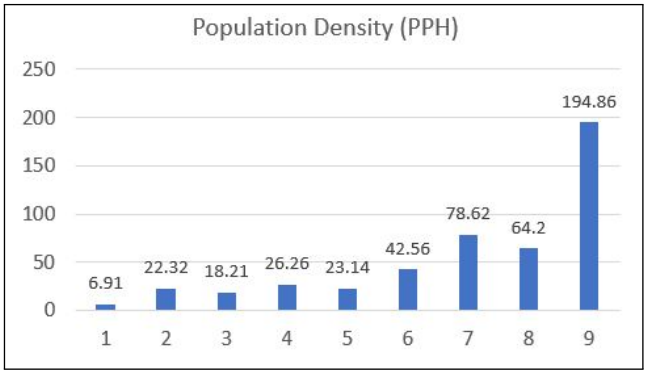

Figure 7: Ward Wise Population Density in 2019

Migration

The migration has social, economic and political impacts on a city. One of the important parts of sustainable growth thus is the maintenance of societal harmony among the local and migrated residents. Coping with migration-based growth comes with its own challenges and opportunities.

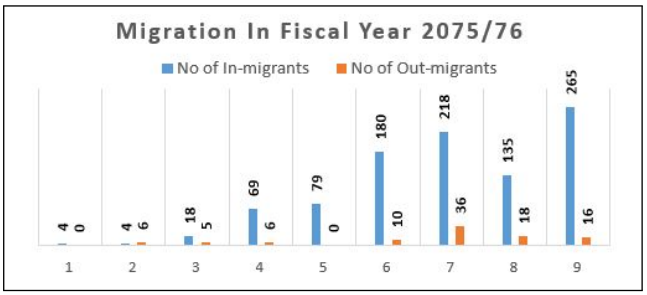

Figure 8: Ward Wise Migration in FY 2075/76

The in-migration of the municipality is concentrated among Southern wards. In the Fiscal year 2075/76, ward 9 alone accommodated 27 percent of total in-migrations followed by ward 7 which accommodated around 25 percent of the total in-migrations. The data on ward wise in-migration reveals the fact that the wards to the South of municipality and closer to Kathmandu is attracting a lot of people. The location next to a larger economic hub might be opportunity for migrants in those areas.

6.3 New Construction

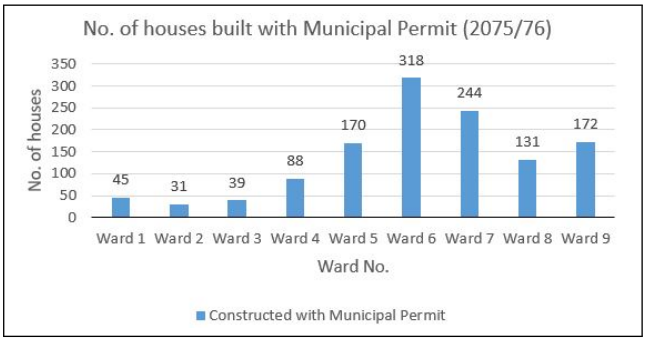

Figure 9: Building Permit issued in the FY 2075/76

Along with the migration concentrated towards the South of the city, new construction of fiscal year 2075/76 also showed the most of the total new construction taking place in the wards 6, 7,8 and 9 of Kageshowori Manohara.

6.4 Mobility

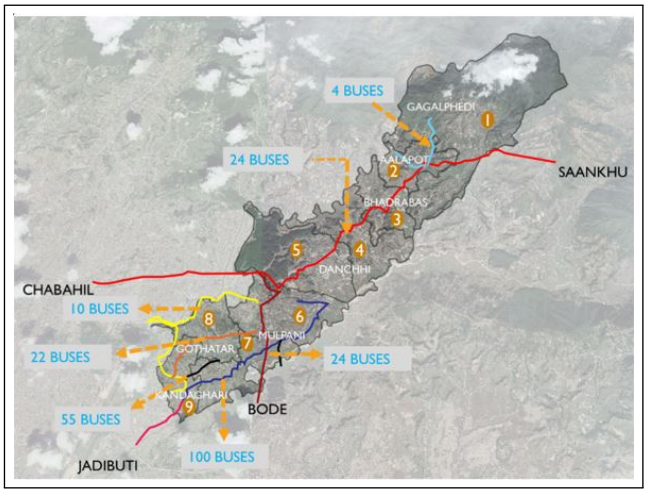

Figure 10: Public Transportation Routes in different areas of municipality

The figure above is the mapping of different public transportation routes and number of vehicles operating each day in the routes. A larger number of vehicles are seemed to be operating in the Southern Wards. Only 28 buses run to provide linkage to Wards 2, 3, 4 and 5 out of which only 4 buses reach Ward 1. On the other hand, almost 215 buses run linking Wards 6,7,8 and 9 with Kathmandu and Bhaktapur on a daily basis. The transportation routes are well connected with almost 7 times more vehicles operating in the Southern Wards of Kageshwori Manohara.

The questionnaire survey conducted among residents suggested that almost 60 percent of the people travel to Kathmandu on a daily basis for work, almost 50 percent people go to Kathmandu for shopping and 100 percent people prefer to go to Kathmandu for health services. This mobility pattern connected to Kathmandu gives the impression of Kageshwori Manohara not only growing due to the growth of Kathmandu but also dependent upon it for a larger portion of urban services.

Findings

There are various causes of urban growth. Natural increase in population, migration, industrialization, commercialization, advancement of transportation and communication, availability of educational and recreational facilities are some of the factors to name a few causes of urban growth. Another important nature of urban growth as seen is the development of

peri-urban areas around major city center. The development of a CBD influences development of several supporting services at a farther distance from its center. Closeness to major infrastructures plays a crucial role in a locality's development [8]. Kageshwori Manohara is one of the 13 newly formed municipalities of Kathmandu Valley. The valley with its major cities like Kathmandu, Lalitpur and Bhaktapur is prime economic center of the Nation. In the period between 2002 to 2012, Valley's population grew by 61.2 percent as [9] causing the subsequent expansion of the built-up area to the peripheral landscapes. The total built up area of Kathmandu Valley in 1989 was 5 percent which has increased to 26 percent by 2016 [9]. It is seen to be expanding rapidly outwards after 2009. Till 2016, the intensification at center and spread outwards both can be seen. Few decades back Kageshwori Manohara was a rural area close to major cities and facing urbanization in the areas sharing proximity to the major cities. This entire process of rural-urban transformation can be better understood via study of satellite images and supporting data that has been discussed in the paper earlier. Kageshwori Manohara lies at the North Eastern periphery of the Valley sharing its boundaries with two existing urban centers Kathmandu and Thimi. However, the access roads and transportation network is well established with Kathmandu as compared to that of Thimi. The previously discussed data on population distribution and migration trend showed higher urbanization rate in the Wards 6,7,8 and 9. Because Wards 8 and 9 shared their boundary with Kathmandu but felt outside the municipal jurisdiction before 2014, it is quite clear that it attracted developmental growth. According to the study of 499 cities conducted by World Resources Institute, most of the South Asian cities exhibit outward growth rather than upward growth. Kathmandu being the capital and major urban and economic center of the country, it is entirely normal for the city to grow and expand. The Oxford dictionary of Architecture defines satellite town as "Towns that are self-contained and limited in size, built in the vicinity of a large town or city to house and employ those who would otherwise create a demand for expansion of the existing settlement, but dependent on the parent-city for population and major services." On that regard, Kageshwori Manohara can be understood as a satellite city of Kathmandu as the growth trend shows major dominance in the areas sharing boundaries with Kathmandu city, which is a growing city in itself.

Conclusion

Though established as an independent municipal corporation, the growth of Kageshwori Manohara demonstrate its high level of dependency with the growth of Kathmandu Metropolitan City. Kageshwori Manohara is undergoing organic influential urbanization. While it is natural for a larger city to influence growth in its peripheral areas, Kageshwori Manohara needs its own internal assessment and development plans in order to develop it as a self sustaining city in the long run.

Acknowledgments

The authors are grateful to all the helpful staff personalities of Kageshowori Manohara municipality who have assisted in providing the various related documents and data. An immense thanks to the residents of municipality who spared their time for the survey.

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ANNEX C: SAMPLE OF QUESTIONS IN QUESTIONNAIRE SURVEY

Study on Mobility pattern of people living in Kageshwori Manohara Municipality

This data obtained from this study will be used for the THESIS presentation at IOE, Pulchowk Campus. The questions asked here is non-invasive.

1. In which ward of Kageshwori Manohara do you live?

   ……

2. Do you own a house on rent?
   a. Own
   b. Rent
   c. Others
3. Do you commute to a certain workplace on a regular basis?
   a. Yes
   b. No
4. If the ans on question 3 is yes, where do you travel?
   a. Inside Kageswori Manohara Municipality
   b. Kathmandu
   c. Bhaktapur
   d. Lalitpur
   e. Others……
5. What distance do you travel?
   a. 0-5 km
   b. 5-10 km
   c. 10-15 km
   d. More than 15 km

6. How much time do you spend on communting?
    a. Up to 30 minutes
    b. 30 mins- 1 hour
    c. 1-1.5 hours
    d. More than 1.5 hours
7. Where do you face the longest traffic jam on your way?

    …….
8. How do you commute to your work?
    a. Public vehicle
    b. Own two-wheeler
    c. Own Four-wheeler
    d. Institutional vehicles
    e. Others…….
9. Where do you go for shopping?
    a. Nearby shops
    b. Kathmandu
    c. Bhaktapur
    d. Others……..
10. Where do you go for health facilities?
    a. Within Kageswori Manohara Municipality
    b. Kathmandu
    c. Bhaktapur
    d. Others…….

11. Where do you go for entertainment purposes?
    a. Within Kageswori Manohara Municipality
    b. Kathmandu
    c. Bhaktapur
    d. Others…….
12. Where do you or your family member go for educational services?
    a. Within Kageswori Manohara Municipality
    b. Kathmandu
    c. Bhaktapur
    d. Others…….
13. What is the price of land per anna in your locality?

    …….

ANNEX D: THEMATIC MAPS OF KAGESHWORI MANOHARA MUNICIPALITY

GOVERNMENT OF NEPAL
MINISTRY OF URBAN DEVELOPMENT
DEPARTMENT OF URBAN DEVELOPMENT AND
BUILDING CONSTRUCTION

Field Report Map of
Kageshwori Manohara Municipality

Kathmandu, Nepal

Project

Integrated Urban Development Plan of 14 Municipalities

(Package:DUDBC/CS/QCBS-11-074-75)

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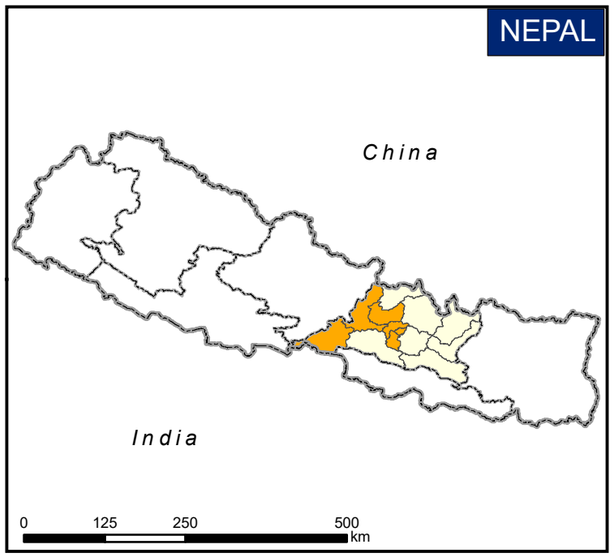
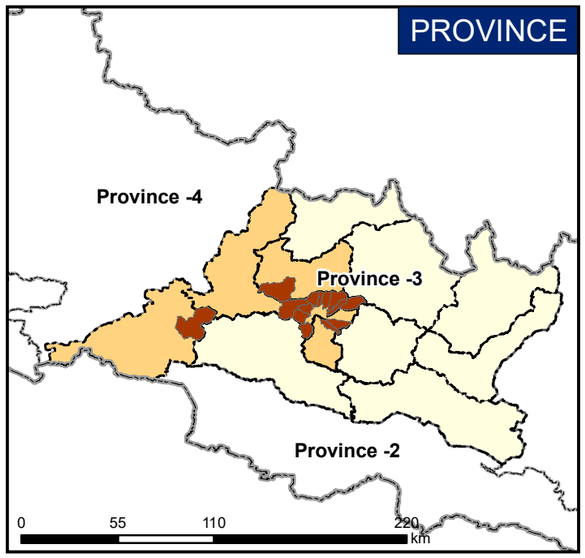
NEST PVT.LTD.
GeoCom International Pvt.Ltd
JV

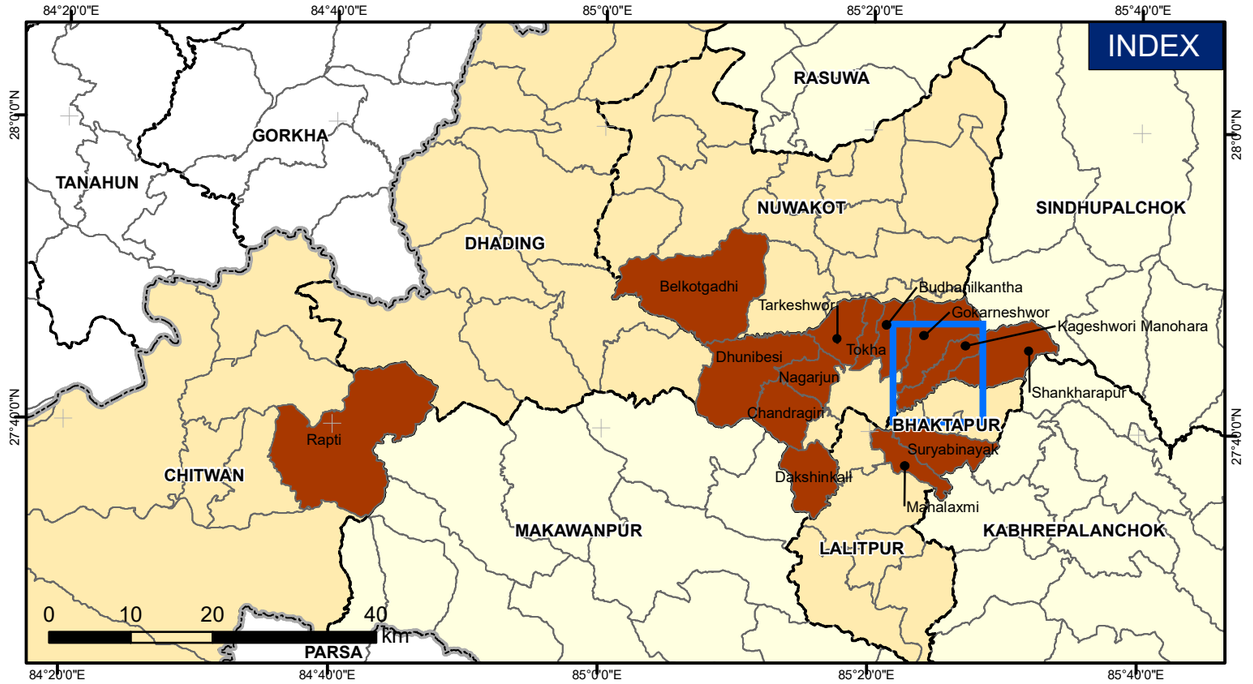
April 2019

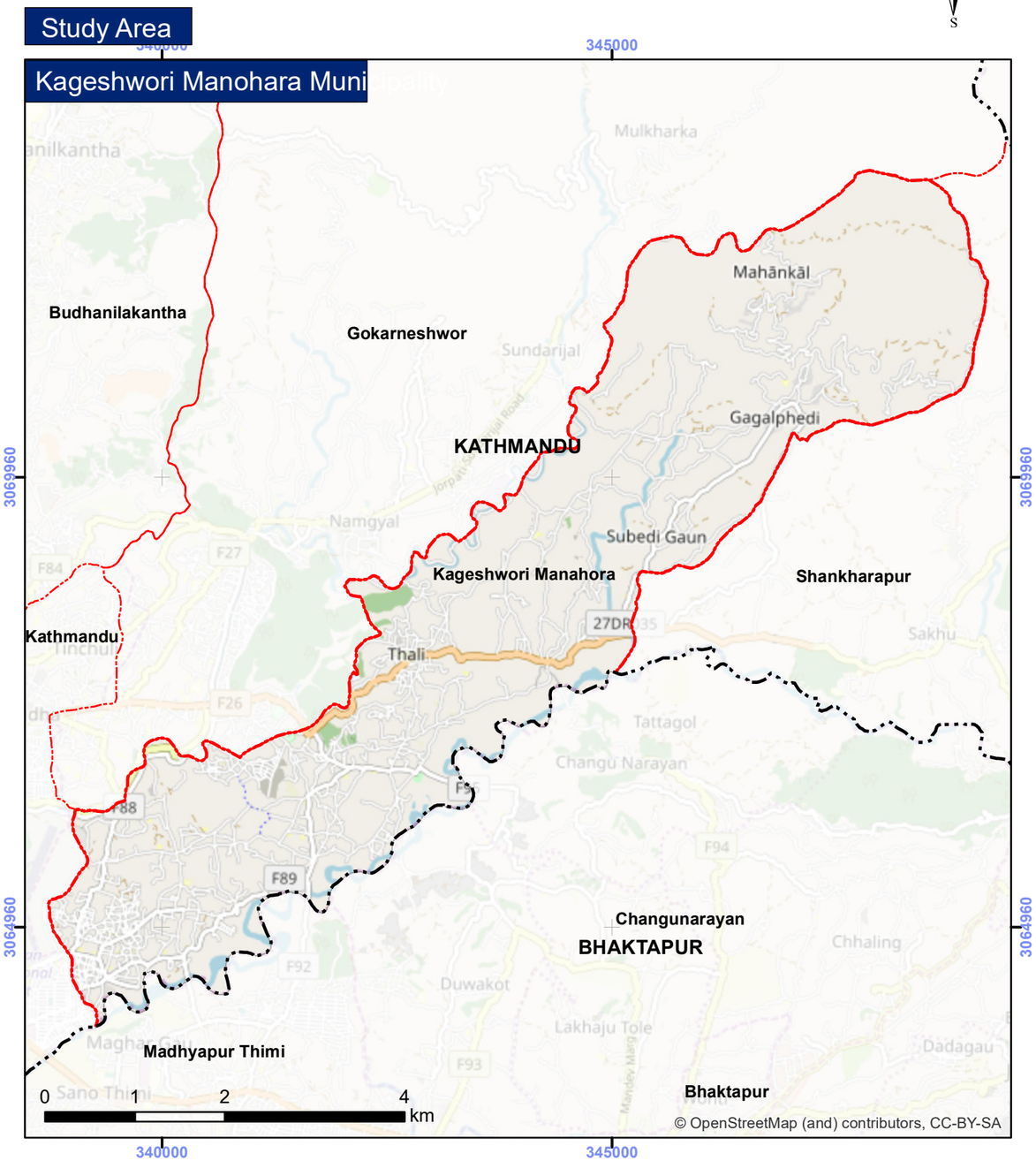
Map No: 1

LOCATION MAP









Legend

- International Boundary
- Province Boundary
- District Boundary
- Municipality Boundary
- Ward Boundary

Source:

- Administrative Boundary: Department of Survey

Note:

- This project is under Department of Urban Development and Building Construction. The index frame in current map shows 14 municipalities under this project package, out of which 9 Municipalites lies in kathmandu, 1 in Bhaktapur, 1 in Lalitpur, 1 in Nuwakot, 1 in Dhading and 1 in Chitwan District. The Study area frame in current Map shows one municipality out of these 14 municipalities.

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

[Integrated Urban Development Plan of 14 Municipalities]

Package:DUDBC/CS/QCBS-11-074-75

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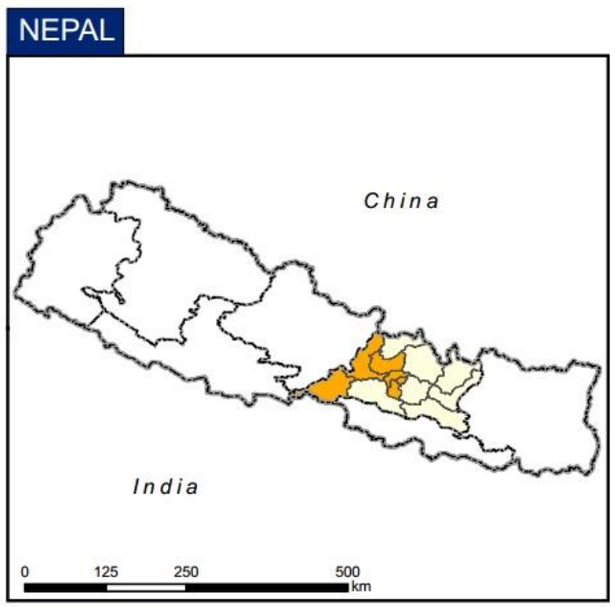
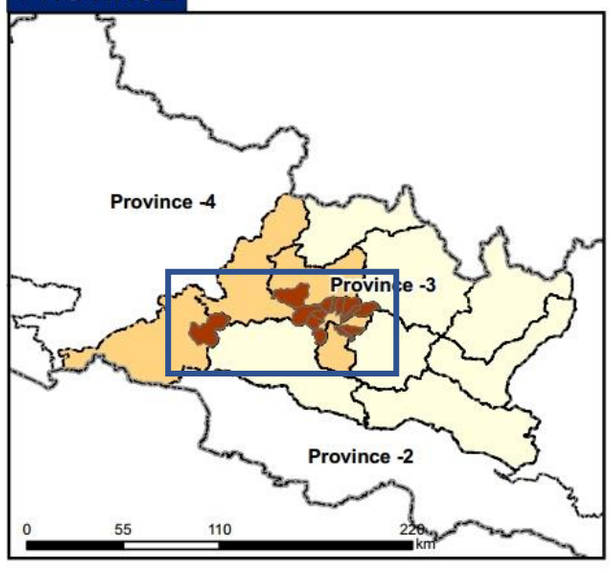
GeoCom International Pvt.Ltd

Department of Urban Development and Building Construction
Babarmahal, Kathmandu

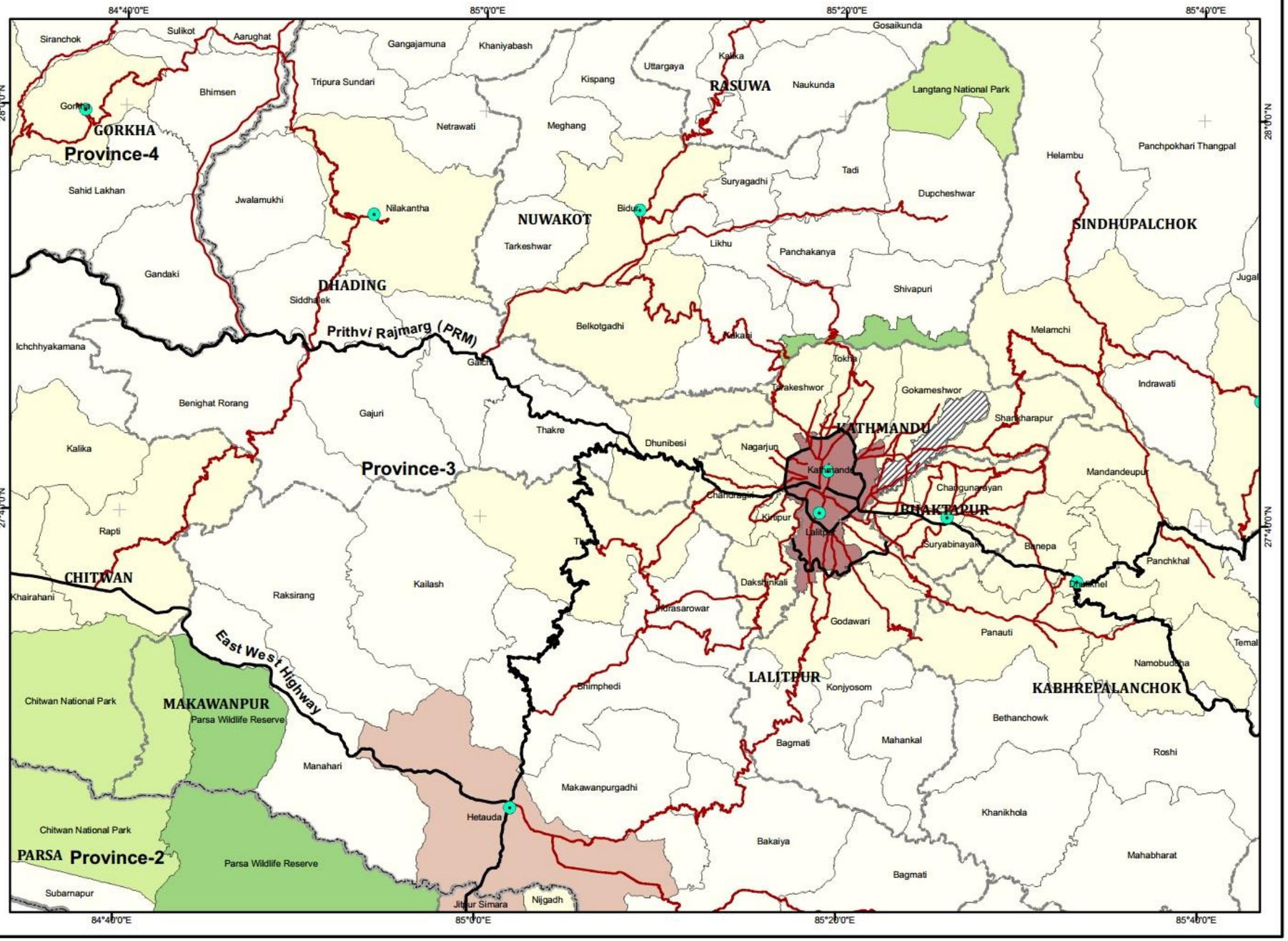
Map No: 2

Regional Linkage Map





This Map Frame highlights 14 Municipalities under this project package



Legend

- International Boundary
- Province Boundary
- District Boundary
- Local Bodies Boundary
- District Headquarters

Source:

- Administrative Boundary: Department of Survey
- Road Network: Department of Road

Local Bodies

- Metropolitan City
- Sub-Metropolitan City
- Municipality
- Rural Municipality
- National Park
- Wildlife Reserve

Road Network

- National Highway
- Feeder Road

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

[Integrated Urban Development Plan of 14 Municipalities]

Package:DUDBC/CS/QCBS-11-074-75

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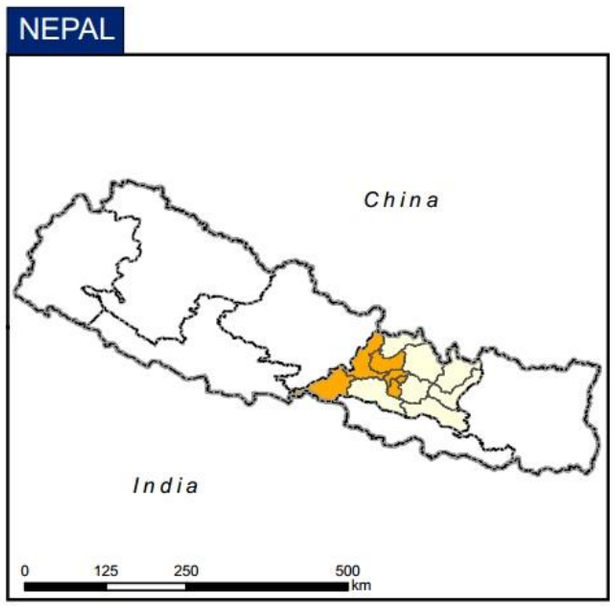
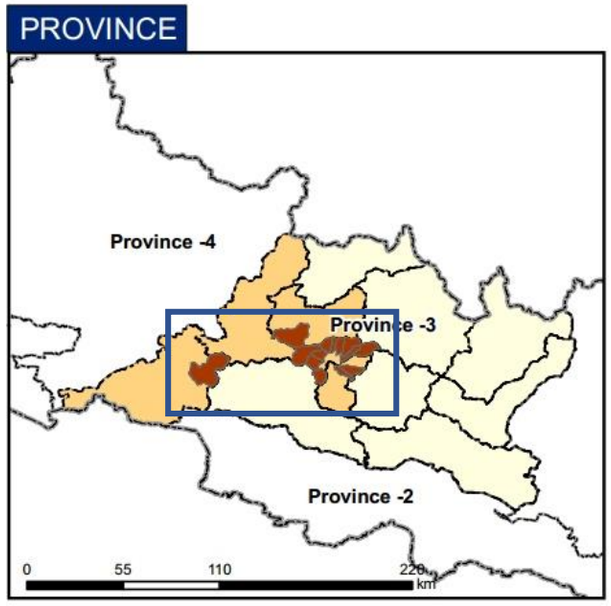
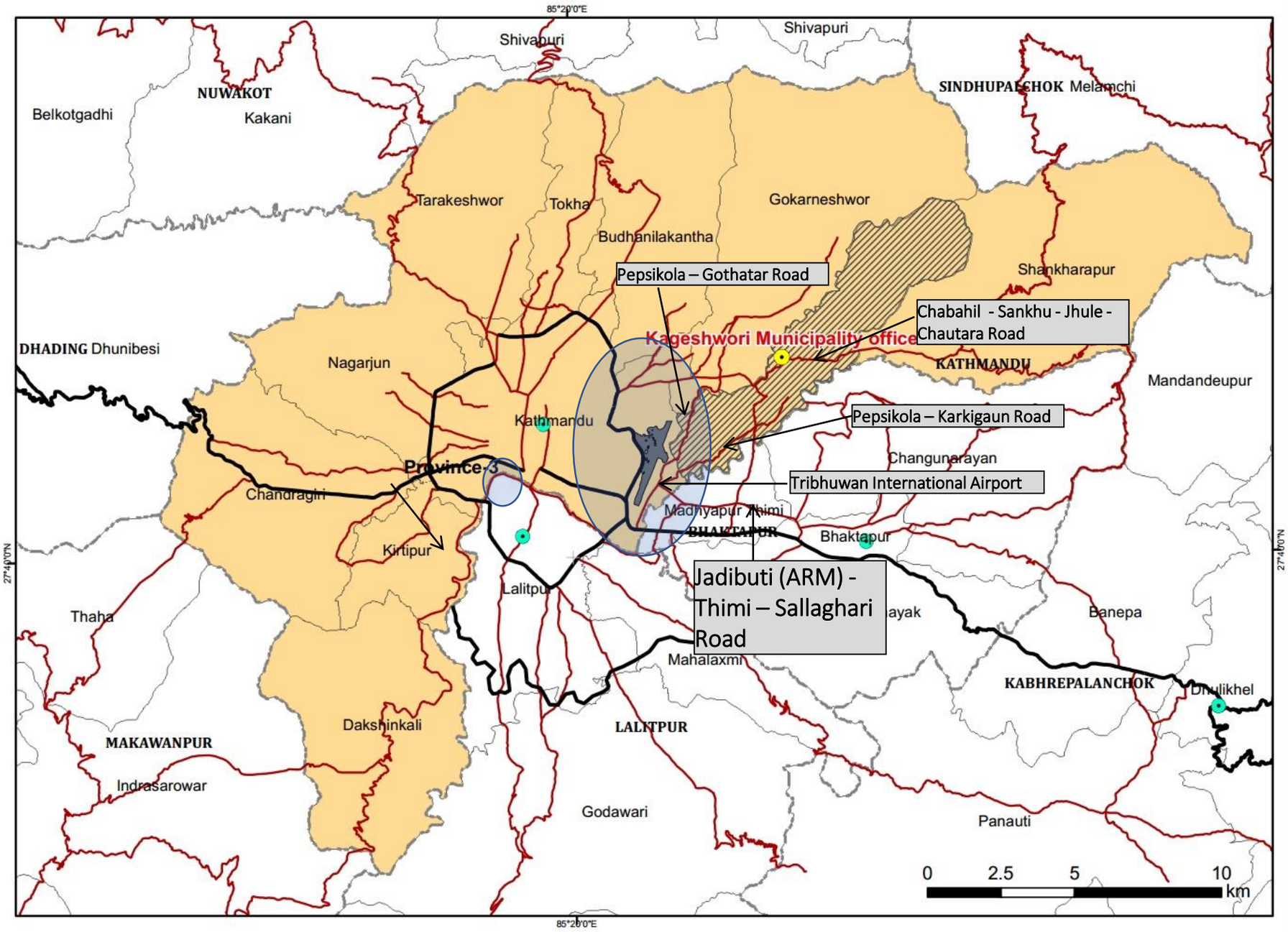
Map No: 3

Hinterland Map





This Map Frame highlights 14 Municipalities under this project package



Legend

- International Boundary
- Province Boundary
- District Boundary
- Local Bodies Boundary
- District Headquarters
- Municipality Office
- KATHMANDU
- Tribhuwan International Airport
- **Road Network**
  - National Highway
  - Feeder Road

Source:

- Administrative Boundary: Department of Survey
- Road Network: Department of Road

[Integrated Urban Development Plan of 14 Municipalities]

Package:DUDBC/CS/QCBS-11-074-75

WGS_1984_UTM_zone_45N

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false_northing: 0.0
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Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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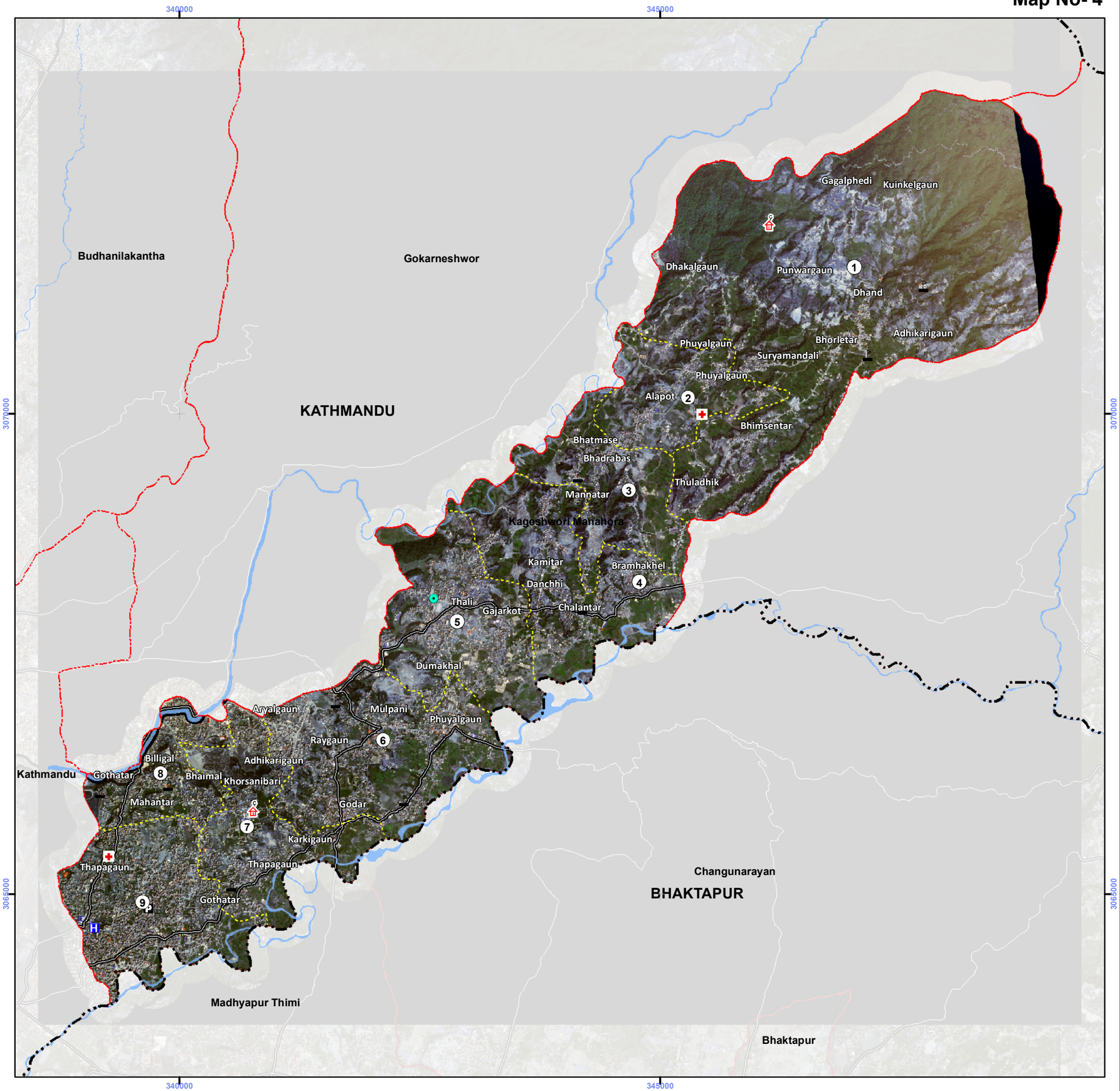
Babarmahal, Kathmandu

Map No- 4



Satellite Image

Kageshwori Manohara Municipality

[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

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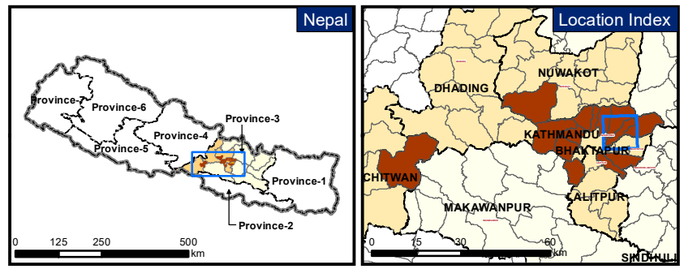

Legend

Administrative	
District Boundary	Other Municipality Boundary
Municipalities Boundary (under this Project Package)	Ward Boundary
(5) Ward Number	• Locations

Landmarks		
Hospital	School	Temple
Health Post	Municipality Office	Police Station

Road Network	Satellite Imagery Specification
National Highway Feeder Road Strategic Urban Road	Satellite Image: Digital Globe_Worldview-4 Archive Date:3/3/2018 Resolution: 0.5m • Image Type: Panchromatic(0.5m) + 4 Band Multispectral Bundle(2m) • Image used for Base Map: Pansharpened Image- 0.5m resolution • Software: Arc GIS for Base Map , Erdas Imagine for Image processing

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Satellite Image: Digital Globe_worldview-4

WGS_1984_UTM_zone_45N

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Geographic Coordinate System: GCS_WGS_1984
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Semiminor Axis: 6356752.314245179

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Map No- 5

Elevation Model

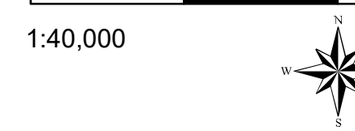
Kageshwori Manohara Municipality

[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000



Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary (under this Project Package)
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Digital Elevation Model

High : 2269.99

Low : 1295.51

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- DEM: Project Team

WGS_1984_UTM_zone_45N

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Semiminor Axis: 6356752.314245179

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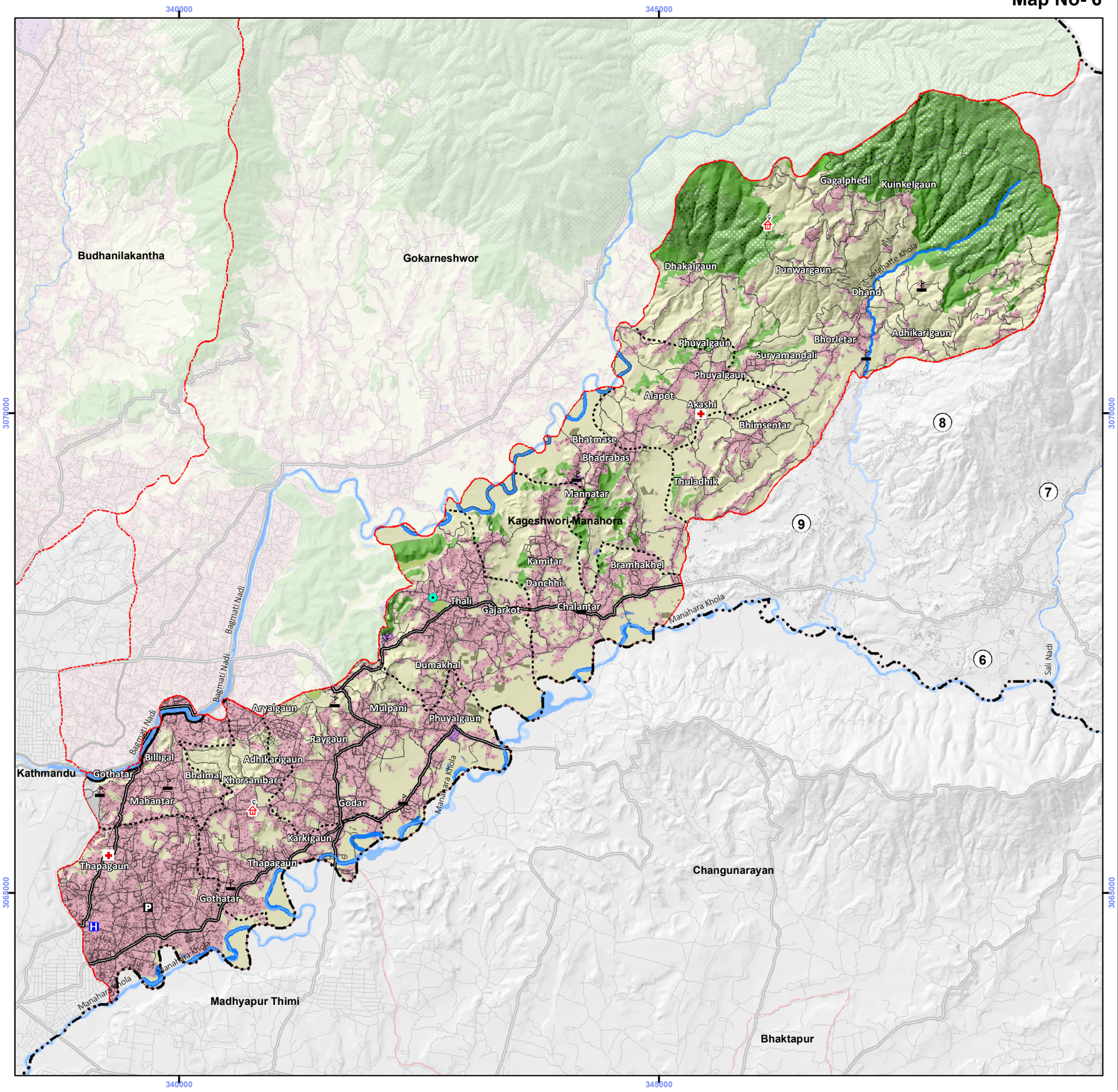
Map No- 6



Landuse Map

Kageshwori Manohara Municipality

[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

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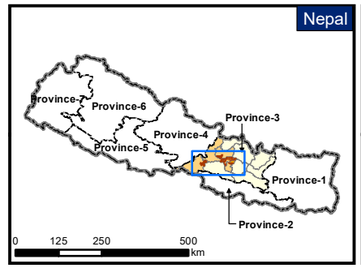

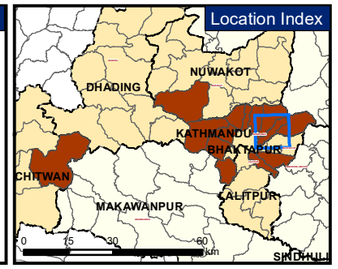

Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Health Post
- School
- Municipality Office
- Temple
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Existing Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational/Openspace
- Others

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Project Team

WGS_1984_UTM_zone_45N

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Geographic Coordinate System: GCS_WGS_1984
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Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 7

Population Density

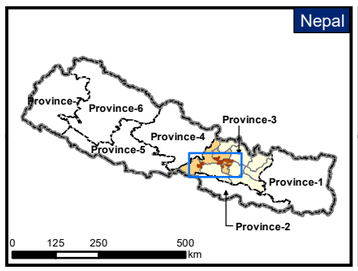
Kageshwori Manohara Municipality

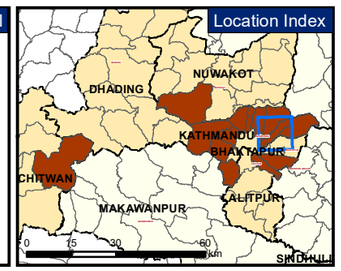
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary (under this Project Package)
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Population Density(PPH)

- 0-12.5
- 12.5-25
- 25-50
- 50-75
- 75-100
- >100
- Building Footprint

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Population: CBS 2011

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

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Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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GeoCom International Pvt.Ltd

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Babarmahal, Kathmandu

Note:
-Area of Ward is taken after deducting restricted areas for development like forest, bushes and waterbodies.

Map No- 7-a

Population Distribution

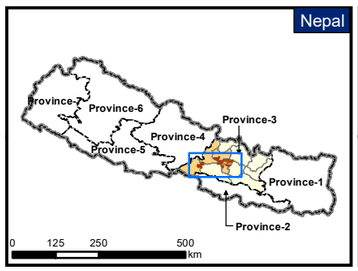
Kageshwori Manohara Municipality

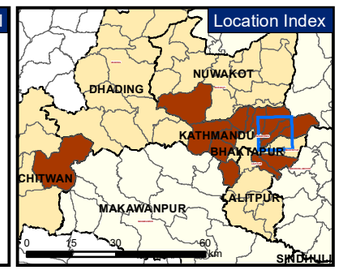
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary *(under this Project Package)*
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Population Distribution

- Male Population
- Female Population

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Population: CBS 2011

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Babarmahal, Kathmandu

Map No- 8

Health Facilities

Kageshwori Manohara Municipality

[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

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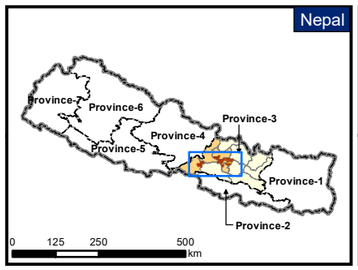

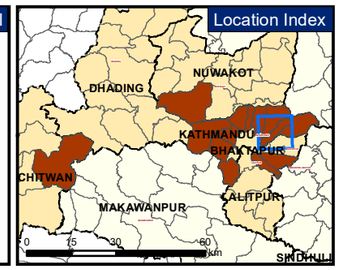

Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary (under this Project Package)
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- School
- Temple
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Landuse

- Agriculture
- Forest
- River
- Builtup
- Protected Area
- Pond
- Bush
- Institutional
- Recreational
- Others

Health Facilities

- Hospital
- Health post
- PHCC
- Clicnic

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Health facilities: Inventory Survey(Project Team)

WGS_1984_UTM_zone_45N

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latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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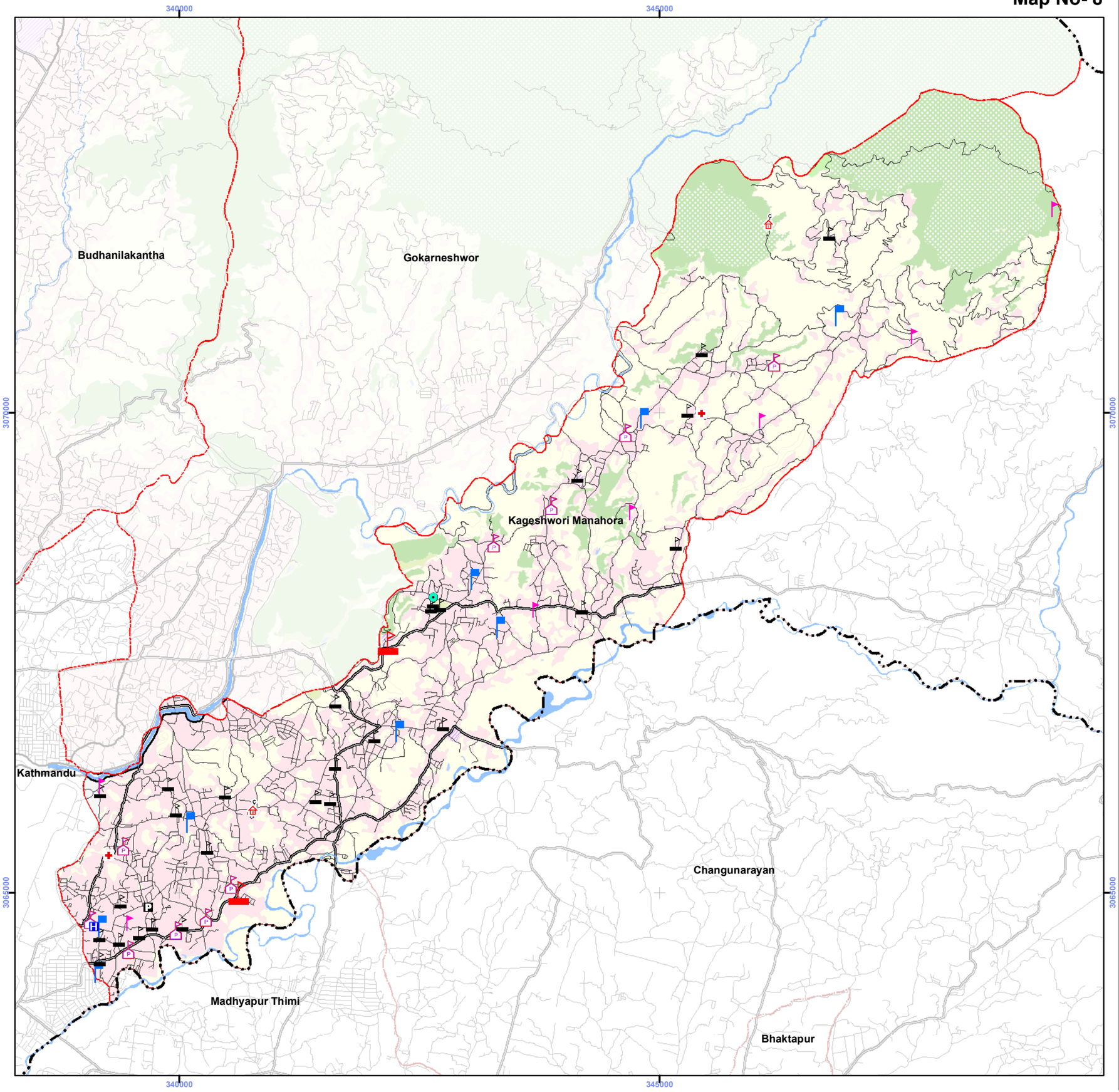
Budhanilakantha
Gokarneshwor
Kageshwori-Manahora
Changunarayan
Madhyapur Thimi
Bhaktapur
Kathmandu
Gagalphedi
Kuinkelgaun
Dhakalgaun
Punwargaun
Dhand
Adhikarigaun
Phuyalgaun
Gagalphedi Health Post
Suryamandali
Aalapot Health Post
Suryamandali
Health Post
Bhimsentar
Bhadrabas Health Post
Dithadanda
Thuladhik
Manatar
Kamitar
Bramhakhel
Danchi Sub Health Post
Thali
Gajurkot
Shalahtar
Dumakhal
Aryalgaun
Mulpani
Mulpani Primary Health Care Center
Raygaun
Billigal
Adhikarigaun
Gothatar
Bhaimol
Khorsanibari
Mahantar
Godar
Karkhanath
Gothatar Health Post
Thaibgaun
Health Facility
Gothatar Polyclinic and lab centre
Gandhi Samudayik Hospital
Shrijanshil Polyclinic
340000
345000
3070000
3065000

Map No- 8



Educational Institutions

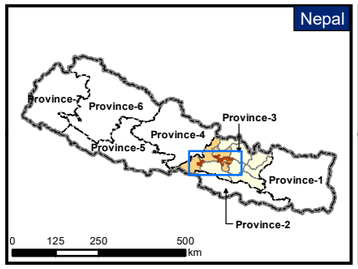
Kageshwori Manohara Municipality

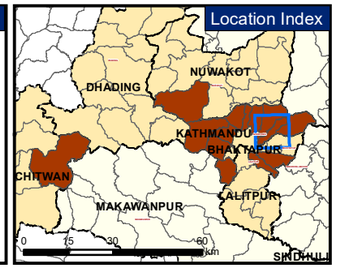
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Municipalities Boundary (under this Project Package)
- Ward Number (5)
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Healthpost
- Temple
- Police Station
- Municipality Office

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational
- Others

Educational Institutions

- College
- Higher Secondary School
- Secondary School
- Lower Secondary School
- Primary School

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Educational Institutions : Inventory Survey(Project Team)

WGS_1984_UTM_zone_45N

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Geographic Coordinate System: GCS_WGS_1984
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Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 10

Religious Places

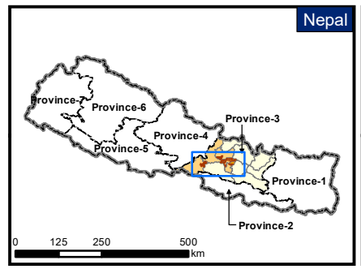
Kageshwori Manohara Municipality

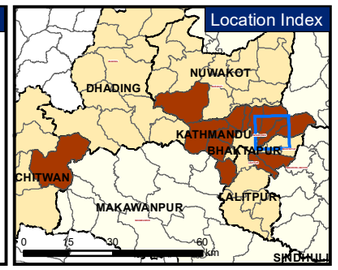
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary (under this Project Package)
- Ward Boundary
- Locations
- (5) Ward Number

Landmarks

- Hospital
- Municipality Office
- School
- Healthpost
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Landuse

- Agriculture
- Forest
- River
- Builtup
- Protected Area
- Pond
- Bush
- Institutional
- Recreational
- Others

Religious Places

- Temple
- Monastery
- Crematorium
- Stupa
- Church

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Religious Places: Inventory Survey(Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
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scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
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Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 11

Telecommunication Tower

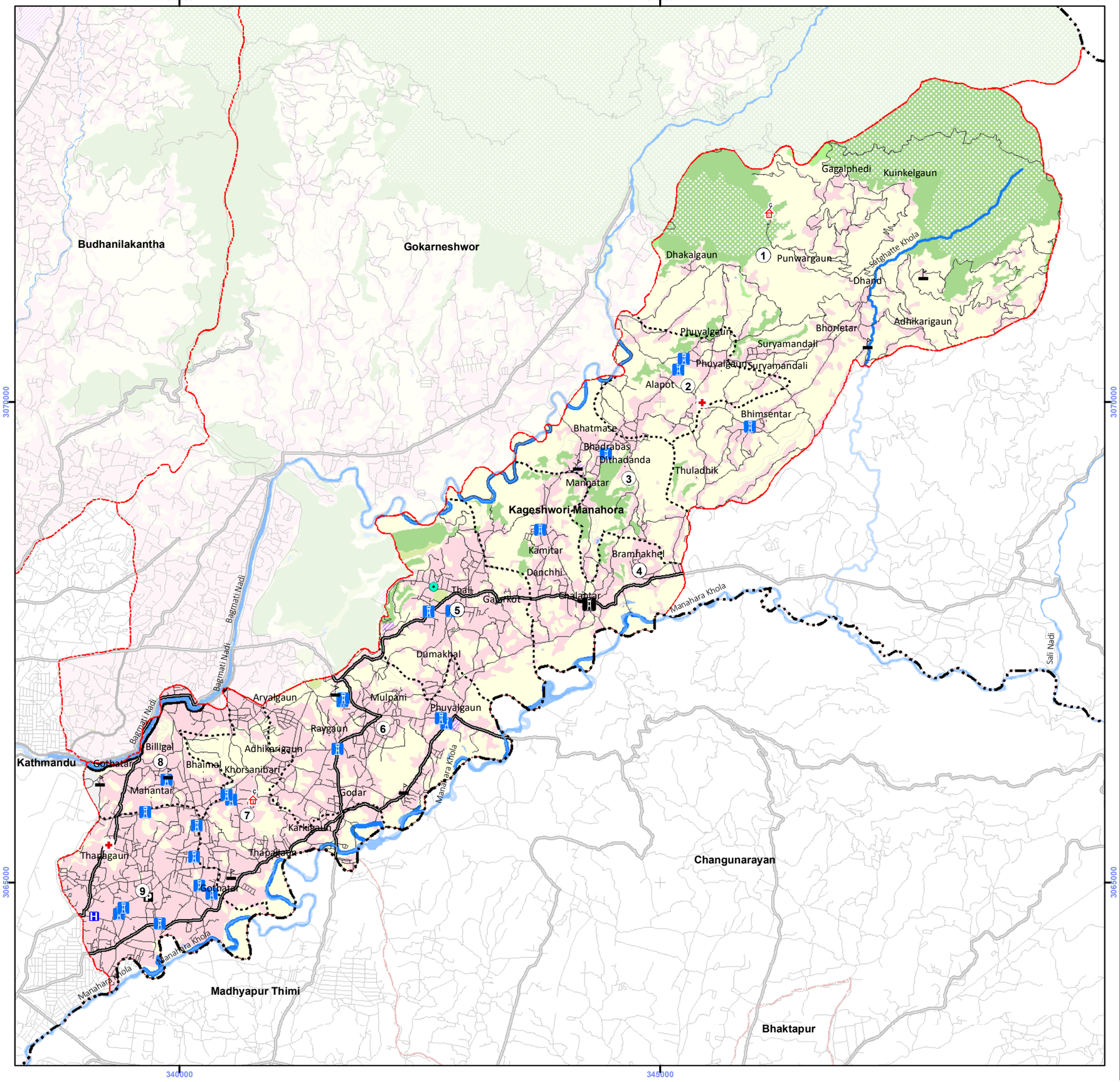
Kageshwori Manohara Municipality

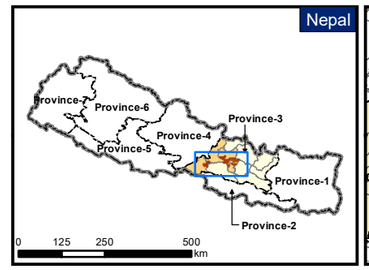
[Integrated Urban Development Plan of 14 Municipalities]

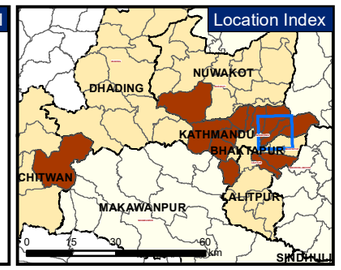
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000







Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Existing Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational
- Others

Telecommunication Tower

- Ground Based Tower
- Roof Top Tower

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Project Team
- Telecommunication Tower: JICA ERAKV

WGS_1984_UTM_zone_45N

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Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 12

Services and Facilities

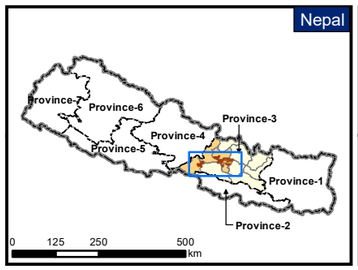
Kageshwori Manohara Municipality

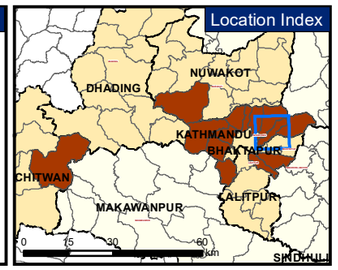
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational
- Others

Service and Facilities

- Petrol Pump
- Stupa
- Church
- Temple
- Monument
- Educational
- Clinic
- Health Post
- Hospital
- PHCC
- Large Scale Factory
- Small Scale Factory
- Government office
- Bus Station
- Community Service
- Park/Picnic Spot
- Stadium
- Police Station

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- -Landmarks: Inventory Survey(Project Team)
- Services & Facilities: Inventory Survey(Project Team)

WGS_1984_UTM_zone_45N

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false_northing: 0.0
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latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 14

Road Hierarchy Map

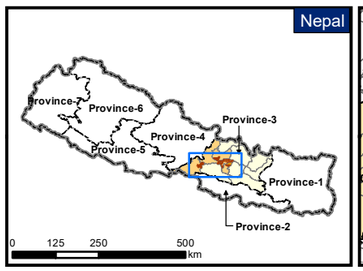
Kageshwori Manohara Municipality

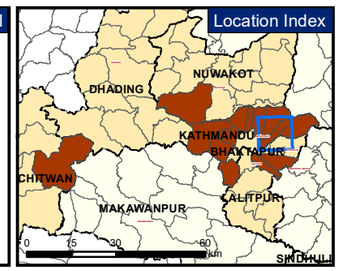
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Municipalities Boundary (under this Project Package)
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Hierarchy

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road
- Outer Ring Road Planned

Existing Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational
- Others

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)
- Road Hierarchy: DoR

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
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scale_factor:..... 0.9996
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Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
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Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 15

Road Width Classification

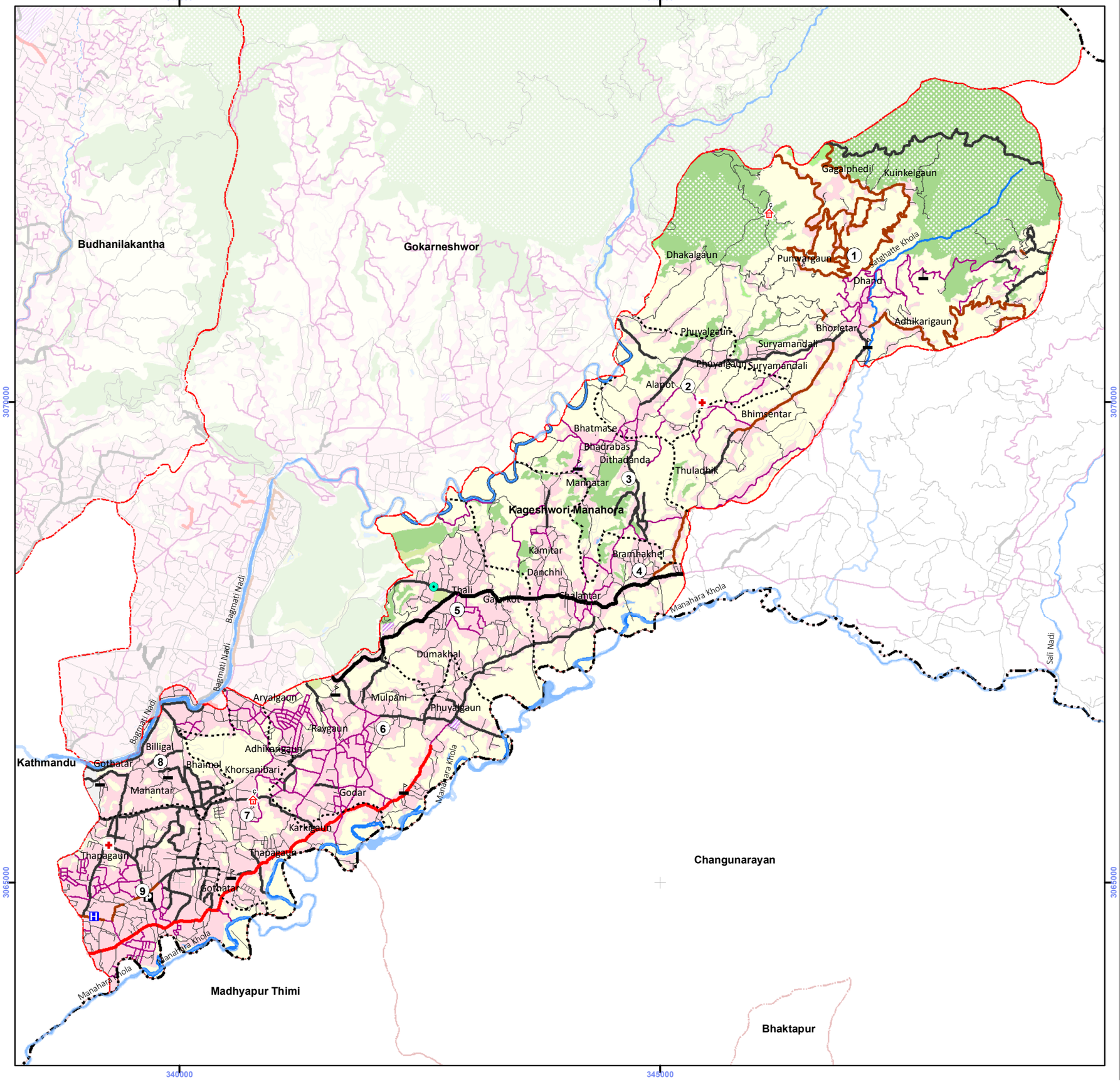
Kageshwori Manohara Municipality

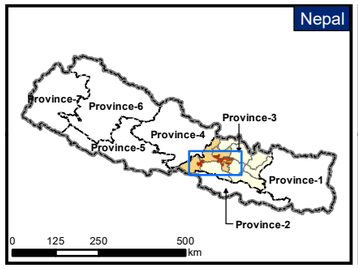
[Integrated Urban Development Plan of 14 Municipalities]

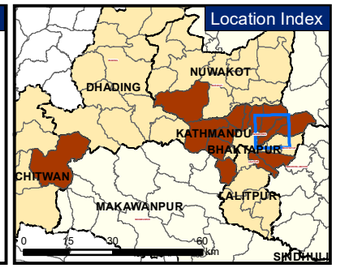
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000







Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Width (m)	Existing Landuse	
<4	Agriculture	Institutional
4-6	Builtup	River
6-8	Bush	Pond
8-10	Forest	Recreational
10-15	Protected Area	Others
15-20		

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)
- Road Width: Inventory Survey(Project Team)

WGS_1984_UTM_zone_45N

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Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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GeoCom International Pvt.Ltd

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Babarmahal, Kathmandu

Map No- 16

Road Surface

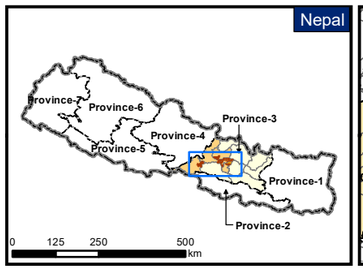
Kageshwori Manohara Municipality

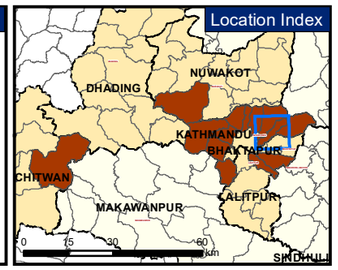
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary (under this Project Package)
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Surface

- Metalled
- Gravelled
- Brick paved/Stone Paved
- RCC/PCC
- Earthen
- Trails

Existing Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational
- Others

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)
- Road surface: Inventory Survey(Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
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scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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JV
GeoCom International Pvt.Ltd

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Babarmahal, Kathmandu

Map No- 17

Slope Analysis

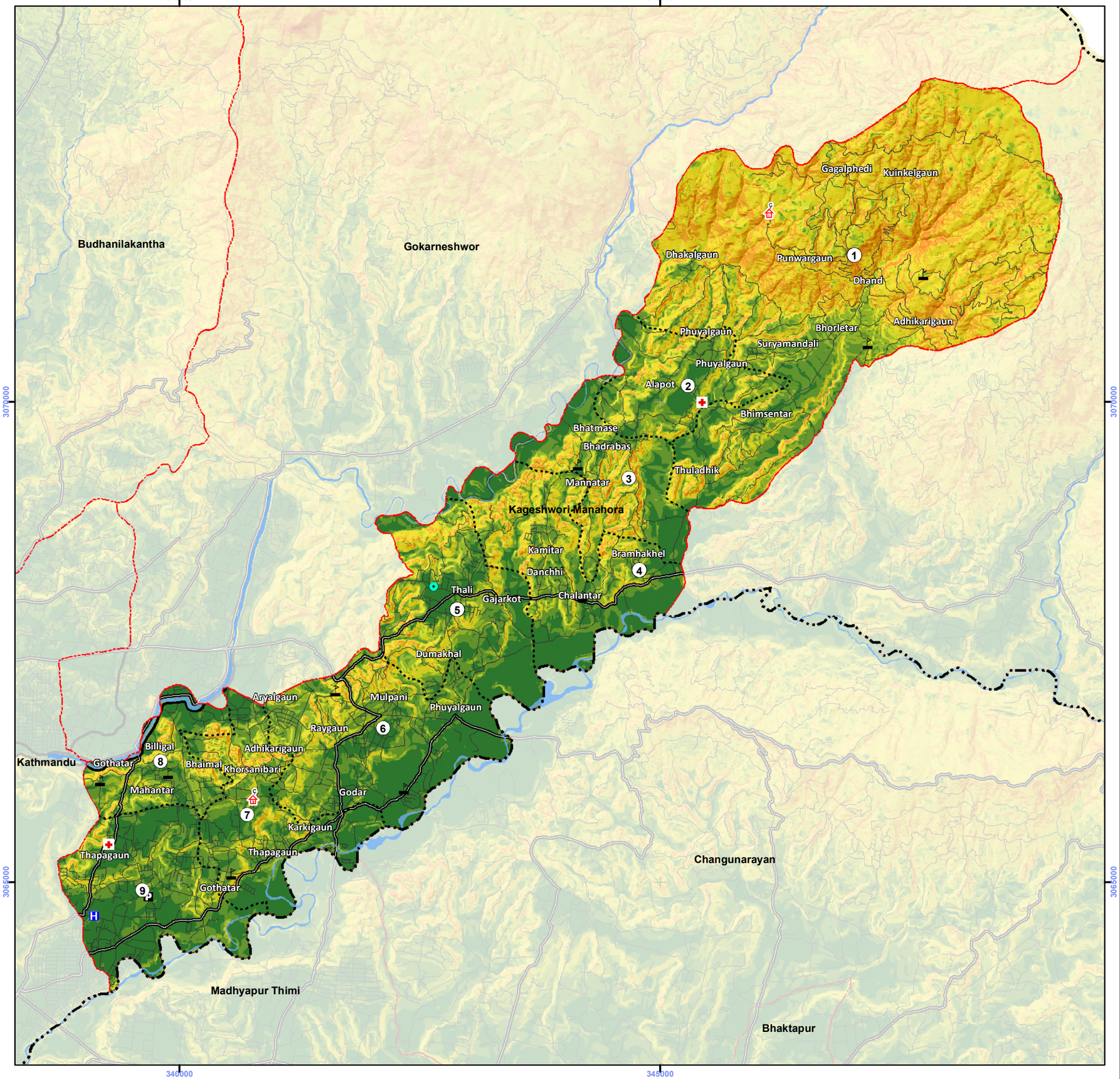
Kageshwori Manohara Municipality

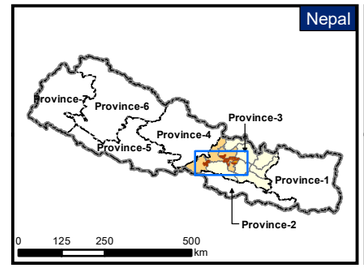
[Integrated Urban Development Plan of 14 Municipalities]

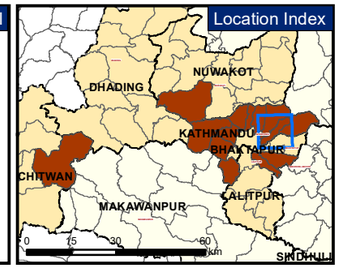
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000







Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Health Post
- School
- Municipality Office
- Temple
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Slope in Degree

0-2	15-30
2-5	30-45
5-10	45-60
10-15	>60

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)
- DEM: Project Team
- Slope Analysis: Project Team

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 17

Aspect Map

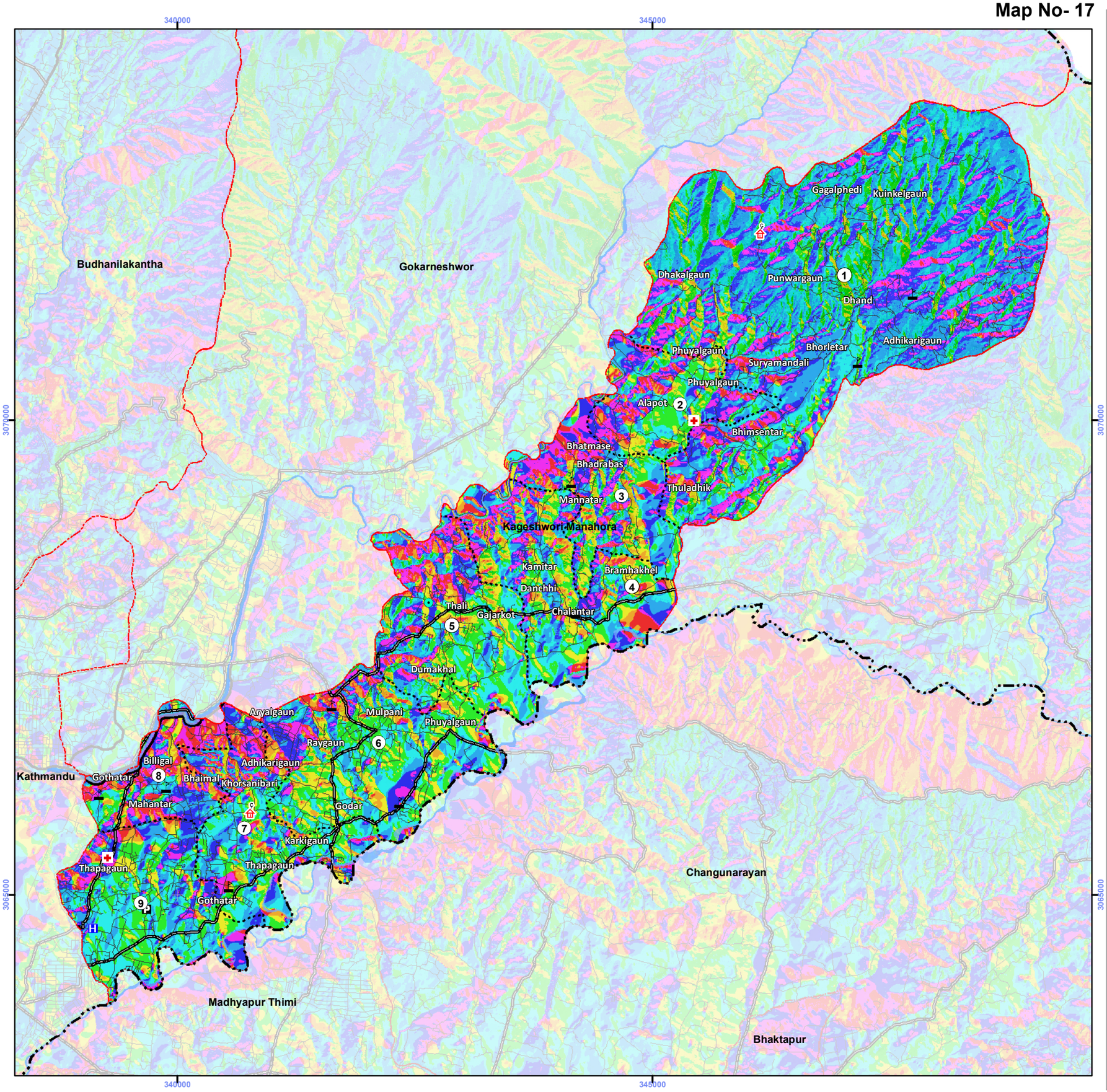
Kageshwori Manohara Municipality

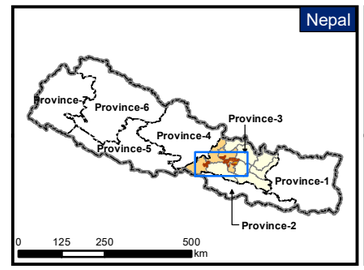
[Integrated Urban Development Plan of 14 Municipalities]

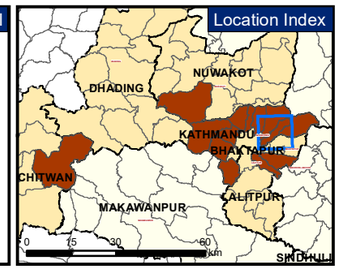
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000







Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Health Post
- School
- Municipality Office
- Temple
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Aspect

- Flat (-1)
- North (0-22.5)
- Northeast (22.5-67.5)
- East (67.5-112.5)
- Southeast (112.5-157.5)
- South (157.5-202.5)
- Southwest (202.5-247.5)
- West (247.5-292.5)
- Northwest (292.5-337.5)
- North (337.5-360)

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)
- DEM: Project Team
- Aspect: Project Team

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
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scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 18

Watershed Analysis

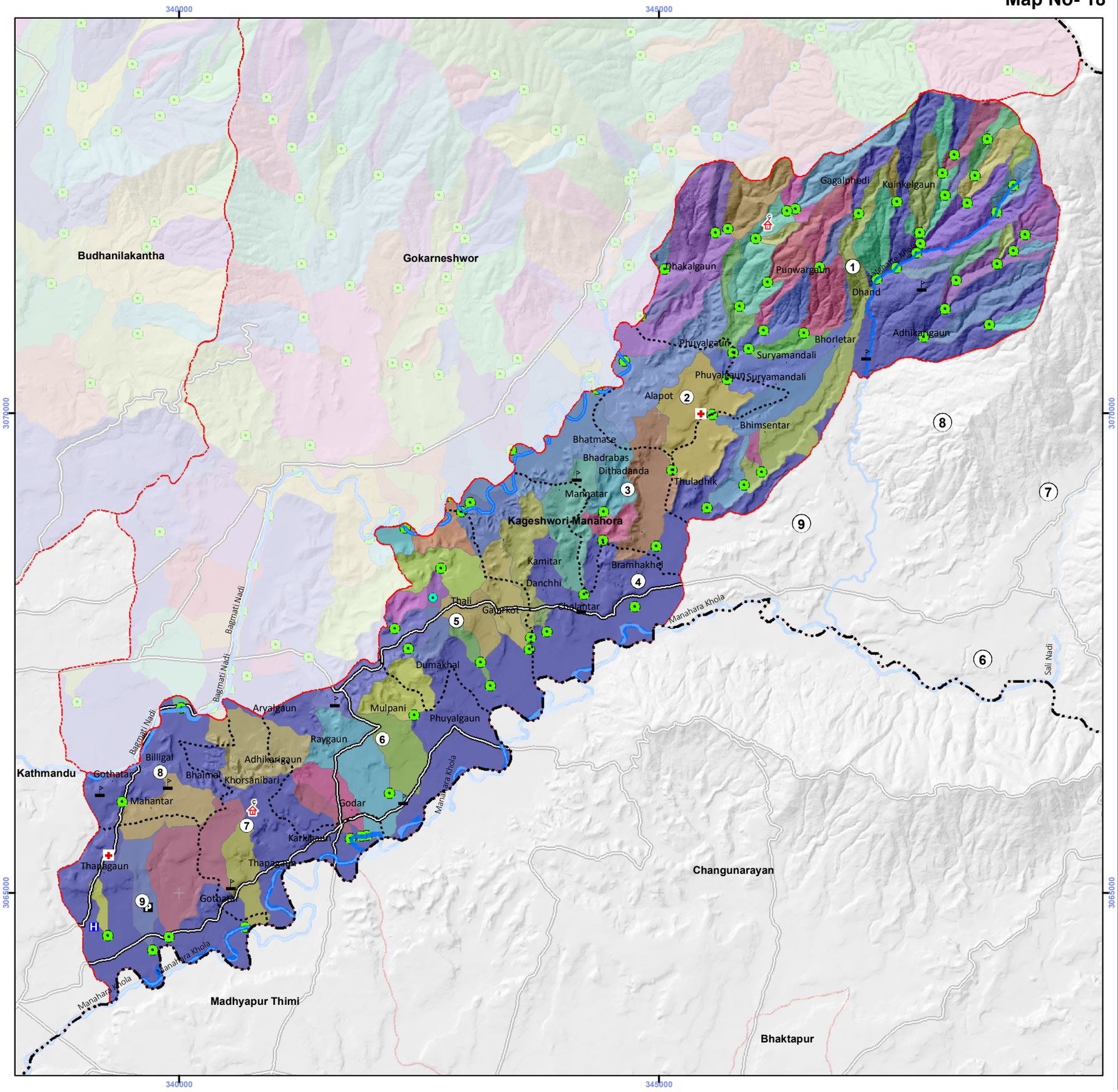
Kageshwori Manohara Municipality

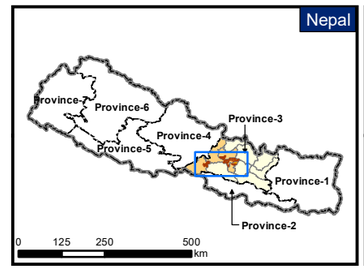
[Integrated Urban Development Plan of 14 Municipalities]

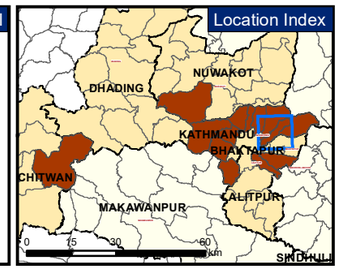
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000







Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Health Post
- School
- Municipality Office
- Temple
- Police Station

Road Network

- National Highway
- Feeder Road

Watershed

- Watershed Catchment Area
- Pour Point
- River
- Streams

Source:

- Administrative Boundary: DoS
- Watershed Analysis: Project Team
- Road Network: Project Team
- -Landmarks: Inventory Survey (Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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GeoCom International Pvt.Ltd
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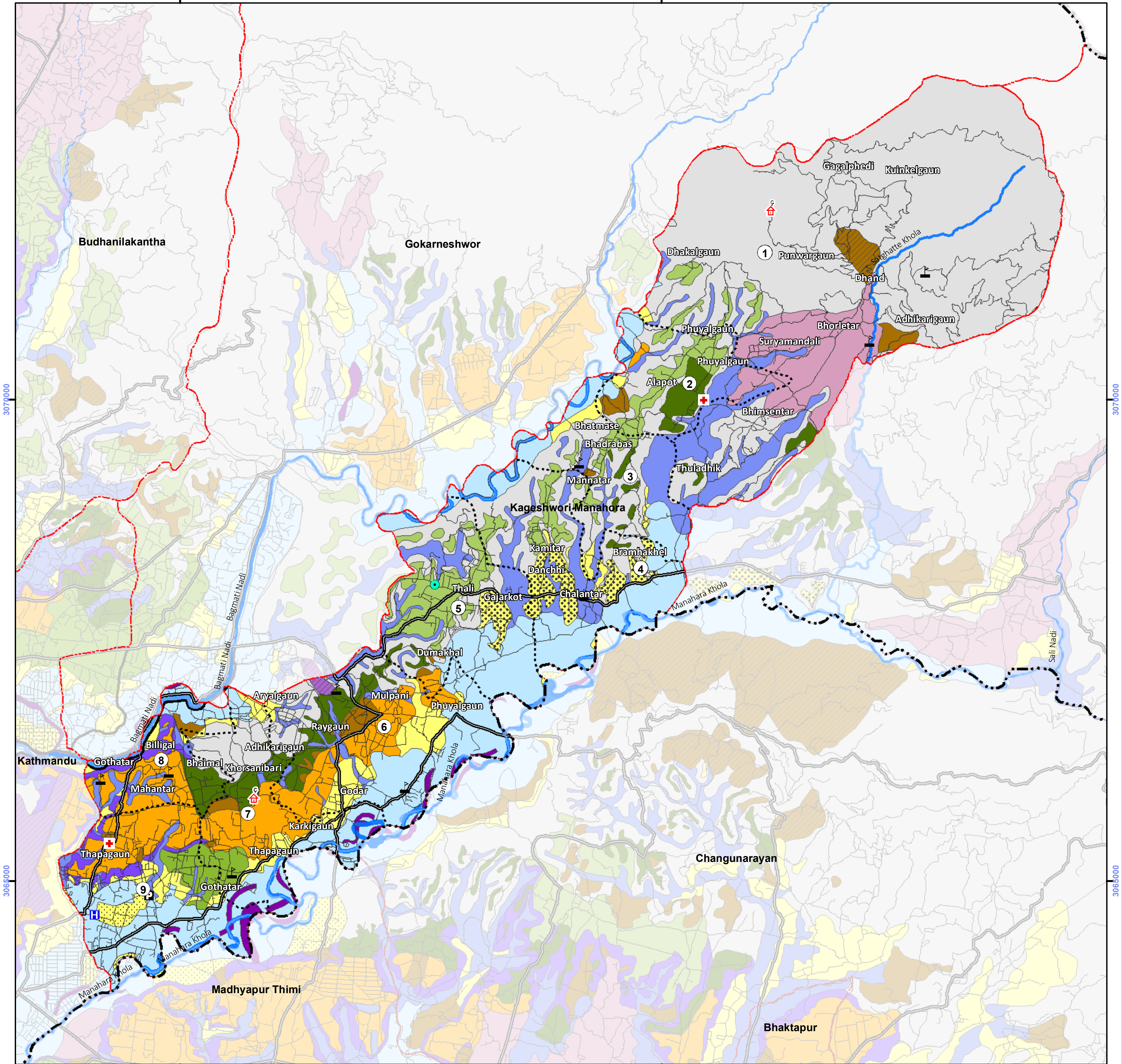
Department of Urban Development and Building Construction
Babarmahal, Kathmandu

Map No- 19



Geomorphological Map

Kageshwori Manohara Municipality

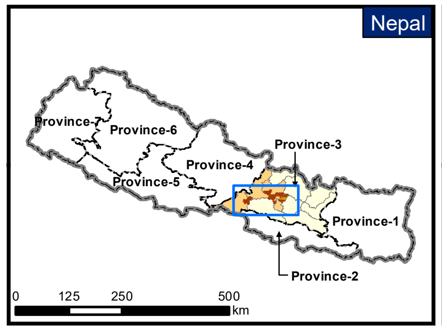
[Integrated Urban Development Plan of 14 Municipalities]

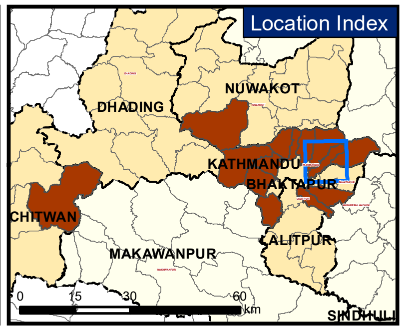
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000

N W E S





Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary *(under this Project Package)*
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Geomorphological Class

- al Alluvial plain
- tributary stream
- fr Former river course
- nl Natural levee and slightly hilly area formed by dry river bed
- fa Fan
- tr2 Lower terrace
- tr1 Upper terrace
- Pa T1 (Patan terrace)
- Th T2 (Thimi terrace)
- Go T3 (Gokarna terrace)
- To T4 (Tokha terrace)
- ta Talus
- Ls Land slide and Land collapse
- es Eroded slope and cliff
- Bs Basement (Mountain slope)
- at Artificially transformed land

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Project Team
- Geomorphology: DMG, ERAKV 2016

WGS_1984_UTM_zone_45N

Projection: Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian: 87.0
scale_factor: 0.9996
latitude_of_origin: 0.0
Linear Unit: Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_WGS_1984
Spheroid: WGS_1984
Semimajor Axis: 6378137.0
Semiminor Axis: 6356752.314245179

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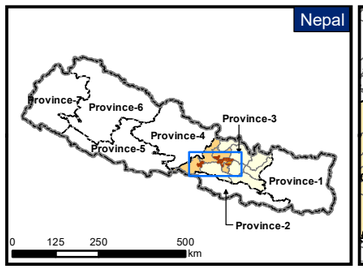
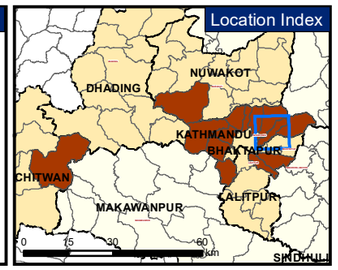
Map No- 20

Decadal Growth of Road Network
Kageshwori Manohara Municipality
[Integrated Urban Development Plan of 14 Municipalities]
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Other Municipality Boundary
- Municipalities Boundary (under this Project Package)
- Ward Boundary
- (5) Ward Number
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Growth of Road Network

- RoadNetwork_1970
- RoadNetwork_1980
- RoadNetwork_1990
- RoadNetwork_2000
- RoadNetwork_2012

Existing Landuse

- Agriculture
- Builtup
- Bush
- Forest
- Protected Area
- Institutional
- River
- Pond
- Recreational
- Others

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Babarmahal, Kathmandu

Map No- 21

Decadal Growth of Settlement

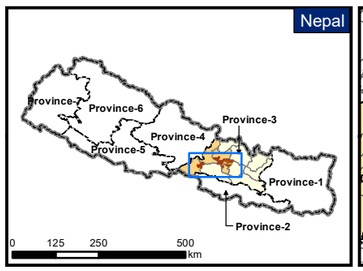
Kageshwori Manohara Municipality

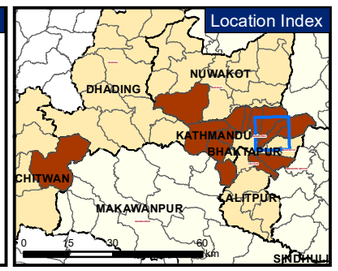
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Decadle Growth of Settlement

- Builtup 1990
- Builtup 2000
- Builtup 2012

Source:

- Administrative Boundary: DoS
- Decadle Growth of Settlement: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Map No- 22

Road Density(km/sqkm)

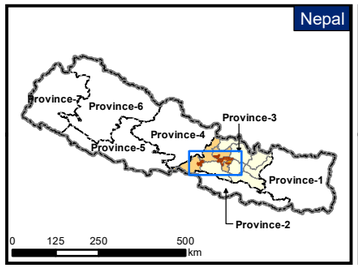
Kageshwori Manohara Municipality

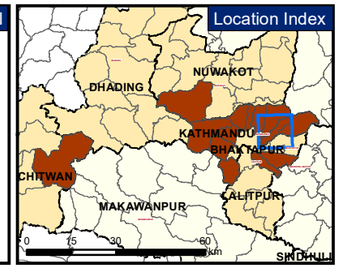
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- School
- Temple
- Health Post
- Municipality Office
- Police Station

Road Network

- Feeder Road
- Strategic Urban Road
- District Road
- Other Road

Road Density(km/sqkm)

- 0-5
- 5-10
- 10-15
- 15-20
- 20-25
- >25

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Road Density: (Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Note:
-Area of Ward is taken after deducting restricted areas for development like forest, bushes and waterbodies.

Map No- 23

Road Density(km/1000 Population)

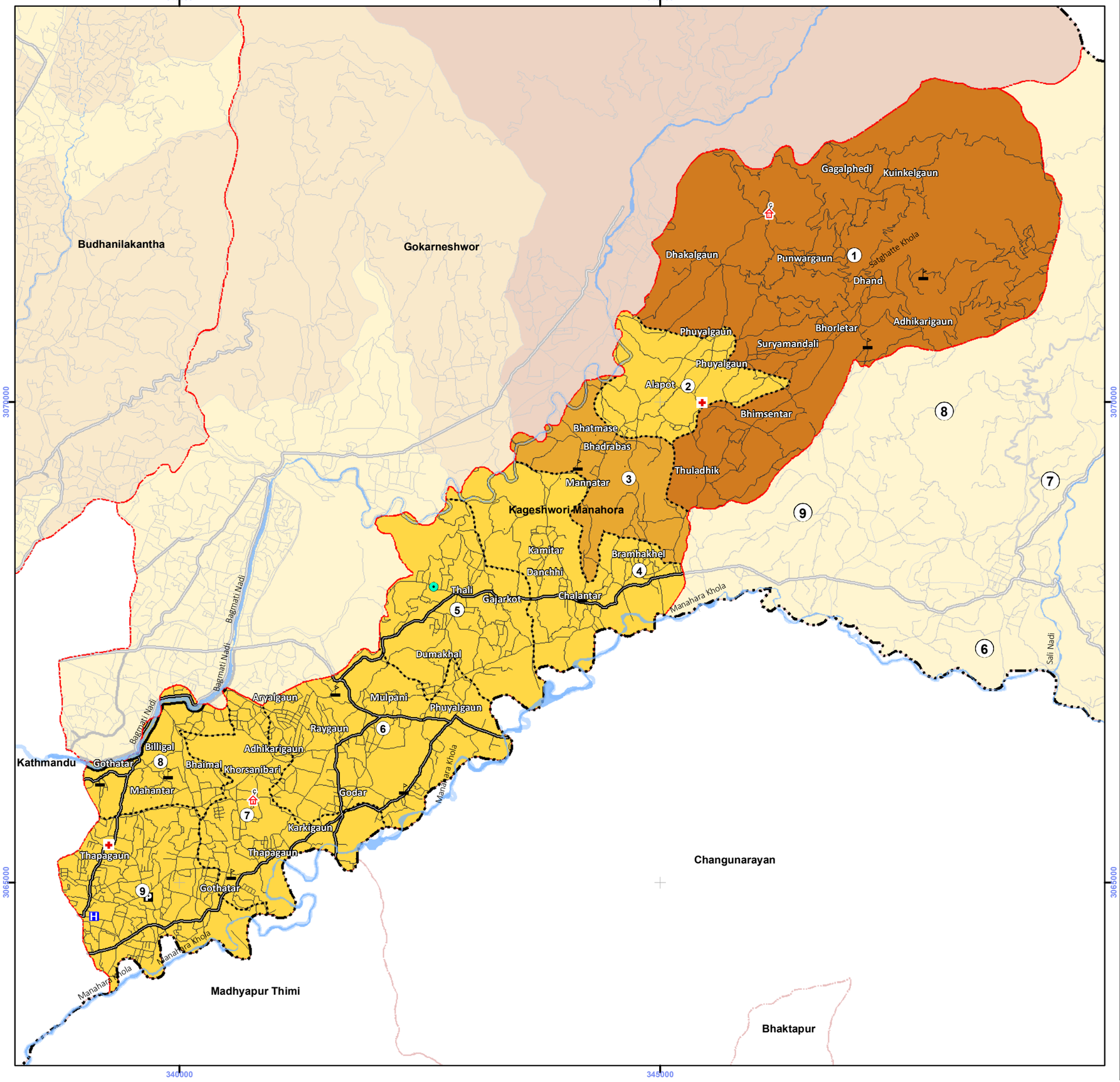
Kageshwori Manohara Municipality

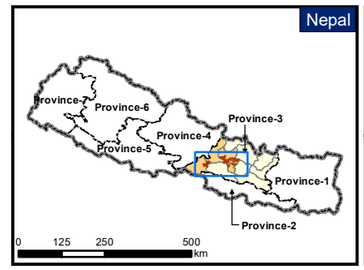
[Integrated Urban Development Plan of 14 Municipalities]

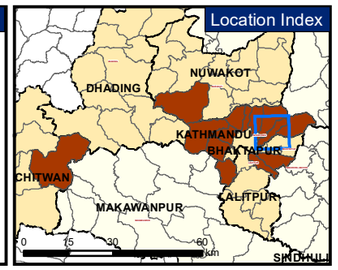
(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000







Legend

Administrative

- District Boundary
- Municipalities Boundary *(under this Project Package)*
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Health Post
- School
- Municipality Office
- Temple
- Police Station

Road Network	Road Density(km/1000 Population)
Feeder Road	0-5
Strategic Urban Road	5-10
District Road	10-15
Other Road	15-20

Source:

- Administrative Boundary: DoS
- Landuse: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey(Project Team)
- Road Density: (Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
false_easting: 500000.0
false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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Department of Urban Development and Building Construction
Babarmahal, Kathmandu

Map No- 24

Land Suitability Analysis

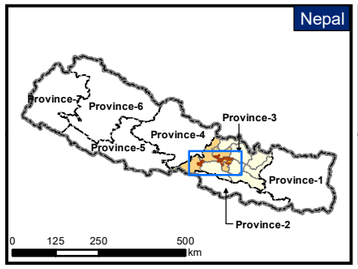
Kageshwori Manohara Municipality

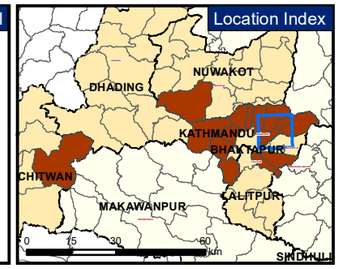
[Integrated Urban Development Plan of 14 Municipalities]

(Package:DUDBC/CS/QCBS-11-074-75)

2 1 0 2 km

1:40,000





Legend

Administrative

- District Boundary
- Municipalities Boundary (under this Project Package)
- (5) Ward Number
- Other Municipality Boundary
- Ward Boundary
- Locations

Landmarks

- Hospital
- Health Post
- School
- Municipality Office
- Temple
- Police Station

Road Network

- National Highway
- Feeder Road
- Strategic Urban Road
- Municipal road

Land Suitability

- Restricted/ Not Suitable
- Suitable

Suitable Area (ha)	Total Area (ha)	Suitability (%)
2052	2736	75%

Source:

- Administrative Boundary: DoS
- Land Suitability Analysis: Project Team
- Road Network: Project Team
- Landmarks: Inventory Survey (Project Team)

WGS_1984_UTM_zone_45N

Projection: .....Transverse_Mercator
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false_northing: 0.0
central_meridian:.....87.0
scale_factor:..... 0.9996
latitude_of_origin:..... 0.0
Linear Unit: .....Meter (1.0)

Geographic Coordinate System: GCS_WGS_1984
Angular Unit: .....Degree (0.0174532925199433)
Prime Meridian:..... Greenwich (0.0)
Datum: .....D_WGS_1984
Spheroid:.....WGS_1984
Semimajor Axis:.....6378137.0
Semiminor Axis: 6356752.314245179

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