



**TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
PULCHOWK CAMPUS**

**THESIS NO.: 074MSUP017**

**Development Pattern of Urban Fringe:  
A Case of Gaindakot as fringe of Bharatpur Metropolitan City.**

by

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A THESIS  
SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE  
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF SCIENCE IN  
URBAN PLANNING

DEPARTMENT OF ARCHITECTURE  
LALITPUR, NEPAL

AUGUST, 2020

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## DECLARATION

I hereby declare that the thesis entitled “**Development Pattern of Urban Fringe: A Case of Gaindakot as Fringe of Bharatpur Metropolitan City**” submitted to the Department of Architecture in partial fulfilment of the requirement for the degree of Master of Science in Urban Planning, is a record of an original work done under the guidance of Dr. Ajay Chandra Lal, Institute of Engineering, Pulchowk Campus. 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**

The urban fringe areas go through lots of transformations due to urbanisation but lack of proper planning and policies in such fringe areas leads to haphazard and unplanned growth, placing enormous pressures on natural resources, existing services and infrastructures. Bharatpur Metropolitan City is one of the fastest growing cities in Nepal which serves as commercial centre of Chitwan district. The city has been growing bigger and it will have its impacts on its fringe areas. Since migration rate is increasing in Bharatpur, this is likely to spread urban sprawl in adjoining areas, Gaindakot municipality being one of them. This research uses multiple theoretical framework and qualitative research approach to find out the effects of urbanization on various aspects and the patterns of land use changes in Gaindakot with the increasing urbanisation over the years. This research attempts to analyse the changing pattern of land uses in rural settlements located in the fringes and make a link between the results to socio-economic developments. Managing rapid urbanization poses challenges that require urgent policy attention. Otherwise, this may lead to rapid and uncontrolled sprawl; irregular, substandard, and inaccessible housing development; loss of open space, and decreased liveability as in Kathmandu valley due to unplanned urban development.

## ACKNOWLEDGEMENTS

This research work has been an exceptional opportunity for me to learn and gain more knowledge. I would like to express my profound gratitude and appreciation to my supervisor **Dr. Ajay Chandra Lal** for his guidance, support, valuable advice, constant effort, and continuous encouragement throughout the whole research.

I would also like to acknowledge my friends Er. Pradeep Bartaula, Ar. Samjhana Bhattarai, Ar. Sajana Lamichhane and Er. Shiva Kafley for their continuous support and guidance throughout my research. Also, I would like to thank the Department of Architecture, Pulchowk campus, and all the faculty members for their help during my research.

I would like to thank Gaindakot municipality and Ward offices for providing me the valuable data. I am also thankful to all the respondents for providing me with their valuable time and resources for my research. I would like to thank all the personnel and organizations that directly or indirectly supported me to conduct this research.

Seema Pandey

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## CHAPTER ONE: INTRODUCTION

### 1.1 Background

Urbanization refers to the proportion of the population of a country that lives in cities (UNESCO, 1973). It is the process of increase in urban centers and migration of people from rural and suburbs to such centers ultimately increasing the population living in those areas and the rate is increasing day by day. Urbanization also means growth and development of secondary and tertiary economic activities. Urbanization is a dominant phenomenon in virtually all developing countries. According to UN World Urbanization Prospects 2018 Revision, more than half of the populations, i.e. 55.7% population live in urban areas. And according to UN DESA, this proportion is expected to reach 68% by 2050.

It has been observed in Nepal from the 1970s onward, showing one of the highest rates in Asia and the Pacific (ADB/ICIMOD, 2006). According to UN World Urbanization Prospects 2018 Revision, Nepal has 21.1% of urban population. Nepal is undergoing two momentous transformations at the moment; rural to urban and unitary to federal state. With the local level restructuring in 2017, there are 6 metropolitan cities, 11 sub metropolitan cities, 276 municipalities and 460 rural municipalities. If all the municipalities are considered proper urban, approximately 40% of population of Nepal fall under urban population (NUDS, 2017).

The challenges and opportunities in cities attract more people from different parts of the country or world which enhance city's growth. As a city grows, more people are attracted in the cities and the increasing concentration and economic activities demand more lands to be developed for public infrastructures, housing, and industrial and commercial purposes. These processes need to be driven by the development plans and policies of a particular region. If proper plans and policies are not made on time, urbanization pressure leads to a population influx, increased motorized transport, air, water and noise pollution, energy consumption and loss of agricultural land and reduction in biological diversity which results into unplanned and haphazard growth of cities. For example: Unplanned building construction and settlement extension, lack of drinking water and electricity, unmanaged sewage and garbage, etc. And unplanned urbanization has always been a threat to public health and safety.

Urban fringe is an area that situates between urban and rural system. It's the most sensitive, dynamic and swiftly changing area during the urbanization process. The term urban fringe was first used by T. L. Smith (1937), to describe the built-up area just outside the corporation limits of the city. Urban fringe is the transitional space between village and town. Urban fringe is the area which incorporates both rural and urban land uses. The characteristics of the area change from largely rural to largely urban over the period of time. The accessibility is the basic factor for the fringe development. Nearer the village to the city, the greater will be its impacts (Frierly 1946). According to Andrews (1942), the adjacent peripheral zone of the urban fringe is the area of intermingling zone of characteristically agricultural and characteristically urban land use structure obtained in the area. Likewise, urban sprawl refers to migration of people from populated areas to low density residential development over rural land due to lower land rates, improved infrastructures, lower house tax rates, lack of urban planning. The extension of the town or city also affects the surrounding area and urbanization leads to the extension of the town boundary which affects the social, political and economic life of the people residing around the town and land value also gets affected (Rajbala, 1985).

Nepal is considered as one of the least top ten urbanized countries as well as one of the top ten fastest urbanizing countries in the world and Kathmandu is the largest metropolitan city with the population of 1.5 million people in city proper and 3 million in its urban agglomeration across Kathmandu valley. Kathmandu valley is the most populated metropolitan region in the country. Kathmandu valley became accessible to people from other parts of the country and the foreigners beginning in the 1950s. The most striking change in the Kathmandu Valley is that agriculturally productive peri-urban areas are now being encroached upon by rapid housing development that is expanding outward. Rapid urban expansion coupled with unmanaged settlement development has led to various socio-environmental challenges. The principal reason for such unmanaged developments in the Kathmandu Valley is due to ineffective land use, zoning, and land sub-division policy. Unplanned urban growth can lead to a loss of open spaces that adversely impacts the urban environment. Due to inability to properly enforce urban interventions, plans and policies on time, Kathmandu valley has been an example of haphazard settlement. Surrounding fringe areas also developed in similar manner, i.e. in unhealthy, unorganized and haphazard way. This trend clearly

shows the need to study the sustainability implications of urban sprawl. Similar haphazard settlements and unplanned development can be witnessed in and the adjoining areas of Bharatpur Metropolitan City if proper attention is not given and proper policies and urban interventions are not made on time.

## **1.2 Need of Research**

Since urban areas become the centers of commercial, industrial, administrative, entertainment and social services, people tend to migrate to urban areas. However, urbanization may have negative implications if urban areas are not managed properly leading to many environmental, health and socio-economic problems and social disorders. Thus, the need of planned and organized urbanization has become a great concern as new urban areas have been added and proportion of urban population has been increasing (Basyal, Khanal 2001). In many metropolitan regions, population growth and the demand for new development are transforming the form and function of landscapes. For the growth of new development areas, the most suitable locations may be found adjacent to existing amenities such as roads and urban centers (Barredo *et. al.*, 2003; Meentemeyer *et. al.*, 2013). Rapid urbanization leads towards the transformation of natural, agricultural and low population density lands to urban settlements. Rapid urbanization greatly pressurizes the natural resources and leads to land use changes. It also leads to poor environmental and unhealthy living conditions. Haphazard and rapid urbanization invites serious physical, social and environmental problems like inadequate housing, traffic congestion, urban poverty, increase in crimes, slums, environmental pollution, vulnerabilities to natural disasters, climate change impacts, etc. Since several studies have found out that the anthropogenic activities greatly influence the urban environment, it is required to give proper attention towards monitoring the land use and land cover changes in urban areas (Stow & Chen, 2002; Patra *et. al.*, 2018). The fringe areas are not adequately incorporated into the overall urban planning: concerned primarily with the urbanization process itself, and the rapid pace of urbanization. Rapid urban expansion places an enormous burden on the planning process, i.e. planning for new development while simultaneously planning for the improvement and upgrading of the existing urban environment. As a result, in most urban centers the existing planning capacity is simply inadequate to an ever increasing task. Fringe areas generally fall outside the jurisdictional boundaries of the governing bodies of the urban area. Therefore the local governments of the fringe areas and those

of the urban area are often acting separately in terms of overall planning. In addition to that the local governments of the fringe areas often have only limited town/urban planning rules, regulations or planning capacity. As a result, their existing “urban planning” is at best incomplete and at worst non-existent.

Since Nepalese cities have been urbanizing haphazardly, it is very important to provide attention towards how the cities expand out to the fringe areas as they grow. If proper study of the urbanizing area and its possible fringe areas is not made, it leads towards lack of coherence in planning policy and regulations, which ultimately leads towards the declination of spatial quality. Sometimes due to sudden increase in population, services get failure leading towards unorganized and unhealthy settlements. The research needs to be done in order to understand the pros and cons of rapid urbanization and urban sprawl as the area selected for the research is prone to urban sprawl. If not planned properly on time, the municipality is likely to suffer from unplanned urbanization in near future. The fast growing urbanization process and the consequences of land acquisitions for construction of buildings and expansion of real-estate areas demands urgent policy responses from the government to address the problems brought by the rapid urbanization and real-estate development in Nepal (Upreti *et. al* 2017).

### **1.3 Importance of Research**

This research can be helpful for the local authorities and the people to have better understanding of changing trends of infrastructures development, population growth, patterns of land use changes and effects in biological environment of the municipality. Thus, the research can be helpful for the policy makers to understand the necessity of making proper urban management and provide required attention before the growing settlements worsen to become unplanned and haphazard one, turning the municipality into just another example of unhealthy and unplanned urbanization.

### **1.4 Problem Statement**

Rural to urban migration is a critical issue faced by the country. Rapid urban population growth increases various urban uses, specially housing and this certainly going to affect the fringe areas (Aguilar 2008). Although certainly not overlooked in national, regional and urban planning activities, two issues that at present are not considered to the extent their impact merits, particularly in regional and urban planning are: the rapid expansion

of urban centers into their “fringe zones” (peri-urban, peri-agricultural, agricultural and undeveloped land) and the impact of urbanization on ecosystem sustainability (Clark 2009). Both issues are of critical and increasing importance to sustainable urban development, however, both issues are largely poorly understood and of ever increasing importance, particularly to urban planning and development. Most of the fastest urbanizing cities are facing rapid urban sprawl, resulting in a series of serious urban socio- economic and environmental issues including urban poverty, inadequate drinking water supply, unhygienic living conditions due to lack of proper sanitation and sewerage facilities, inadequate urban infrastructure and inefficient services, poor access to services, crime and host of other issues. The economic opportunities factor is found to have major impact on urbanization process in the areas. The city core is already crowded and the land is very expensive. The available lands are only affordable to large scale investors or commercial organizations. The land is comparatively cheaper than in the city core in fringe areas. Several businessmen and workers select the fringe area as it is in close proximity to their working places. These processes enhance the population growth significantly by accelerating demand for urban services that ultimately change the landscape. Fringe zones associated with urban centers have become more numerous, larger and complex with rapid urbanization and the associated transition of large populations from rural to urban lifestyles. Unfortunately the loss of agricultural and undeveloped lands, unauthorized urban development (sprawl) and industrial operations, environmental degradation and overall a significant alteration of critical ecosystems are serious and ever increasing problems faced by fringe zones.

Bharatpur Metropolitan City is one of the fastest growing cities in Nepal which serves as commercial center of Chitwan district. It is located at the center of Mahendra Highway and Kathmandu-Birgunj road corridor thus, has important geographical location. The population of Bharatpur was 199,867 according to census 2011. The population has now reached 280,502 and it is the now fourth largest populated city in Nepal. It has large shopping areas, big hospitals, colleges, agriculture-based industries (small-scale processing industries, poultry industries, honey, mushroom, floriculture) and service industry (education and health). Further, multinational companies like Coca-Cola and San Miguel are also situated in Bharatpur (MuAN 2015). Major business and trading houses have opened branches in Bharatpur, leading to steep rises in land values. Now with the proposal of developing Bharatpur as Smart City, the city



will even grow bigger and it will have its impacts on its fringe areas. Since migration and the population growth is increasing in Bharatpur, this is likely to spread urban sprawl in adjoining areas, Gaindakot municipality being one of them. The population of Gaindakot is 55,205 according to census 2011. The migration rate is already high in Gaindakot area now and the trends of unplanned settlements, unorganized land plotting and unplanned growth are already taking place. If the process continues and the concerned authorities are not able to make proper policies for the area, the municipal area is likely to suffer from haphazard settlement and unplanned urbanization in near future. Thus, the efforts should be made to study the challenges that come along with the opportunities of urbanization. As the city expands, the rural-urban fringe experience its direct impact with those living there facing new challenges and opportunities in meeting their life needs and accommodating the by-products of land use changes. Although urbanization of these fringe areas provides opportunities for employment, better housing, education, knowledge and technology transfer, and ready markets for the agricultural products, increase in population places enormous stress on natural resources and existing social services and infrastructure (Rees 1992).

This report attempts to find out the patterns of land use changes in Gaindakot with the increasing urbanization over the past few years and analyze. Managing rapid urbanization poses challenges that require urgent policy attention. And one of the major challenges is haphazard and uncontrolled growth of built-up areas, several market and border towns are growing without government planning and control. This may lead to rapid and uncontrolled sprawl; irregular, substandard, and inaccessible housing development; loss of open space, and decreased livability as in Kathmandu valley due to unplanned urban development. Urban policy identifies the key principles that guide orderly planning. Planning by necessity translates policy guidelines into the actual practice of land use allocation. But such an allocation has to be sensitive to key elements of urban theory and the changing characteristics of the urban population (Ruhiga, 2014).

### **1.5 Research Questions**

- What is the existing land use pattern of Gaindakot?

- How can the prevailing town development trend be transferred into planned urban form?

## **1.6 Research Objectives**

This research tries to find the contextual reality of effects of urbanization in fringe areas with the case of Gaidakot, Nawalparasi. The objectives of the research are as follows:

- To study the patterns and trends of land use changes in Gaidakot.
- To identify the effect of urban sprawl.
- To determine development strategy for planned growth of Gaidakot.

## **1.7 Validity of Research**

The topic ‘Development pattern of Urban fringe: A case of Gaidakot as fringe of Bharatpur metropolitan city’ is valid because the area is new for the study. No study has been done regarding the land use changes in Gaidakot over the years till now. Majority of the studies have been done for the Bharatpur Metropolitan City in various aspects but the adjoining areas have not been studied. With the increasing urbanization in adjoining Bharatpur Metropolitan City, the impacts made on various aspects of adjoining areas can’t be ignored.

## **1.8 Methodology**

### **1.8.1 A Research Paradigm**

#### **Ontological position with positivist/constructivist paradigm**

The study of real and existing scenario in the study areas is based on the positivism in ontological position which provides the idea and concept of urban sprawl and urban fringe development in terms of land use and housing expansion, infrastructure and series, road networks, street patterns and transportation, and socio economic status. Constructivist paradigm is used to study real and existing scenario of social behaviors of the study areas. The social observations are treated as entities and real cause of social outcomes are determined reliable.

#### **Epistemological position with positivist/constructivist paradigm**

Constructivist paradigm is used to gather knowledge of the urban fringe development trend in epistemological position. Since the explanations are generated inductively from the data that is observed, constructivist paradigm is used. Thus the research is based on descriptive method.

### **1.8.2 Literature Review**

Firstly, literature review was done to get theoretical understanding of the research topic. The study of related articles, thesis, scientific papers, journals, reports, acts and collection of relevant maps, etc. are done to collect wide range of data on various related subjects like urban fringe development, characteristics of urban sprawl. Urbanization and urban land management process, etc. Urban containment policies, land use policies, planning legislations and acts are reviewed in order to identify the appropriate strategies to overcome the problems identified in the case.

### **1.8.3 Designing of Interview Questionnaire**

The questionnaire survey was done to obtain the socio-economic data of the study area. The questionnaire survey held the key themes like household composition (size and status of household), place of origin, reason for migration, income status, land and building information and available infrastructure and services.

### **1.8.4 Data Sampling**

Stratified random sampling method was used to draw sample size for questionnaire survey. Sample size of the study area was determined according to the total number of households stated in CBS 2011. According to CBS 2011, the total number of households was 6687. So with reference to known population size, sample size was determined from Equation 1 (Trek, 2013):

$$n = [(z^2 * p * q) + ME^2] / [ME^2 + z^2 * p * q / N]$$

Where,

ME= margin of error

z= critical standard score

N= population size

$p$  = population proportion

$q = 1 - p$  With the desired margin of error as 10 percentage, confidence level of 95 percentage and value of population proportion as 50 percentage, the sample size was obtained 95.

### **1.8.5 Data Collection**

**Primary data collection:** Primary data is collected using different approaches like field observation, questionnaire survey and interview of local experts and key informants.

The field observation was made to know the physical status of study area as it helps to know the pattern of current urban development trends, infrastructure development and land use types.

The questionnaire was prepared for guiding the research questions. The key themes of the questionnaires were identified through literature review like household composition, place of origin, reason of migration, socio economic status, land and building information, infrastructure and services. Then the questionnaire survey was conducted. Respondents were randomly selected from each stratum and interviewed.

Interview was also carried out to discover the issues and pattern related to urban growth in fringe areas and also to identify the issues related to planning policies regarding the growth of urban fringe areas.

**Secondary data collection:** Secondary data was collected in the form of published data, records, reports etc. from different sources like DUDBC, Municipality offices, Ward offices, etc.

### **1.8.6 Data Analysis**

The data obtained from questionnaire and maps will be analyzed using excel, GIS and AutoCAD to see association between variables and interview will be interpreted to explain the phenomenon.

### **1.8.7 Conclusion and Recommendations**

After analyzing the data and identifying the current trends of development and existing problems, some specific recommendations (possible planning interventions) will be made to regulate the haphazard growth of Gaindakot municipality.

### **1.8.8 Expected Output**

Since the land use changing pattern of the area will be studied, the study area will be able to control haphazard urbanization whereas promote sustainable urban development. Gaindakot municipality will be able to make necessary planning interventions to achieve the planned urban expansion in the municipality.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Urban**

The term urban is derived from the Latin word *Urbanus* which pertains to a city or city life. “An urban area is a location characterized by high human population density and many built environment features in comparison to the areas surrounding it. Urban areas may be cities, towns or conurbations, but the term is not commonly extended to rural areas such as villages and hamlets. The types of urban areas can greatly vary as the variety of activities performed there: the means of production and the kinds of goods, trade, transportation, the delivery of goods and services, or a combination of all of these activities.” (Gallion & Eisner, 1998). However, the definition of ‘urban’ may vary from country to country, and, with periodic reclassification, can also vary within one country over time, making direct comparisons difficult.

In Nepal, National Planning Commission prepared National Urban Development Strategy (NUDS) in 2015 which defines urban area as, “Municipalities in Nepal are de facto urban areas.” Current urban conditions are reflected through available basic data on urban infrastructure, environment, economy, governance, finance and investment. (Commission, National Urban Development Strategy, 2015).

### **2.2 Urban Fringe**

The rural-urban fringe is the boundary zone outside the urban area proper where rural and urban land uses intermix. It is the area where the city meets the countryside. It is an area of transition from agricultural and other rural land uses to urban use. Located well within the urban sphere of influence the fringe is characterized by a wide variety of land use including dormitory settlements housing middle-income commuters who work in the central urban area. Over time the characteristics of the fringe change from largely rural to largely urban. Urban fringes are receiving more and more attention, given the transformational changes in both urban and rural areas plus the fact that both are becoming increasingly interwoven. Fringe is defined as relation to the city and exists in agriculture hinterland (area around or beyond a major town) where land use is changing. Urban fringe is an area that situates between urban and rural system. It's the most sensitive, dynamic and swiftly changing area during the urbanization process (Gu & Xiong, 1989).

One of the best aspects of living in the urban fringe for the people who live there is its proximity to nature, the ability to get away from the fast pace and crowding in the city. Many cities are built in mountain valleys or near open water, and the need to preserve these lands is for the population's leisure activities, wildlife and the ecosystem is extremely important. Preserving nature is more dependent on what the population demands and the land surrounding the city.

The term urban fringe was first used by T. L. Smith (1937), to describe the built-up area just outside the corporation limits of the city. To analyze the “elements of urban fringe pattern”, Andrews (1942), in his study, has tried to distinguish between the urban fringe and rural urban fringe. He defined, “the adjacent peripheral zone of the urban fringe ...as the area of intermingling zone of characteristically agricultural and characteristically urban land use structure obtained in the area”.

The fringe is an area, zone or buffer between ‘real’ countryside on one side, and the town or city on the other: it is simply the edge of the built up area (Broughton, 1996; Shoard, 1999) differentiated from these adjoining landscape types by its particular mix of land use. The fringe is also home to the ‘urban dowry’ (Kaika & Swyngedouw, 2000): those uses that are part of the machinery of cities, but which are noisy, noxious or use large amounts of space. The dowry comprises waste processing facilities, municipal dumps, power stations, electricity substations, reservoirs, gas works and so forth. The fringe is viewed as a ‘transitional zone’ with these types of urban encroachment transforming areas of former countryside into a new type of landscape. Fringe can only be defined as such with reference to its particular attributes and character. It was noted earlier that the fringe is often truncated by orbital and arterial roads. According to Ramachandran (1989), “the rural-urban fringe is an area of mixed rural and urban populations and land uses, which begins at the point where agricultural land uses appear near the city and extends up to the point where villages have distinct urban land uses or where some persons, at least, from the village community commute to the city daily for work or other purposes.”

It is believed that the rural urban fringe development started post World War II. After world war II, there was widespread inner city development but could not develop housing units for all those needed. So, they went on to build houses on the edge of towns and cities. Thus, residential growth started outwards into the suburbs where population density as well as the land price is lower than that of inner city. As the trend

continued, many shopping centers, offices and factories also move to the edge of the urban area for cheaper and larger areas, still being able to take advantage of the facilities in nearby city. Also the traffic congestion is less and the environment is more pleasant in such areas. Thus, this led to the expansion of smaller towns and villages in the areas nearby cities.

However such areas do not grow in well-defined patterns rather sprawls haphazardly resulting into incoherent landscape which is the characteristics of the fringe. Another characteristic of fringe areas is a wide mix of land uses ranging from a variety of commercial developments, including out-of-town shopping centres, to the city services and industries which are conveniently located at the margins.

To sum up the concept, it forms the outer suburban zone or, R-U fringe lying beyond the city administrative limits. It is a wide rural area into which residential development is intruding and new industrial sites and other urban uses are in the process of development along its main lines of communication, often clustered around existing villages and small towns.

### **2.2.1 Stages of Growth**

According to R .Ramachandran and Srivastava, in 1950's during a study of villages lying in the RUF of Delhi, they had found a particular pattern of stages through which a village community passes as the village gets transformed into an urban one. The rural urban fringe developed as four aspects:

- 1) Spatial interaction with city.
- 2) Social dimensions.
- 3) Physical aspects.
- 4) Economic aspects.

There are five stages in the process of transformation:

#### 1) Rural Stage:

Agriculture is the main occupation of the people who live in villages. Land less laborers form a large group and work as agricultural laborers. Interaction between the city and village is minimum. Movement is restricted only to jobs in urban areas and trips for sale of agricultural produce. Such villages lack almost all the facilities available in the city.



## 2) The Stage of Agricultural Land use change:

The city offers a market for products like milk, vegetables and etc. and villagers are in a position to supply. Few farmers notice it and take advantage of this opportunity. The village in this manner becomes vegetable farm and milk shed of the city. The factors which are responsible for development are increase in city population leading to the demand for products like milk, and vegetables, improvement in transportation facilities making village more accessible than before.

## 3) Stage of Occupational Change:

The village population responds to the employment opportunity in the city. Some village families have started business like repair shops, tea shops, grocery in city. The mobility of village population increases and number of scooters, bikes, cars and city buses increases. Houses are rebuilt with better furnished and well equipped in the villages.

## 4) Stage of Urban Land Use Growth:

A few plots of land from villagers are purchased by real estate agents from the city. They develop into residential colonies within a short time and they convert village lands into city life. Lands near main road which connects the village to city are first developed.

## 5) Urban Village Stage:

Now the fringe village is converted into urban uses. No agricultural lands around the village. Migration starts and all around the village site, we have a number of urban residential localities.

Differences and fluctuations in property value Lack of coherence in planning policy and regulations, potentially leading to a decline in spatial quality and loss of attractiveness of the area. In contrast, sometimes a lack of identity: not rural, not urban, lack of specific cultural or regional identity, as a result of the lack of coherent planning and the diversity of functions. Services may get failure due to the sudden increase in population. When new development takes place consider opportunities to enhance and strengthen green infrastructure to provide a link between urban areas and the wider countryside. Reinforcing woodland belts, enhancing water and soil quality and the provision of green corridors from and between settlements could all help reinforce

landscape and biodiversity features. Along major roads, develop schemes to improve visual awareness of the individual settlements, land uses and cultural landmarks. Conserve and maintain traditional farm buildings within their own setting. Reduce the impact of large scale new farm buildings by careful location so as not to dominate the traditional farm buildings on a plot adequate to accommodate circulation, storage and landscape proposals using a choice of sympathetic colours and non-reflective finishes.

Though urban fringes are becoming as extension areas for cities, it is our responsibility to not to disturb/destroy existing features like nature, settlements, economic activities etc. of the urban fringe areas. While zoning, it's recommended to give recreational zone/ agro zone as major land use to urban fringes, so that the existing features won't get disturbed by this land use and bio-diversity can be maintained in cities.

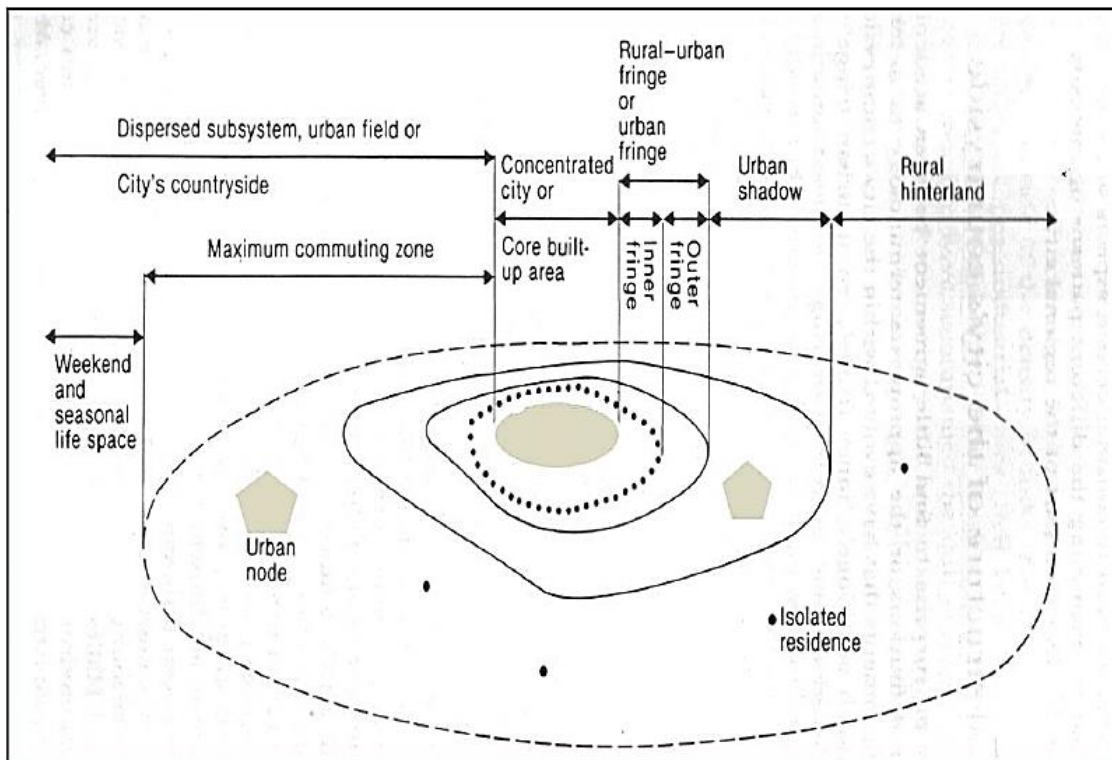


Figure 2-1 The rural-urban fringe scheme.

Source: (Modified from Bryant et al., 1982: 12).

### **2.2.2 Physical Characteristics of urban fringe**

The urban fringe shows the characteristics of both urban and rural areas. According to (Audirac et al., 1999) and (Bryant et al., 1982), the general characteristics of the fringe areas are as follows:

1. Conflicting land uses, (residential and non- residential)
2. Rapidly residential expansion, (new and more spacious housing)
3. The population is mobile and low or moderate density
4. Speculative building and sub division of land
5. The provision of services and public utilities is incomplete
6. Changing pattern of land occupancy,
7. Poor network of public transport
8. Crop production is intensiveS

### **2.2.3 Factors influencing growth in urban fringe**

According to Kivell (1993), there are many forces that affect rural to urban conversion of land uses, ranging from macro scale (social, political and economic diagnosis) to meso and micro scale (housing and land market, panning decisions, ownership patterns, land characteristics, infrastructure and transportation structure and roles of actors within this process) in the fringe areas. Developers are also the actors during the process. According to Velibeyo lu (2004), developers decide on buying the land, parceling and constructing infrastructure and houses directly affect the land-use decisions at urban fringe. According to Timothy (1995), the role of rural to urban migration in the developing countries play vital role in development of urban fringe as the new city immigrants with low income could not be absorbed by the city and hence they had to look for affordable accommodation within the fringe. Besides population growth, transportation and land are the factors that influence urban fringe development.

**Population Growth:** One of the main factors for population growth is migration. It is a notable factor in urban growth of big urban centers like Kathmandu valley, Bharatpur metropolitan city, etc. The subsequent migration initiates the gradual change in the traditional urban form into a spread towards the agriculture fields. The development thrust from increasing population keeps on transforming the physical and social landscape of any fringe areas.

**Transport:** According to Bryant (1982), the improvement in the transportation system increases an individual's ability to commute, like the advent individual car ownership, contributes to the growth of fringe in developed countries. Likewise improved public transport system allows low income groups to commute to and fro the fringe.

**Land:** Since the land is limited, the core city is not able to accommodate all those needed within the city. Inadequate housing, shortage of serviced plots, inefficient land delivery mechanism, tough planning law and regulation, tax invasion and high land values in the city are some of the land related issues that affect the growth towards the fringe from the city.

Migration is a notable factor in urban growth of big urban center like Kathmandu valley, Bharatpur Municipality, etc. According to Subba (2003), the subsequent migration into the Kathmandu valley, primarily non-urban hill population initiated the gradual change in the traditional urban form into widespread towards the agriculture fields, which is transforming the physical and social landscape of the valley. Likewise according to Bryant (1982), improvement in transportation system increases the individual's ability to commute which contribute to growth of fringe in developed countries. Since the cities have problems like inadequate housing to accommodate all the people, shortage of serviced plots, high land values in the city, the growth takes place away from city but within the easy reach as land value is lower in urban fringe areas. According to Muller (1995 c.f. Subba 2003), the developers also prefer open spaces at metropolitan fringes where large packages of cheap land could readily be assembled. However, according to South Worth and Owen (1993), developing methods and standards that meets basic environment and economic needs while still allowing for organic and incremental growth process is a challenge.

#### **2.2.4 Components of urban fringe transformation relevant with Nepal**

##### **Physical Aspects:**

Due to the ongoing urbanization the effect of peripheral settlement can be seen in physical form. Many of the agricultural land get converted into urban use in the process of urbanization. The pressure of the urbanization changes the landscape of settlement. Accessibility is the dominant factor influencing the land use and development of land parcels. Ribbon development usually takes place in a linear manner mostly along transportation link. Irregular patches of urban development are seen in some locations.

In our context the natural increase in household size and family subdivision and fragmentation of parental land affect the land use. According to South Worth and Owen (1993), it's a challenge for urban designers and planners to develop method and design standards that meet the basic environment and economic needs while still allowing for organic and incremental growth process.

### **Social Aspects:**

With the increasing trend of migration, societies become heterogeneous which affect social structure and organization such as on the class and class patterns, language group, religious practices and beliefs, kinship, marriage and family and community living. Shah and Pant (2005) describes the social structure changes in Kathmandu valley stating that “old structures of society and community are giving way to the emergence of new social divides.”

### **Economic Aspects:**

Various economic activities are engaged in cities According to Subba (2003), the economic activity of the Kathmandu valley shows a major restructuring from primary agriculture sector to secondary manufacturing and tertiary sectors after 1981. The change in activity from agriculture base to more industrialize and development sector the socio-cultural values also gradually decline and becomes dominated by more developed and complex social structure.

## **2.3 Urban Sprawl**

Urban sprawl is basically the spatial dispersion of settlements. Altshuler (1993) defined urban sprawl as “a continuous low density residential development on the metropolitan fringe, ribbon low density development along major suburban highways, and development that leapfrogs past undeveloped land to leave a patchwork of developed and undeveloped tracts”. According to Club (1998), urban sprawl is defined as “a low-density development beyond the edge of service and employment which separates where people live from where they shop, work, recreate and educate- thus requiring cars to move between zones”. The above definitions of urban sprawl have similarities like scattered development, leap frog development, low density development, etc. According to Jaeger & Schwick (2014c.f. Nazarnia et. al 2019), “the more area built-over in a given landscape (amount of built-up area), and the more dispersed this built-up area is on the landscape (spatial configuration), and the higher the uptake of built-up area per inhabitant or job (lower utilization intensity in the built-up area), the higher

the degree of urban sprawl”. According to Bhatta et. al. (2010), there is a “general consensus that urban sprawl is characterized by unplanned and uneven pattern of growth, driven by multitude of processes and leading to inefficient resource utilization”.

### **2.3.1 Driving forces for Urban Sprawl**

The orienting powers affecting the development of sprawling are urban growth, increased mobility, transportation and technology, economic development, consumer demand and public policy.

1. **Urban Growth:** The movement of rural people to urban areas led to pushing of dense population of central cities to further into the surrounding country side. Thus, urban growth pushes the cities further out.
2. **Increase Mobility, Transportation and Technology:** Similarly, the main driving force for urban sprawl in increased transportation accessibility, Public investment in roads and associated infrastructure have played significant role in relation to the urban sprawl (Heimlich). The other driving force is information and communication technology like internet, local and wide area networks, fiber optics, portable computers, etc. According to Kivell (1993), changing patterns of employment and manufacturing process, changing fortunes for urban locations and changing land use demands are associated with new information and communications technologies.
3. **Economic Development:** Similarly new economy or high technology companies develop on spacious sites around small towns, university campuses and urban fringes in the newly favored locations which challenge the traditional role of city.
4. **Consumer Demand:** The developments of housing areas are the main issues in the development of sprawl. Demands on housing environment in secure and natural amenities, with low density, larger houses increase and this is closely related with increase in income and changes in lifestyle.
5. **Public Policy:** The regulatory and policy framework includes land use planning, transportation policy development control, fiscal policy.

### **2.3.2 Impacts of Urban Sprawl**

According to Velibeyo lu (2004), municipal fragmentation frequently associated with urban sprawl is likely to intensify problems like conflicting land uses, pressures and

agricultural and open space, high costs of service provision, adverse consequences on traffic and public transport, social disparities, etc.

Table 2-1 Impacts of Urban Sprawl Development

| Substantive Concern             | Negative Impacts   | Positive Impacts   |
|---------------------------------|--|--|
| Economic costs                  | Higher infrastructure costs under sprawl than compact development<br>Higher public operation costs<br>More expensive private residential and non-residential development costs<br>More adverse public fiscal impacts | Lower public operating costs<br>Less expensive private residential and non-residential development<br>Fosters efficient infill development                   |
| Transportation and Travel costs | More vehicles miles travelled<br>Longer travel times<br>More automobile trips<br>Higher household transportation spending<br>Less cost efficient and effective transit<br>Higher social costs of travel              | Shorter commuting times<br>Less congestion<br>Lower governmental cost for transportation<br>Automobile most efficient mode of transportation                 |
| Quality of life                 | Aesthetically displeasing<br>Weakened sense of community<br>Greater stress<br>Higher energy consumption<br>More air pollution<br>Lessened historic preservation  | Preference for low density living<br>Lower crime rates<br>Enhanced value or reduced costs of public and private goods<br>Fosters greater economic well being |
| Social Issues                   | Fosters suburban exclusion<br>Fosters spatial mismatch<br>Fosters residential segregation<br>Worsens fiscal stress<br>Worsens inner city deterioration   | Foster localized land use decisions<br>Enhanced municipal diversity and choice   |
| Environmental costs             | Loss of agricultural land<br>Reduced farmland productivity<br>Reduced farmland viability (water constraints)<br>Loss of fragile environmental lands<br>Reduced regional opens pace                                   | Enhanced personal and public open space  |

## **2.4 National Policies Review**

The official published documents for Land Use Policy 2015, Environmental Policy 1993, and National Urban Development Strategy 2017 and Municipality level risk sensitive land use planning implementation policy 2073 from the respective government websites. These policies and strategies were then studied and analyzed following interpretative paradigm. . The policies are compared with Risk Sensitive Land Use Plan of Bangladesh. The interpretation is limited to researcher and does not include views and experiences of other parties. The policy or strategy has been looked at in terms of legal, financial, environmental and institutional aspects.

### **2.4.1 Framework for Public Policy Formulation in Nepal**

Framework for public policy formulation is the basic structure underlying the process and task of policy making. (Gelal, 2018) Says the constitution of Nepal is the major source which provides guidance to define the frame of public policy formulation in Nepal. The provisions of preamble which are not subject to changes and the facilitation of constitutional commissions, the theory for separation of power into various government bodies at different levels, and guiding principles of the state have provided the government with a framework for policy formulation.

### **2.4.2 Factors Influencing Public Policy Formulation Process in Nepal**

Public policy formulation is a long process. Various challenges and opportunities surround the task of policy formulation. The factors influencing public policy in Nepal are:

- Political vision reflected in the election manifesto of political parties
- Philosophical/ideological ground setting the political culture of the political parties
- Public agencies and bureaucracy
- Development partners' interests
- Economic actors: market, private sectors and agencies of globalization
- Key economic/fiscal (Ministry of Finance) and development planning (National Planning Commission) agencies
- Pressure groups and minorities' stakeholders
- Elites and community leaders



- Voters, the common people
- Professional institutions
- Resources

### **2.4.3 Environmental policy 1993**

Under the auspices of the National Planning Commission, the Nepal Environmental Policy and Action Plan (NEPAP) were prepared. The NEPAP makes effort to incorporate environmental concerns into the country's development process. It reviews current government policy on the environment, where it is needed and suggests an action agenda to address environmental problems.

The NEPAP has also been prepared in response to the growing global awareness about the importance of maintaining a balance between economic development and environmental conservation, which culminated in the United Nations Conference on Environment and Development in 1992.

There are five main aims of environmental policy;

- To manage efficiently and sustainably natural and physical resources
- To balance development efforts and environmental conservation for sustainable fulfillment of the basic needs of the people
- To safeguard national heritage
- To mitigate the adverse environmental impacts of development projects and human actions
- To integrate environment and development through appropriate institutions, adequate legislation and economic incentives, and sufficient public resources.

As majority of population depends on agriculture, proper management of land, forest and water resources is essential to guarantee and enhance the continued productivity of the country's agriculture.

### **Sustainable management of natural resources**

Sustained growth in the agricultural sector is critical for feeding the growing number of people in Nepal, and for generating a sufficient surplus to support other economic sectors, such as manufacturing. However, growth in the agricultural sector has been one of the principle reasons for low growth in agriculture, low crop yields that are, in turn,

affected by deteriorating soil fertility and quality of agricultural land. Appropriate policies therefore need to be pursued to improve soil fertility and to raise agricultural productivity. Proper soil fertility management through optimal utilization of locally available biomass, rehabilitation of lower potential agricultural lands, adoption of environmentally compatible farming practices, and a reorientation of research and extension to reflect greater responsiveness to the local needs and to sustainable production and consumption alternatives, as well as improved management of livestock and rangelands are some of the key policies.

Deforestation and forest degradation have seriously reduced the availability of timber, fuelwood, leaf litter, fodder and forage. This has not only depressed the incomes of those who traditionally depend on the direct extraction and utilization of these products, but has also contributed to soil erosion and fertility loss, damaged ecosystems, degraded watersheds and other adverse environmental effects. Proposed policies to improve the management of forests and rangelands include adoption of a national land use plan based on appropriate resource use in different agro-ecological zones, formulation of a national energy policy that emphasizes increased energy use efficiency and development of alternative sources, better integration of related sectors such as agriculture, livestock and soil conservation, and greater participation of local communities and the private sector in the management of forests and rangelands.

Implementation of the above policies will be made effective through a number of actions, including: simplification of the rules governing the allocation of forests for private, leasehold and community management and promotion of agro-forestry, to expand income and employment opportunities, adoption of a long-term land use plan and a system of zoning to better manage natural resources, institutionalization of necessary legal reforms and forestry research and extension geared to increase community participation.

Nepal's vast water resource potential remains largely untapped, particularly for energy generation. Yet erosion and sedimentation have emerged as serious problems in many watershed areas. Watersheds, which comprise over two-thirds of the country's land area, have experienced degradation due primarily to inappropriate farming practices and de-vegetation.

Protection of Nepal's watersheds is essential to prevent further degradation from human-induced actions. In this regard, low-cost vegetative and cultural measures, that recognize the needs of farmers, have a better chance of success in preventing erosion and conserving soil than high-cost civil works programs where the farmer has little involvement.

### **Mitigating Adverse Environmental Impacts**

The impacts of urbanization and industrialization are beginning to cause serious environmental problems in some areas of Nepal. Also, many development projects, particularly large infrastructure projects, can have adverse environmental impacts. Steps must be taken to foresee and correct these environmental issues before they inflict high costs on Nepal's people and its economy.

Environmental conditions have deteriorated rapidly in the Kathmandu Valley and some other towns, particularly in the Terai are rapidly expanding, unplanned urban settlements have generated a range of environmental problems affecting human health and welfare. Air and water pollution has worsened due to inadequate sewerage, improper disposal of solid wastes, industrial effluents and discharges, and emissions from motor vehicles. The provision of infrastructure and utility services has been inadequate, exacerbating the situation further.

The current trend of urban sprawl and industrial expansion in and around densely populated areas is unsustainable and poses a serious threat to a clean environment. Policies and actions to remedy the environmental problems associated with urban growth and industrial development, and to prevent similar consequences from happening in future include defining and implementing appropriate zoning regulations, setting of standards for air and water pollution and their enforcement through a carefully designed package of incentives and regulation, and the clear designation of responsible institutions for providing infrastructure and utility services.

Local bodies and the private sector will have to be involved to a much greater extent in the provision and maintenance of infrastructure services. Capacities of local bodies and the private sector will have to be enhanced. In view of the particular issues affecting urban and industrial expansion in the Kathmandu Valley, a separate action plan needs to be developed and implemented for this area.

#### **2.4.4 Land Use Policy 2015**

Land Use policy is devised for protection, promotion and optimum use and effective management of Land and Land Resources (LLRs).

The fast growing population of Nepal, uneven migration has led to unmanaged and rapid urbanization as well as encroachment of arable land and forests, Government and public lands and various resources. The uneven pressure on land and changes in land's geographical and geological condition has paved way for disaster like flood, landslides and soil erosion. To provide a safer settlement, maintain ecological balance and for food security, Land Use Policy 2013 was adopted. The main agenda of Land Use Policy, 2013 was protection of arable land ensuring food security.

The earthquake of 2015 brought into light the need to focus on secured settlement as well and disaster risk mitigation to escape the vulnerability from such devastating disaster. Thus, Land Use Policy 2015 came into existence upon making a review over Land Use Policy 2013. (Ministry of Land Reform and Management (MoLRM), 2015)

Land Use Policy 2015, aims for social, economic and ecological development by optimum use of available Land and Land Resources (LLR) thus leading the country towards prosperity. The objective of Land Use Policy 2015 is to categorize lands into specific land use zones thus making it easy for protection of agricultural land, forest land and develop better sustainable settlement all the while reducing the risk of disastrous hazards.

#### **Problems addressed by Land Use Policy 2015**

- Reduced agriculture produce and low productivity due to encroachment of arable land
- Problem in protection of life and property and disaster management due to lack of approach of scientific classification, development and management of land
- Encroachment of arable land, forests, Government and public lands and natural resources
- Ecological degradation and imbalance in biodiversity, reduction of natural resources due to environmental pollution and climate change
- Negative impact in lower riparian areas without proper conservation of Himalayan regions, Hills and Churia Zones

- Lack of open spaces in urban areas

### **Challenges to overcome**

- Developing a proper utilization of land upon scientific classification in a special manner
- Ensuring institutional and coordinating roles by stakeholders
- Ensuring food security by boosting agriculture and preserving arable lands
- Creating a hygienic, beautiful, well facilitated and safe human settlement for sustainable urbanization
- Mitigating climatic changes and new natural hazards, protecting biological diversities and environment by conserving, developing and managing critical natural resources
- Effectively enforcing LUP once it is formulated

### **Opportunities for effective Land Use Policy**

- Commitment by political parties and stakeholders
- Mass concern for better and safer human settlement
- Local enthusiasm for conservation of Land and Land Resources and natural heritages
- Technically sound equipment for Land Use Information System
- Goal of prosperous country

### **2.4.5 Core Case for Formulating Policy**

- Constitutional: Article 51 of Constitution of Nepal 2015 regarding policies relating to Agriculture and Land Reform which envisage that land management and commercialization, industrialization, diversification and modernization of agriculture shall be done by pursuing Land Use Policy (LUP)
- Underlying Principles for classification of LUZ; Promote complimentary Land Use, maintain competitive land use and avoid conflicting land use
- National Need for optimum use of LLR and maintain balance between environment and development
- International Commitment Sustainable Development Goals
- Directions and recommendation by Council ministers/ Commissions/ Committees

- Long Term Roadmap of Ministry of Land Reform & Management

Table 2-2 Land use policy

|                              |   |
|------------------------------|---|
| <p><b>Policy 1</b></p>       | <p><b>Classification into Land Use Zones (LUZ)</b></p> <ul style="list-style-type: none"> <li>• Agricultural Zone</li> <li>• Residential Zone</li> <li>• Commercial Zone</li> <li>• Mines and Mineral</li> <li>• Cultural and Archeological Zone</li> <li>• River and Lake Reservoir</li> <li>• Forest</li> <li>• Public Use and Open spaces</li> <li>• Building Material(Sand, Stone, Concrete) Excavation</li> <li>• Other Zones as per necessity</li> </ul>  |
| <p><b>Interpretation</b></p> | <p>The classification is to be done according to existing land use, the capacity of the land, geographical and geological land composition. A properly studied geographical and geological land composition can reduce human and property loss factor by assigning lower risk zones for high human density areas. Moreover, such classification can help in conservation of arable lands, forests and other public spaces as use of land not conforming to specification is prohibited.</p> <p>Classification of land use allows for better control over the development of land and unchecked urbanization as different land requires different set of rules and regulations suited for its specific land use type.</p> <p>It also helps ease budget distribution according to the need of specific zones.</p> |
| <p><b>Policy 2</b></p>       | <p><b>According to federal structure, Level wise Land Use Plans shall be devised of and be executed</b></p>   |

|                       |   |
|-----------------------|---|
| <b>Interpretation</b> | <p>With expertise on hand, new technology and technical assistance, Federal Land use Map is to be prepared, based on national priority and policy, following the objectives of the Land Use Plan. The plan thus formulated at federal level provides a better basis upon which Land use plans at local levels can be further detailed with modified application, additional rules and regulation concurring with the Federal Level Land Use Plan.</p> <p>Land Use plan at local level is to involve local communities and should be devoid of discrimination in any form.</p> |
| <b>Policy 3</b>       | <p><b>The use of Land and Land Resources (LLR) ensured on the basis of Specific Land Use Zone (SLUZ) and Land Use Plan (LUP)</b></p>  |
| <b>Interpretation</b> | <p>The land use plan is to be devised according to land resources available. The classification therefore helps in optimum utilization of the resources in that zone. This checks for overexploitation thus preventing environmental degradation and avoiding induced disaster risks.</p> <p>The policy also ensures proper land use and has strategies in place to promote the use of land as intended by discouraging improper use and revoking the land use not conforming to the policy. This helps in ensuring status of policy 1.</p>                                   |
| <b>Policy 4</b>       | <p><b>Level wise LUP compatible with physical Infrastructure and development projects shall be devised of and implemented</b></p>   |
| <b>Interpretation</b> | <p>On the basis of Land Use Plan, a proper well organized and planned human settlement is to be proposed in places that are geologically sound (i.e. low risk due to land nature). Proper planning of infrastructure is advised for better distribution of facilities and uplift quality of life to form a resilient community towards any form of risks.</p>   |

|                       |  |
|-----------------------|--|
|                       | For the operation of physical infrastructure development work, industrial development as well as land development programs private and cooperative sectors is to be encouraged.  |
| <b>Policy 5</b>       | <b>Optimum use and protection of arable lands shall be ensured of upon discouraging of non-agricultural use of arable lands and trend of keeping land fallow and rampant fragmentation</b>   |
| <b>Interpretation</b> | <p>Agricultural zones have been allocated in various parts for food security. To promote agriculture in these zones, grant and/or compensation has been facilitated. Irrigation channels have also been assigned thus encouraging commercial farming. Highlands of mountainous regions, land with irrigation facility and under command area of planned irrigation are classified as agricultural zones. These lands are provided with specified facilities.</p> <p>Any non-agricultural land use or land left vacant in these zones might be imposed with additional tax. This prevents encroachment of agriculture land as well as promotes densification of the core areas.</p> <p>Minimum lot size has been marked to prevent further defragmentation of land.</p> |
| <b>Policy 6</b>       | <b>A hygienic, beautiful, well-facilitated and safe human settlement as well as a planned and sustainable urbanization of the country shall be ensured of.</b>   |
| <b>Interpretation</b> | <p>The earthquake of 2015 spread light upon many residential areas on high risk lands as well as risk due to unmanaged sprawl. For safe human settlement, the policy states that residential zones be allocated in less risk areas according to geological study to reduce the impacts in case of disasters. It has strategies in place vulnerable or unsecured human settlements to be moved to safer areas and prevent any further high risk development in such zones.</p> <p>New towns to be proposed shall have proper planned</p>  |



|                       |   |
|-----------------------|---|
|                       | <p>infrastructure with standard bye laws and proper demarcation of open spaces as safe zones.</p> <p>Also, need of new secured low cost housing for the landless or people who have difficult access to land is addressed which prevents squatter settlements, encroachment of open spaces, forests and public areas. This diminishes environmental degradation as well as maintains necessary open spaces. For this, Government/ public-private partnership (PPP concept) and/or public-cooperatives are encouraged to participate.</p>  |
| <b>Policy 7</b>       | <b>Conservation and optimum use of forests and other natural heritages shall be ensured of.</b>   |
| <b>Interpretation</b> | <p>Demarcation of forests and reserve areas in land use plan indicates the maximum protection of green areas to integrate with the planning process. This policy guides the planner to avoid deforestation; if forest area is to be used there should be afforestation equivalent to those areas. In Nepal's context urban forestry is rank low in the local agenda; this policy is not implemented in most of the planning process. Taking Kathmandu as an example there is no any implementation of those policies which promote conservation of forest and green areas. Conservation of water shed areas, wet land areas, reserves, intermediary areas, national parks and wildlife reserves and pasture areas are most important to promote tourism and to maintain ecological biodiversity. Lands in mountainous and hill areas having low productivity and with human settlement in between forest zones obliged to relocate other appropriate zones and be encouraged to develop forests into such areas.</p> <p>The evidence of the environmental and socio-economic unsustainability of urban growth is increasingly drawing public attention to the need for more sustainable and resilient urban models, capable of responding to increasing demands for food and basic ecosystem services. By providing ecosystem services,</p> |

|                       |  |
|-----------------------|--|
|                       | <p>products and public benefits in and around urban settlements, well-designed and well-managed urban forests can significantly contribute to the livelihood and health of urban and peri-urban communities. The availability of urban forests close to cities, in fact, allows citizens to experience forests without going far from the place where they live, thus helping strengthen people's link with nature and increase public awareness on the importance of preserving natural resources. It can also help in tourism development of the country. This helps to generate income in that local area as well as uplift the economic condition of country.</p>  |
| <b>Policy 8</b>       | <p><b>Incentive-oriented programs shall be operated in order to motivate people for the use of Land and Land Resources (LLRs) in accordance with Land Use Zones (LUZs) or Land Use Plans (LUPs).</b></p>   |
| <b>Interpretation</b> | <p>This policy encourages the people to use land in productive sector. If any industry, housing company, private sector, co-operative sector, among others, became interested for agricultural development in line with land use plans and the policy concerned, the state can provide additional subsidy/facility to them. Private sector is encouraged if they come to develop the 'unused land' under the Specific Land Use Zones (SLUZs) and Land Use Zones (SLUZs). It will motivate the person or institution to invest for the purposes of commercial farming, tourist hubs, research center, scientific laboratory, entertainment venues, games &amp; sports, among others, which can uplift the economic condition of a person or institution. It also helps to boost the economy of a country.</p> |
| <b>Policy 9</b>       | <p><b>Keeping lands under conditions of 'non-use' or 'under-use', 'misuse and 'excessive use' shall be discouraged.</b></p>  |
| <b>Interpretation</b> | <p>This policy strictly prohibits any development affecting natural flow of rivers, boundaries and prescribed standard. This can</p>   |

|                              |   |
|------------------------------|---|
|                              | <p>reduce the vulnerability of flood and liquefaction around the river area. Boundaries of lake-reservoirs, bio-track, public pond, wetland and pasture lands should not be encroached those area can be used for promotion of tourism without affecting their natural features; it helps to generate economy of that area and also uplifts national economy. Protection of soil by maintaining its natural core should be encouraged; whereas on the other hand, acts against standards of land use causing changes in the natural features should be discouraged. It will control haphazard development of any area. Acts such as: facilitating land-soil, affecting arable land and making road or extension thereto causing vulnerability to nearby local settlement are discouraged. It will reduce the vulnerability of landslide of nearer area. In order to bring 'non-use' type of Govt., or public lands, 'underused' or 'low graded' type of lands into Specific Land Use Zones (SLUZs), land development programs are encouraged on such lands. This can motivate a person or institution to invest on unused government land in any agriculture, commercial, industrial or for productive purpose.</p> |
| <p><b>Policy 10</b></p>      | <p><b>In order to keep balance between development and environment for the mitigation of natural and human created-hazards, vulnerable zones shall be identified and the provision thereof shall be made to ensure of operating of certain activities only in those zones.</b></p>  |
| <p><b>Interpretation</b></p> | <p>By identifying highly hazardous zones of natural disasters only certain activities are given to operate in such places, which will ultimately prohibits any development in that area to reduce vulnerability. In order to protect sensitive zones through eyes of natural disasters, protective programs are allowed to operate. It can help to aware people about probable disasters in that area. In operating construction and/or development-works, in order to keep balance between land, environment and development; the</p>  |

|                       |  |
|-----------------------|--|
|                       | <p>principle of sustainable development are adopted in view of the impact of climate change. In maintaining the natural flow of rivers through secured and sustainable embankment, the upper level Govt. lands so made are used, on the basis of appropriateness, for agriculture, forest, road, green belt and open places/zones. Focuses on identifying natural disaster-prone zones and implementation of protective programs as means for mitigating negative impacts on land, environment and climate surrounding such zones. Strategises on limiting development related and construction activities at such zones – only risk free activities are to be allowed to operate at such zones. For example if certain part of landpooling is falls under liquifaction zone that area should not be used as residential development, that area can be used for openspaces, playground ect.</p>  |
| <b>Policy 11</b>      | <p><b>Protection and optimum use of natural heritages, tourist hubs and historical, cultural and religious, archaeological zones including lands belonging to Government, the public and trust shall be ensured.</b></p>   |
| <b>Interpretation</b> | <p>By identifying various historical, cultural and religious, archaeological zones and potential areas of tourists' hubs; use and protection thereof are done not affecting their originalities according to the objectives of those zones. This policy intends to identify, safeguard and ensure optimum use of zones of historical, cultural, religious and archaeological importance. This policy also focus on maintaining the orginality of such sites, limiting the misuse of heritages, preventing damage to biodiversity and restriciting the wasteful use of valuable natural resources at such sites. Heritage conservation is important for identifying, recording, analyzing and protecting heritage and cultural resources. It plays an important role to define the landmark within the heritage area as well as to generate economic return and to support the tourism industry. Conservation of heritage sites is very</p> |

important because it provides a sense of identity and continuity in a fast changing world for future generations. Heritage sites basically represent the past history and culture of a nation. Heritage sites possess historical values resulting from their beautiful architecture and their correlation with important events that occurred in the heritage area such as religious, social and political events. They are subjected to processes of degradation with time, which leads to a situation in which they became not able to fulfill the purpose for which they were built. They must be created and developed to ensure that any important changes in conservation work are undertaken in the most ways possible to preserve the heritage structure's, historic character and features. Use of heritages affecting those listed in the world heritages and change of Land Use Zones (LUZs) should be prohibited. In order to protect zones of strategic, environmental and sensitive through eyes of bio-diversities and zones of special importance, No GO Zone are managed to a certain distance of those zones, and those zones are prohibited for other uses. This will help to protect random activities in heritage sites. In case important natural resources discovered in future such as: minerals, oil, gases, among others; whatever zones they lay in, the zones should be used under the same classification according to the Specific Land Use Zone classification. Lands belonging to Government, public or trusts – which are not in proper use should be managed under protection and be used under Specific Land Use Zones (SLUZs) purposes. Records of Government and public lands shall be maintained and a permanent mechanism equipped with functions, duties, powers and responsibilities should be established for necessary protection. Aims of the policy may be realized for example, by creating zones of prohibition (No Go Zones), classifying certain sites as Specific Land Use Zones (SLUZs) whenever appropriate and by maintaining proper government records of lands owned by the government, public and trust.

|                       |   |
|-----------------------|---|
| <b>Policy 12</b>      | <b>Minimum valuation and land tax system shall be developed as per a plot based land records upon referring Land Use Zones (LUZs) on the basis of specific land use</b>   |
| <b>Interpretation</b> | It can provide tax subsidy given to the land used for agricultural purposes. Except that, tax shall be assessed on the basis of use and benefits. This policy aims to complete the surveying and record keeping of all lands that are not yet in records. It is aimed to implement taxation on the basis of land use and benefits, and to levy it progressively. Tax subsidised for land used for agricultural purposes.  |
| <b>Policy 13</b>      | <b>Information system on Land Use Plans (LUPs) shall be developed</b>   |
| <b>Interpretation</b> | A land use information system is essential in handling and integrating databases. This role is particularly important as various applications, such as economics, demography, agriculture, and the like, are being integrated in land use planning and monitoring. Integrating information also enables local government to provide varied products and services to clients. Land use in local government has evolved from mere physical planning to management and governance. A land use information system can be developed to manage land use changes and to promote participative decision making. It can be used to decide, enforce, and monitor land use plans and policies. With publicly available and accessible information, the system can be a means to promote participation, transparency, and accountability. |
| <b>Policy 14</b>      | <b>Institutional structure shall be established in course of the execution of land use policy, plans and programs thereto.</b>  |
| <b>Interpretation</b> | Establishment of institutional structure/mechanism and coordination in between or among different stake holding agencies can be a major policy. In case of Nepal, there is no any   |

|                       |   |
|-----------------------|---|
|                       | systematic coordination of institution like department of Roads and KUKL.   |
| <b>Policy 15</b>      | <b>Public awareness shall be enhanced on land use and long term impact thereto.</b>   |
| <b>Interpretation</b> | Knowledge and awareness on optimum land use and land resources encourages people and stakeholders not to use vulnerable land for any residential, commercial purpose. However, developing the steps leading to the desired future, decision-makers should have an awareness of what the situation is now, and how the various parts of society are connected with each other. |

#### **2.4.6 Municipality level risk sensitive land use planning implementation policy, 2074**

The policy was prepared by the Ministry of Federal Affairs and Local Development with the technical assistance of Comprehensive Disaster Risk Management Project (CDRMP) under UNDP. It divides Disaster Risk Management into 2 types namely Potential Disaster Risk Management and Hazardous Disaster Risk Management. The major objectives of the policy remain as the zoning of land as per its risk sensitivity and selection of the suitable usage of a land according to the level of its risk sensitivity. This would thus reduce the impacts of natural and man-made hazards. The division of the land into 11 different zones according to its usage is suggested in the policy. There are various factors and stages in development of Risk Sensitive Land Use Planning process. This policy, as it is to be implemented at different municipalities, identifies Municipality as a strong institutional body. The fortification of the institutional body with all the intellectual manpower, a timely supervision on the implementation of plan and improvisation of policies along with the time is mentioned in the policy.

The RSLUP is seen to have focused on the role of Municipality as an institution in the formulation, implementation, and supervision and up gradation of such land use plans. RSLUP is a multi-sectorial plan that requires the knowledge and brain storming from

wide fringe of intellects. It also suggests that the Public Participatory Approaches (PPA) can result into practical policies which actually work because it addresses the issues of the local public. Thus, the importance of institutional framework and public participation can be enlisted as major takeaway from the review of this particular policy.

#### **2.4.7 National Urban Development Strategy 2017**

With nearly 50% of its population now living in the urban areas and formation of new municipalities, Nepal has reached at a critical point to provide access to basic infrastructure services and guide its urban development through a holistic approach. Accepting the fact that the future of the nation relies in its urban development, the Ministry of Urban Development (MoUD) has formulated National Urban Development Strategy (NUDS) to lead the process of urbanization by integrating actions of important urban sectors through strategies that will help in shaping the future of the urban areas. With the vision for next 15 years, NUDS has envisaged integrated urban development efforts. NUDS has been shaped realizing the need of strategic direction that will guide the urban development process in the country. As such, it provides strategies for urban development for the next fifteen years by covering various sectors of urban areas such as infrastructure, environment, system, finance, economy, investment, land and governance.

Municipalities are the key actors for implementing NUDS. Local bodies better knows the potentials of their cities and tries to create the resources based identity of city and the planning can orient on these directions. The strategies linked with urban system, urban infrastructures, urban environment, and urban economy, urban financing and urban land development issues have to deal on the broad frameworks of NUDS.

#### **2.5 Case Study of Howrah District (Kolkata Urban Agglomeration)**

Howrah is a metropolitan city within Howrah district, in the Indian state of West Bengal. It is the headquarter of the Howrah Sadar subdivision. Howrah is located on the western bank of the Hooghly River. It is a part of the area covered by Kolkata Metropolitan Development Authority (KMDA). Howrah is an important transportation hub of West Bengal and a major gateway for its twin city of Kolkata. Howrah grew as a part of the hinterland of Kolkata. Howrah is connected to the metropolis of Kolkata



by two bridges. Howrah provided significant economies for the growth of industries like jute, ship repair and engineering.

According to Roy and Chatterji (2017), Kolkata grew steadily in economic and political importance with the expansion of British colonial power from Bengal to the rest of the Indian sub-continent, to emerge by the 19th century as the capital of a vast empire and the preeminent port of Asia. The city's economic rise was closely associated with its becoming the dominant node in the colonial trade route linking distant forelands in Europe with China and southeast Asia, while at the same time acting as the gateway to a natural resource (e.g. jute, tea, coal, iron) rich hinterland of the northern India through an elaborate rail, river and road network (Tan 2007 c.f. Roy & Chatterji 2017). The capital of British India was shifted to Delhi in 1912, but still Kolkata continued to grow commercially till mid 1960s (Goswami 1989; Raychaudhuri & Basu 2007 c.f. Roy & Chatterji 2017). The extended metropolitan region of Kolkata includes three 3 municipal corporations (Kolkata, Howrah and Chandannagar), 38 municipal councils, and 22 Panchayet Samitis (Rural Councils) in an area of 1851 sq.km (KMDA 2007) and has 14.1 million population (Census 2011). It is oriented along a north-south longitudinal axis with the River Ganges running through the middle. 4 The metropolitan core is constituted of Kolkata Municipal Corporation (KMC) area, which forms the nucleus of this agglomeration with a population of 4.5 million (Census 2011) on eastern side of the river along with Howrah Municipal Corporation (KMC) area having a population of 1.07 million (Census 2011) on the western bank of the river.

According to Roy and Chatterji (2017), an industrial complex, (which mainly consisted of jute mills and heavy engineering industries) started forming around Kolkata and Howrah from the 1860s. Railway lines, which were also simultaneously laid in the 1850s parallel to the river, connected the mill towns to two major railheads (Sealdah Station and Howrah Station) located at the eastern and western flanks of the metro core. Developed railway infrastructure of the suburban mill towns, availability of skilled labour force and proximity to banking, financial and administrative facilities of Kolkata, contributed to further growth in industrial manufacturing, between 1920s and 1950s, especially in areas of heavy mechanical and electrical industries (Such as rail wagon, ship building, motor cars, transformers etc.). Supply-chain demands in heavy engineering industries in-turn led to formation of a large cluster of small scale ancillary workshops, lathe machine-shops, metal foundries in Howrah.

According to Roy and Chatterji (2017), benefits of agglomeration economy brought variety of other industries such as chemicals, rubber etc. to the city. Colonial era industrialization in the city attracted entrepreneurs from neighboring districts and different parts of the state and menial workers from the underdeveloped states of Bihar and Uttar Pradesh. During 1950s and 1960s, while the town witnessed industrial expansion with small enterprises being set up within the residential areas, deteriorating municipal infrastructure was characterized by overflowing sewerage, scanty water supply, potholed roads and proliferation of slums and squatters. But the golden era of industrialization in Howrah was short lived. The Freight Equalization Policy of Government of India in the late 1950s robbed Howrah of the advantage of its proximity to coal and iron belt and spelt doom for the metal and metal based engineering industry. The jute industry was also facing downswing due to fragmentation of jute growing areas after the partition. Other industries were confronted with general recession and political upheaval in the state during mid-sixties. A vicious cycle of sickness of industries and militant trade unionism compelled the owners to close down many factories leading to flight of capital from the town and the state. Subsequently, Howrah grew as an appendage of Kolkata. The first comprehensive planning effort to rejuvenate Kolkata metropolitan region- the Basic Development Plan 1966-86 published by Calcutta Metropolitan Planning Organization (CMPO) envisaged a bi-polar urban structure with Kolkata-Howrah in the north and Kalyani-Bansberia in the south of Kolkata Metropolitan Area.

A separate development plan of Howrah was published in 1967 that suggested a detail revival plans for industrial areas and augmentation of infrastructure and amenities (CMPO, 1967). In the CMPO plan there was proposal to set up separate development authorities for the east and west bank of the river. Accordingly, Calcutta Metropolitan Development Authority (CMDA) was constituted in 1970 but the one for Howrah could not materialize due to prevailing political climate of the state. So Howrah despite its economic contribution remained as backyard of Kolkata and the planning and development attention focused on the east bank in general and Kolkata in particular. Even after five decades of formulation of the Howrah Plan in 1967, planned urban development remains a distant dream and urban amenities and infrastructure is in appalling state in the city. The few positive events happened during this period are the construction of the Vidyasagar Setu (second bridge over the river connecting the

southern part of the Howrah with Kolkata), the Nibedita Setu (third bridge connecting the Dum Dum international airport with National Highways on the west bank), and the Kona Expressway connecting Howrah to the network of National Highways. Recently the East-West Metro is being constructed to connect the central part of Howrah with Kolkata through mass transit system.

Despite the improvement in connectivity with Kolkata by the two new bridges, Kona expressway and East-West Metro construction in process, Howrah continues to remain as a suburb of Kolkata without any concerted effort to rejuvenate its ailing industries, dearth of quality civic infrastructure for academic, health, commercial and recreational activities and land supply to ensure affordable housing for the people living in slums or slum like situation in the city.

In spite of the historic reasons of economic decline, one of the prime reasons of its resilience is excellent road and rail connectivity to Kolkata and rest of India. Proximity to the ports of Kolkata and Haldia and direct access to the industrially developed western and southern states of the country through well-developed highway network made Howrah a transport hub and distribution centre for goods.

Slum is an integral feature of the urban fabric of Howrah since the inception of the town. The urban growth induced by colonial industrialization was not supplemented with municipal service provision. The migrant workers from the impoverished states of Bihar and Uttar Pradesh were also not interested in better living conditions as it would entail higher taxes or user charges. The problem multiplied after independence, especially during the recession and political unrest in 1960s (Roy and Chatterji 2017).



Figure 2-2 Connection between Howrah Municipal Corporation and Kolkata Municipal Corporation

Though separated by Hooghly River, a natural barrier, Howrah grew along with Kolkata, gave opportunities of employment to large section of low and middle income labor force through growing tertiary sector activities. Because of which Howrah always had stable population base despite its bleak infrastructures.

Inferences:

Gaindakot municipality is also separated by Narayani River, a natural barrier, from Bharatpur metropolitan city. Since Bharatpur is economic hub, Gaindakot has always been influenced by development of Bharatpur. Gaindakot is largely dependent on Bharatpur for many services and economic opportunities. Gaindakot is also providing support for Bharatpur by suppling labor force, raw materials, etc. It is very necessary to intervene properly at right time so that Gaindakot will not have to suffer as Howrah had to suffer by being near to economic hub.

## CHAPTER THREE: STUDY AREA

### 3.1 Introduction of Gaidakot

Gaidakot is municipality situated in Nawalparasi District in the Lumbini Zone and has an area of 159.93 sq. km. It was declared municipality in May 2014 by merging the then existing three VDCs: Mukundapur, Amarapuri and Gaidakot. Ratanpurj VDC was also later merged in the municipality. The municipality is bordered with Chitwan and Tanahun districts on east, Devchuli Municipality on west, Bulingtar Rural municipality and Tanahun district on north and Chitwan district and Chitwan National Park on south.

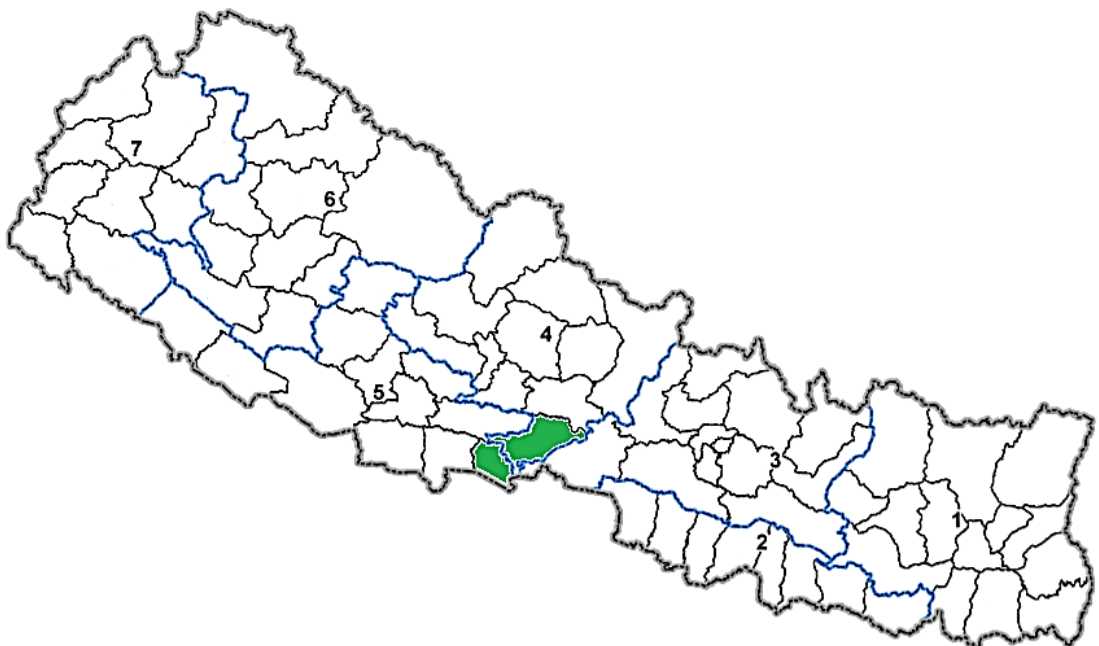


Figure 3-1 Nepal- Nawalparasi District



Figure 3-3 Nawalparasi District- Gaidakot Municipality

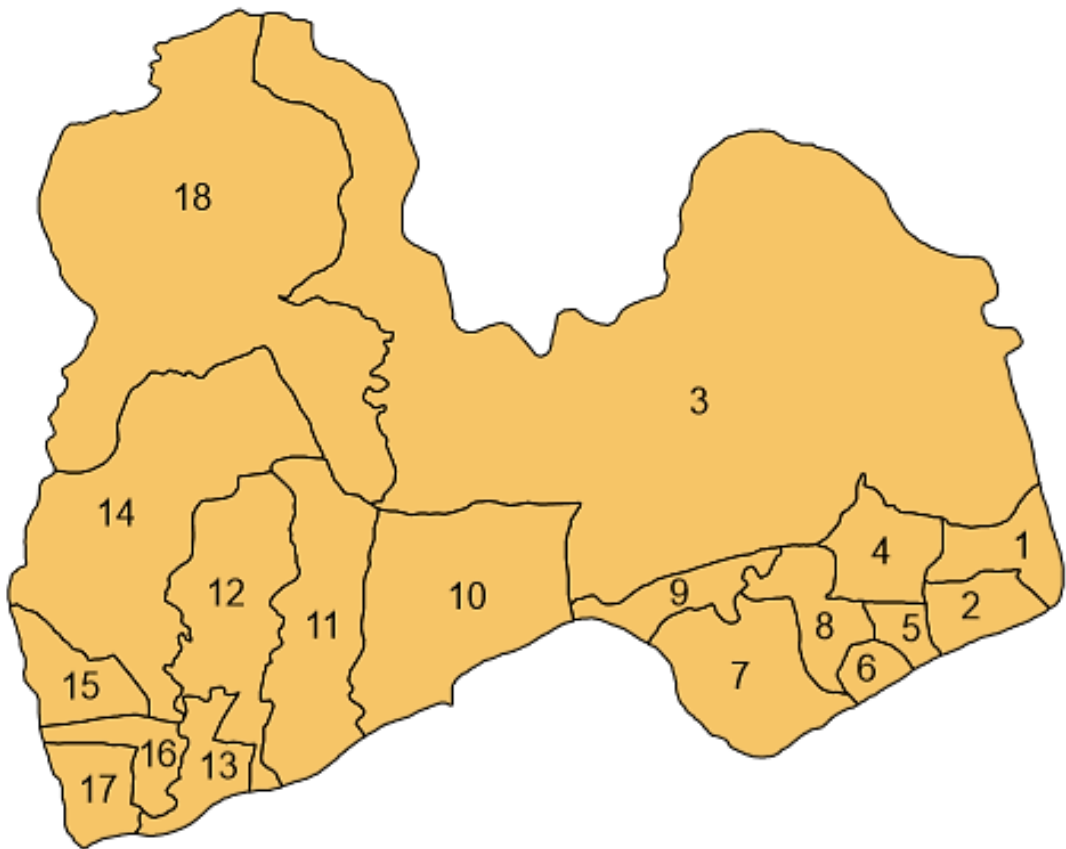


Figure 3-2 Gaidakot Municipality- Wards

Gaindakot municipality doesn't have native people of its own. Rather it is developed through migration because of which the caste/ethnicity seems to be a mixed one comprising of Brahmin, Chhetri, Janajatis and Dalits. Most of the people use Nepali language for communication but besides Nepali language, other languages like Newari, Tharu, Gurung, Tamang, Magar, etc. are also used. People from various caste/ ethnicity and religious groups celebrate various festivals like Dashai, Tihar, Chhath, Lhosar, Teej, Buddha jayanti, Maghi, etc. Thus, Gaindakot municipality demonstrates multi culture and multi ethnicity. Similarly, there are various cultural heritages in the municipality like Maulakalika temple, Divya dham temple, Koteshwor Shivalaya temple, Radhakrishna temple, Ram mandir, Ganesh temple, Harihar temple, Kalika temple, Durga temple, Boudhha gumba, Chaitya gumba, Boudhha stupa, etc. Maula kalika temple, British camp, Dhodeni and Narayani River are major tourist attraction areas in Gaindakot municipality.

Since Gaindakot is developed through migration, the municipality seems to be mixed settlement ethnically comprising Brahmin, Chhetri, Janajatis and Dalits. The demographic status of municipality is shown below:

Table 3-1 Population Status

| CBS  | Households | Total Population | Male Population | Female Population |
|------|------------|------------------|-----------------|-------------------|
| 1991 | 5105       | 28892            | 14148           | 14744             |
| 2001 | 8333       | 43060            | 21352           | 21708             |
| 2011 | 13623      | 58841            | 28209           | 30632             |

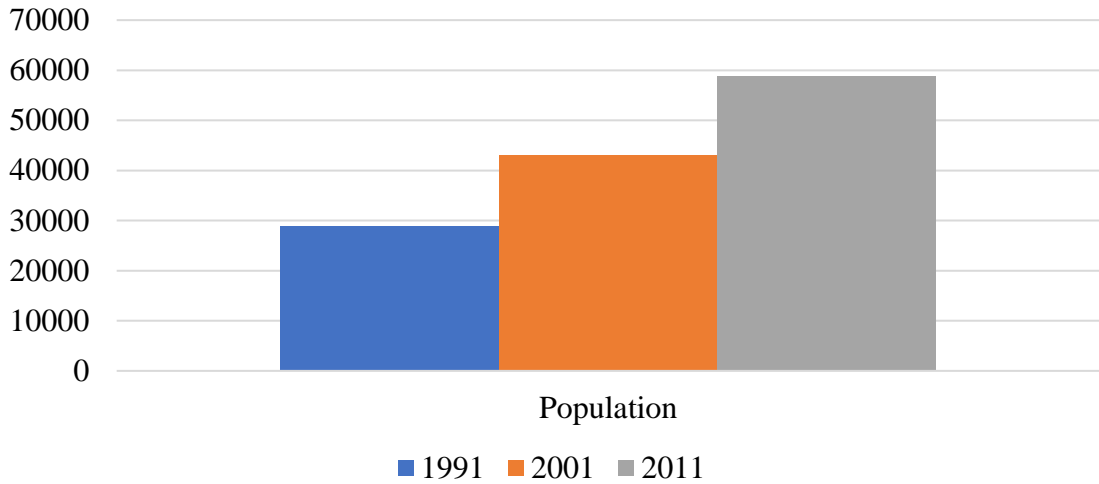


Chart 3-1 Population Status

### 3.1.1 Existing Land use of Gaidakot Municipality

Land use consists of the percentage shares of total land area for various uses like agricultural, residential, recreational, industrial, etc. In Gaidakot municipality, the majority of land is covered by forests which are nearly 47% of the total area. The forests provide great variety of trees like sal, saj, jamun, etc. and the forests provide various products and services like grass, fodder, timber, fuel wood, medicinal herbs, etc. The existing land use of Gaidakot municipality is given as below:

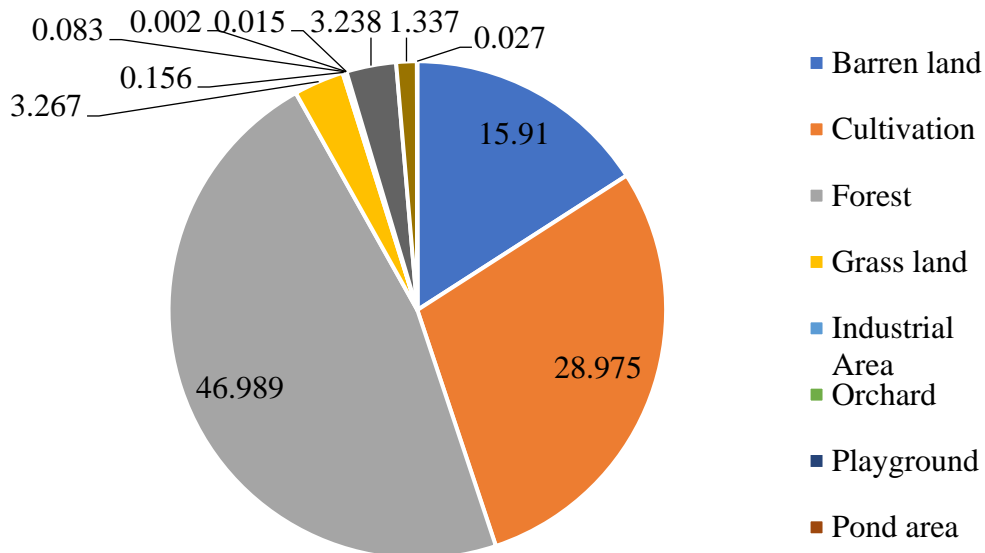


Chart 3-2 Land cover of Gaidakot Municipality



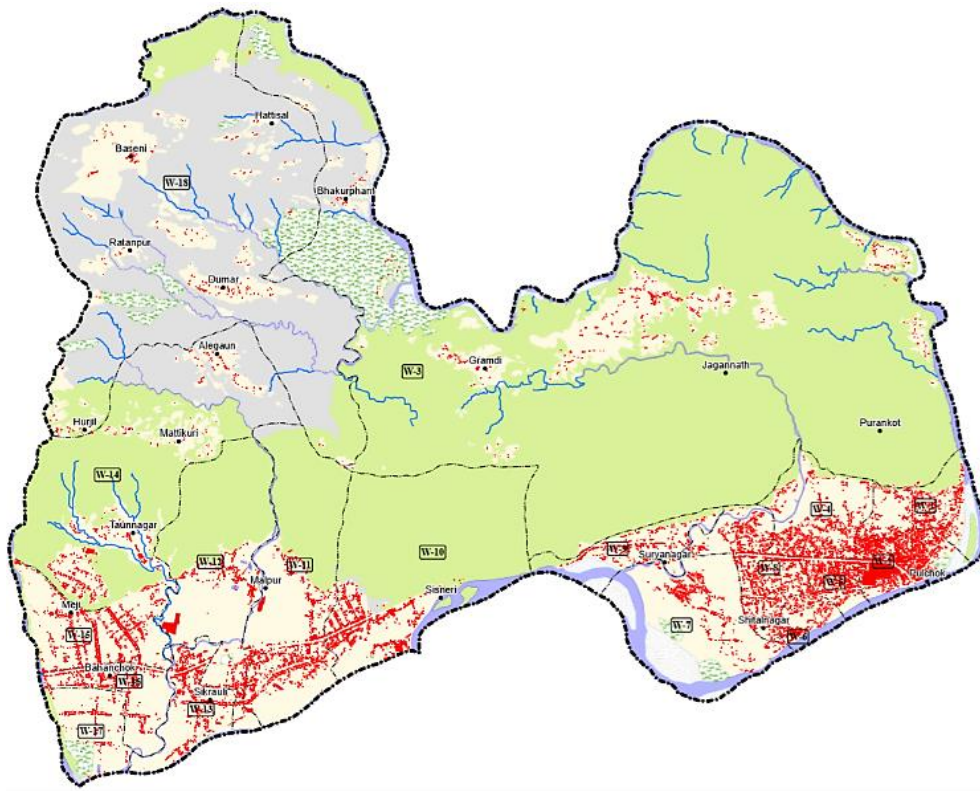


Figure 3-4 Existing land use map of Gaidakot Municipality  
(Source: IUDP draft report, Gaidakot )

### 3.1.2 Economic Condition

Since the municipality shows the characteristics of both rural and urban areas, there are various activities through rural urban linkages that generate economy. However, Agriculture is the main occupation of the people in Gaidakot. However, there is need of commercialization in agriculture as the prevailing system is subsistence and traditional one. The major crops produced in the municipality are rice, maize, wheat, mustard, cauliflower, potato, etc. Vegetable farming, poultry, fish farming, etc. are gradually increasing and becoming an important source of income in the municipality. Besides, Gaidakot has got small and medium scale industries like textile industries, gas refilling industries, rice mill, water factory, plastic factory, block factory, chocolate factory, hatcheries, oxygen plant, cotton mill, etc. which generate employment opportunities and are aiding the income of the municipality. The Bhrikuti Pulp and Paper Mill is situated in ward no. 2 of Gaidakot municipality and is owned by the Golcha Organization. The company was established in 1985, with support from China. It was privatized in 1992, and Golchha Organization had been operating the factory

since then. The paper factory halted productions in March 2011, citing shortage of raw materials, more than 16 hours of power cuts, and declining demand for the paper it produced, among others, it has permanently shut down since then. There are various financial organizations in the Gairdakot municipality like saving groups, co-operatives, remittance exchange firms and banks. Almost every ward has one co-operative. Wage labor and service are other sources of income. Foreign employment is another main source of economy in Gairdakot now. The mobility of the people for employment ranges from different parts of India to Gulf countries, USA, Australia and various European countries as well.

### 3.1.3 Urban Development Infrastructure Indicators

#### 1. Transportation and road network

Mahenda Highway runs through Gairdakot. Narayani Bridge is the only connector of Gairdakot with Narayanarh.

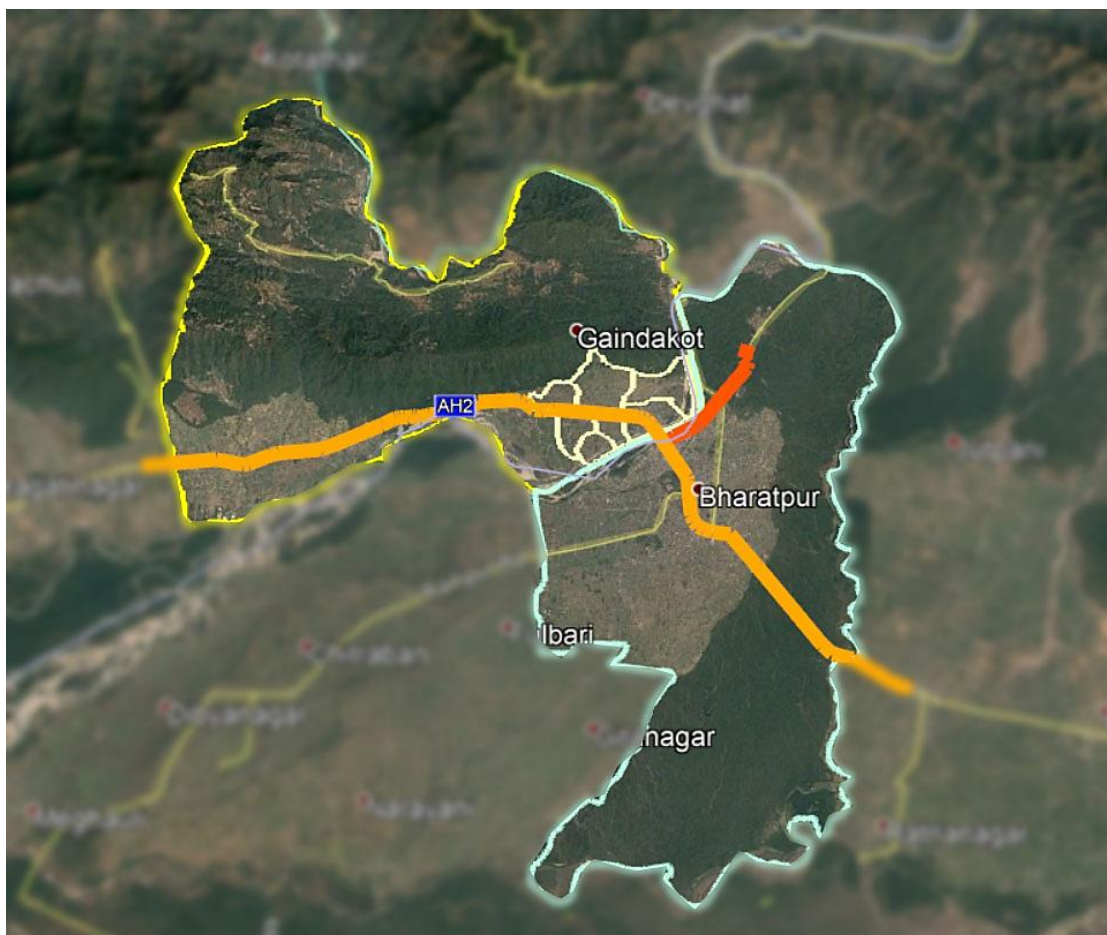


Figure 3-5 Transport Linkage

Gaindakot municipality does not have airport of its own and Bharatpur Airport is the nearest airport. For long route journey, the people of Gaindakot take vehicles from Narayangarh. Road networks have developed a lot over the past few years in Gaindakot. Nowadays, most of the roads are pitched and are of six meters width minimum. Public transportation is regularly available and large no of people use private vehicles as well.

## 2. Water Supply

The major water supply for the Gaindakot area are Gaindakot pumping scheme water supply, situated in ward no. 4 and another is Jaluke drinking water supply, situated in ward no. 1. Nowadays, tap water is the main source for people. However, there are different sources of water like rivers (Naryaani, Jayshree), tube well, open wells, etc.

## 3. Education

According to CBS 2011, 80.35% people are literate in Gaindakot. There are several schools in the municipality, which can be government, private and community based institutions. Besides, many students go to schools in Bharatpur Metropolitan city for education. The students from Gaindakot mainly go to Bharatpur or other cities for doing graduation.

## 4. Health

There are few health posts, clinics and private hospitals in Gaindakot. People from all wards can visit health post within half an hour but mostly people in Gaindakot go to hospitals in Bharatpur for major treatment.

## 5. Drainage

The municipality has no proper sewerage system and drain facility. Due to poor drain facility; many areas of Gaindakot municipality have to face floods during rainy season. The waste products in the municipality is collected by municipality vehicle, however, there is no land fill site in the municipality. The provision of dust bin for waste collection in public areas is developing. Degradable wastes are converted into compost manure for farm lands.

## 6. Irrigation

Narayani River, Jay shree khola, kakarsoot khola, dhunge khola, khahare khola, hadbade khola, etc. are the water resources for irrigation in Gaindakot municipality. The municipality does not have sufficient irrigation facility. A small irrigation dam is located on the way toward Dhodeni, north of Ranital.

### 3.1.4 Selection of wards

The wards 1, 2, 3, 4, 5, 6 and 8 are the study area of my research. Among the four VDCs merged in Gaindakot municipality, the wards of the then Gaindakot VDC are not changed. Among the nine wards of the then existing Gaindakot VDC, ward no 3 is largely covered by forests and is far from Mahendra Highway whereas the wards for the study show major settlement growth. The land use in these wards are changing rapidly than remaining three wards of the then existing Gaindakot VDC. Thus these wards are selected for the research.

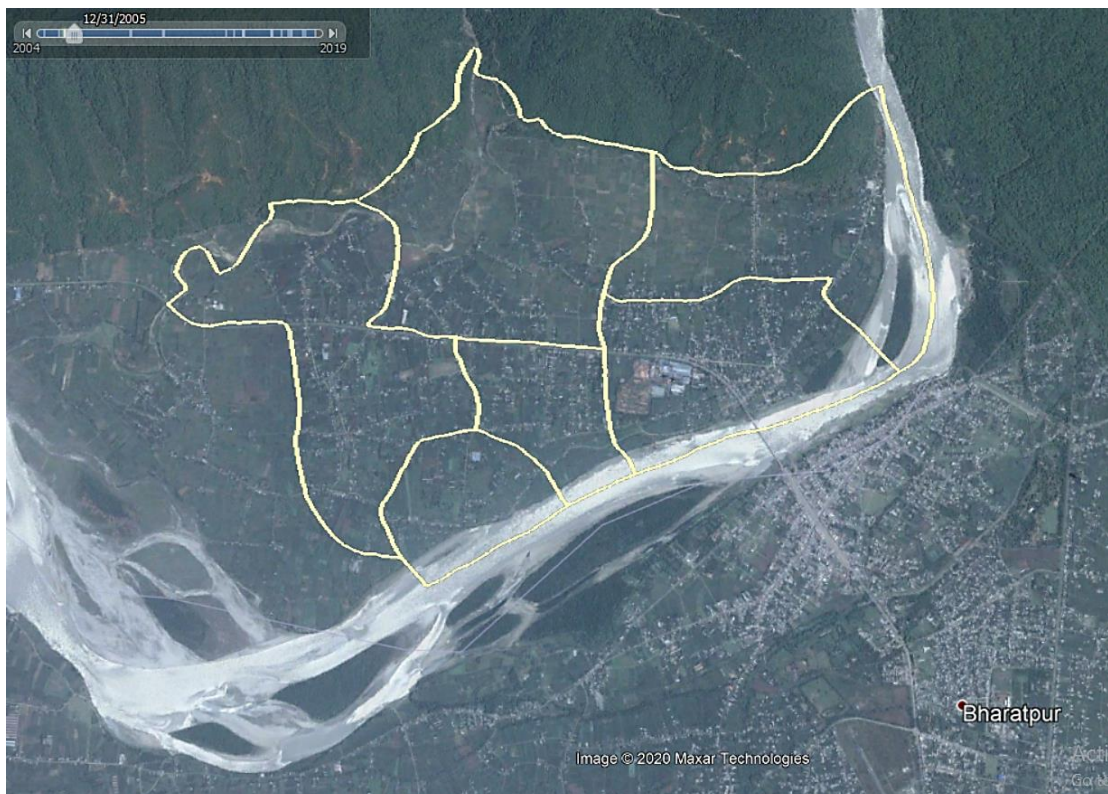


Figure 3-6 Satellite Image 2005



Figure 3-8 Satellite Image 2010



Figure 3-7 Satellite Image 2015



Figure 3-9 Satellite Image 2019

### 3.1.5 Development Trend

#### 1. Socio economic profile of study area

- Population

The ward wise population of the study wards according to CBS 2001 and 2011 are shown below:

Table 3-2 Ward wise population status

| Ward | Total Population |      | Increment in Total Population |      |
|------|------------------|------|-------------------------------|------|
|      | 2001             | 2011 | 2001                          | 2011 |
| 1    | 3405             | 5042 | 1                             | 1.48 |
| 2    | 4556             | 7517 | 1                             | 1.64 |
| 4    | 2115             | 3818 | 1                             | 1.80 |

|   |      |      |   |      |
|---|------|------|---|------|
| 5 | 2836 | 5319 | 1 | 1.87 |
| 6 | 1833 | 2518 | 1 | 1.37 |
| 8 | 2243 | 3056 | 1 | 1.36 |

- Education

According to survey data, the students going to schools and colleges are higher within the municipality. The schools and colleges are increasing in number and the quality is also getting better because of which people usually prefer to study within the municipality. But for undergraduate and graduate studies, people have to go either Bharatpur or other cities as there are very less colleges/campuses providing the degrees. The chart shows that Gaindakot municipality is dependent on Bharatpur metropolitan city for educational purposes.

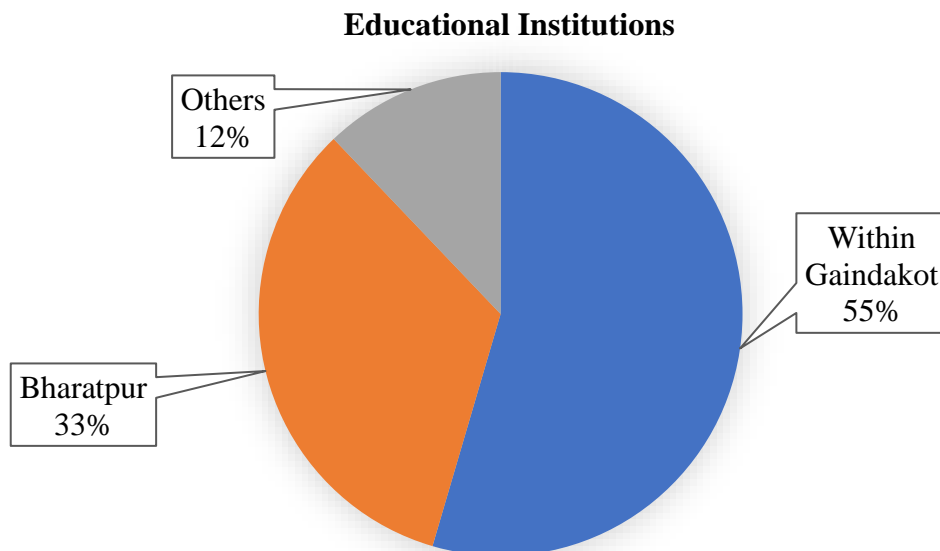


Chart 3-3 Proportion of HH attending educational institutions

The students going to school nearby the houses prefer to go on foot whereas for farther distance, the students mainly use private motorbike or scooter as travel mode. According to survey data, the use of public vehicle is less. The chart shows that the movement of students through private and public vehicles is more.

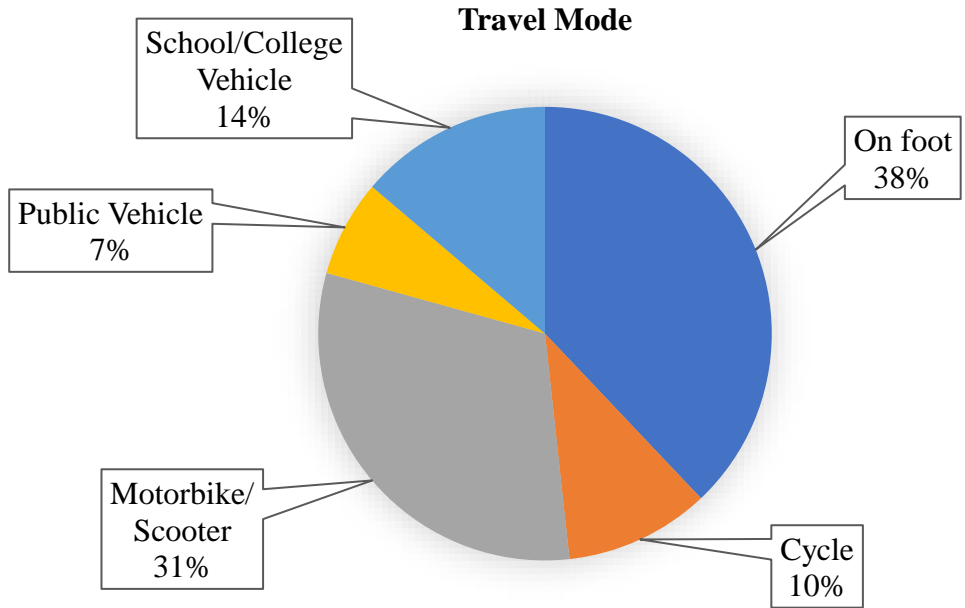


Chart 3-4 Proportion of HH using different Travel modes for Education

- Occupation

The major occupation of most of the people is private service followed by business then abroad study and work. As per the survey data, the agriculture is not the main occupation in these wards. The chart shows the shift in occupation from primary to secondary and tertiary economic activities, which one of the major factors showing urbanization.

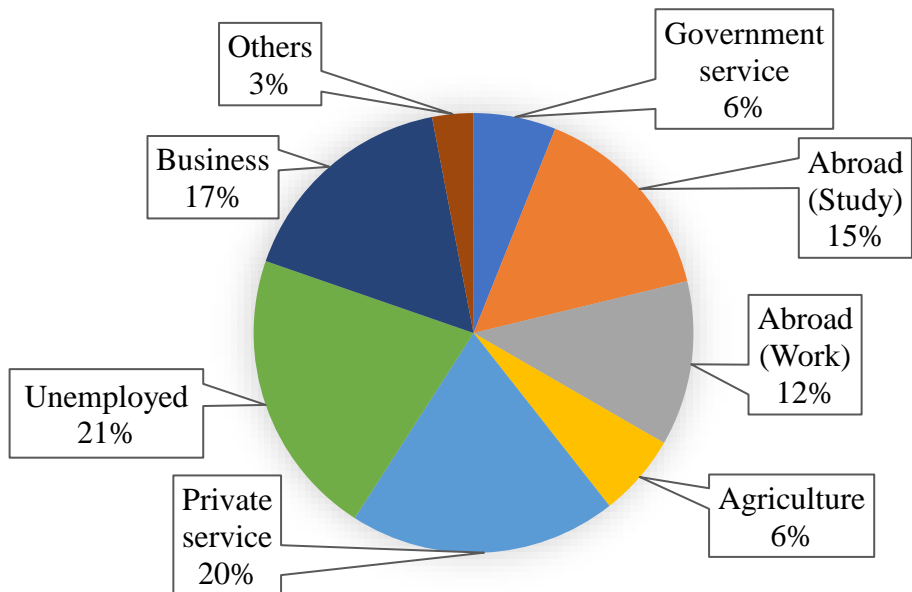


Chart 3-5 Proportion of HH and occupation



According to the survey data, employment opportunities are available both in Gaindakot municipality and Bharatpur Metropolitan city for the people residing in these wards. Previously, people of Gaindakot mainly were dependent on Bharatpur for job opportunities but now days since Gaindakot municipality is itself growing and developing, the economy is being generated within the municipality itself. Since Bharatpur Metropolitan city is bigger in economic terms as well, it will always make impacts on economy of Gaindakot municipality.

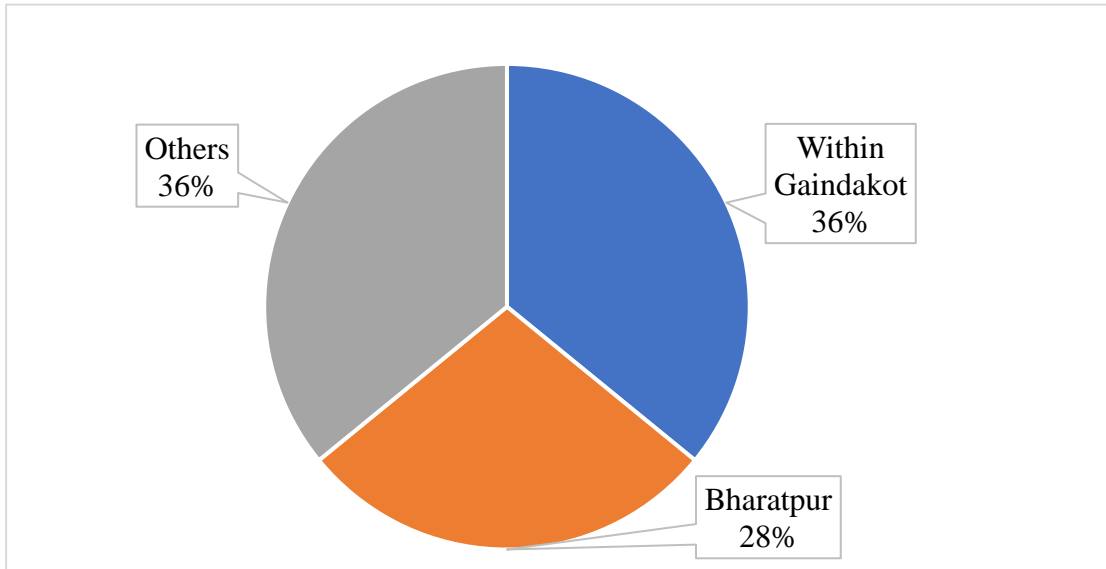


Chart 3-6 Proportion of HH and workplace

- Family Structure

From the survey data, it is seen that most of the households (64%) are of nuclear type. The average family size of these wards is 5.6. The trend of nuclear families is growing which is one of the major indicators of urbanization as well.

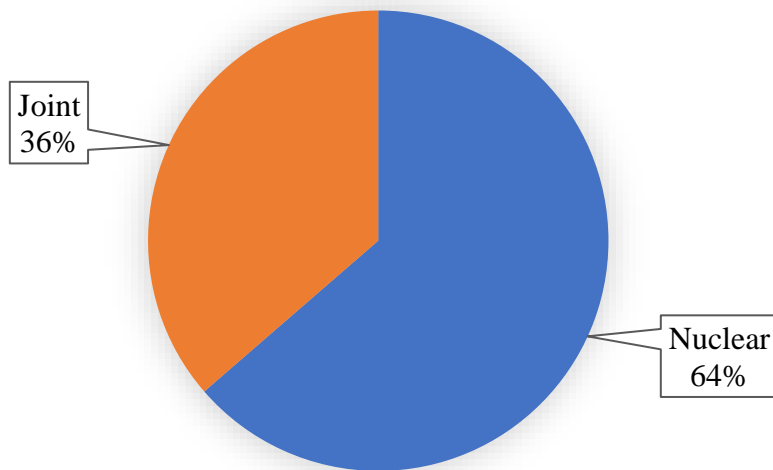


Chart 3-7 Proportion of HH and family structure

- Migration

From the survey data, it is seen that most of the people migrated themselves in search of job opportunities, affordable land, easy life and other facilities. As per the survey data, most of the people (41%) were migrated from Baglung, followed by Gorkha and Tanahun.

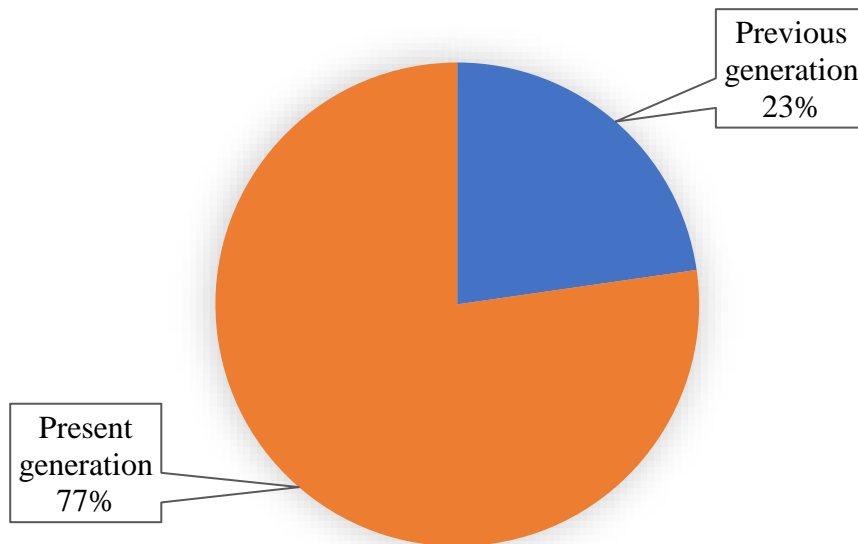


Chart 3-8 Proportion of HH and migrating generation

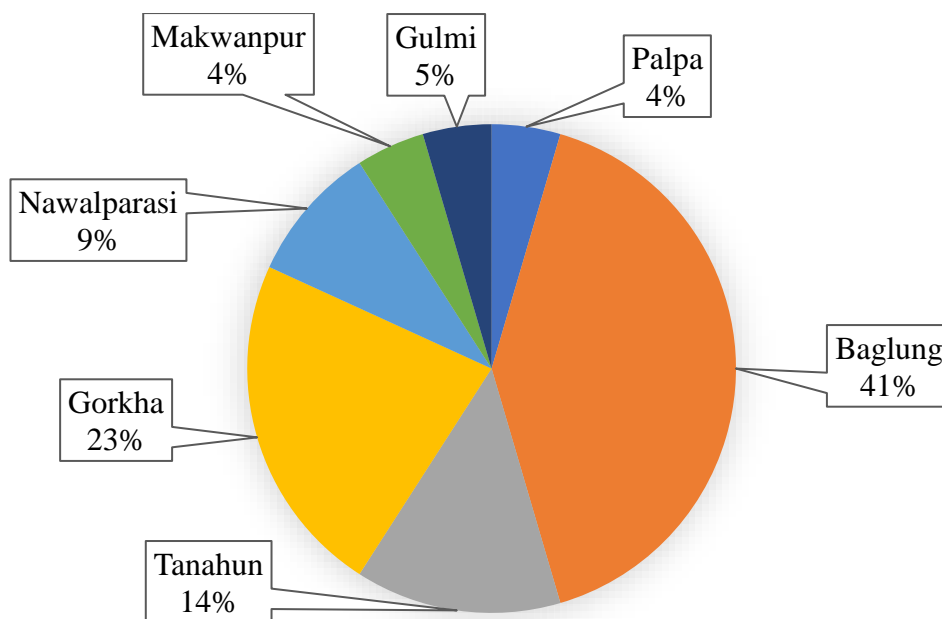


Chart 3-9 Proportion of HH and previous location

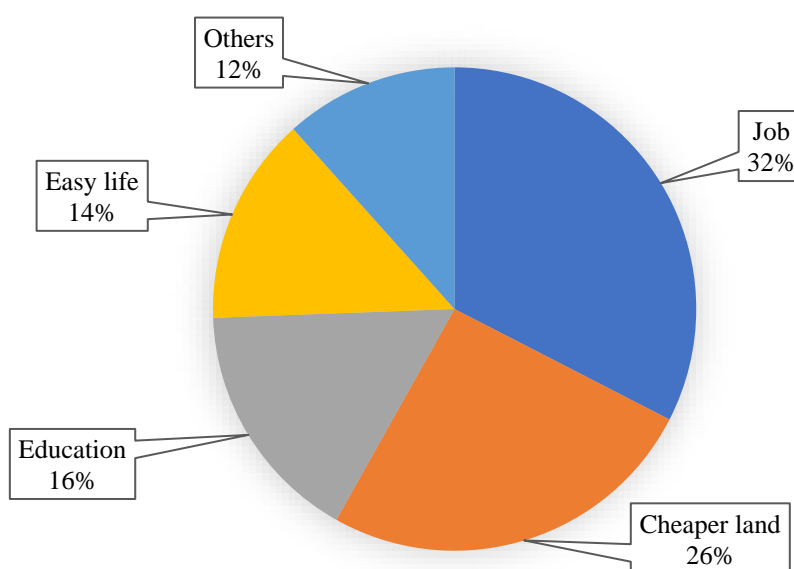


Chart 3-10 Proportion of HH and reasons for migration

- Rent

As per the survey data, 57% of the houses have rented the buildings for various purposes like establishing offices, accommodation, etc. The municipality provides various economic, educational, health, etc. services within itself or nearby city because of which people tend to migrate to the municipality.

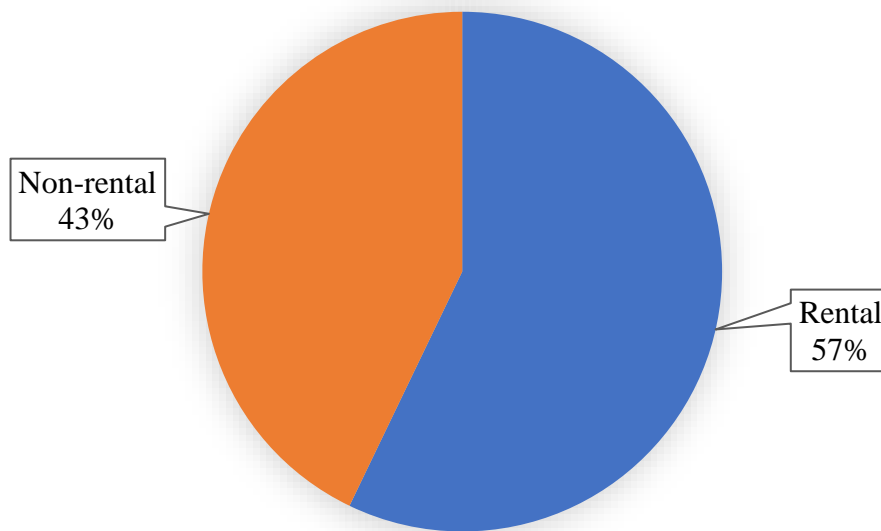


Chart 3-11 Proportion of HH and rental provision

- Infrastructure and Services
  - i. Road: Among the selected wards, Mahendra Highway runs through wards 2, 4, 5 and 8 only. The feeder road connects ward no. 1 and 6 with the highway.
  - ii. Water Supply: The selected wards for the study have piped water connection as main source of water. The major water supply for the Gaidakot area are Gaidakot pumping scheme water supply, situated in ward no. 4 and another is Jaluke drinking water supply, situated in ward no. 1. However, there are different sources of water like rivers (Naryaani, Jayshree), tube well, open wells, etc.
  - iii. Electricity: The entire households in Gaidakot municipality have electricity connection.
  - iv. Drainage and Sewer: The drainage facility in these wards is not satisfactory. During rainy season, these areas are likely to suffer floods sometimes. The houses in these areas have their own septic tank. The municipality doesnot have the provision of sewer connection.

- v. Solid Waste Management: The municipality provides door to door collection of solid wastes twice a month. Mostly the people dispose their waste in their own land either by composting or burning, remaining wastes are sent to municipality collection service.
- vi. Market centers: Mostly people buy goods for regular uses from nearby shops. But for other purposes, the people are equally dependent on Narayangarh as well. According to the survey, the people previously were greatly dependent on Narayangarh for supply of goods but the situation has changed over the years now.

### **3.1.6 Impacts of distance from the city**

Narayangarh has been performing as center of business, commerce and various educational, health services and facilities. Thus Bharatpur has been the center of attraction for people. The amount of built up clustered near Narayangarh is significantly higher than area which is farther away from Narayangarh. This demonstrates that with increased distance from the city boundary, the number of settlement decreases.

The findings of this study indicates that the amount of land covered by settlements is high closer to the urban area and with the amount of land covered by settlement decreases with the increasing distance from the city area.

### **3.1.7 Impact of road on urban fringe settlement**

The distribution of settlements is mainly concentrated along the road networks. There are more settlements situated around roads but are very few in areas where there are no roads. This means the probability of urban growth is higher at closer proximity of road networks. The urban growth probability decreases with the increasing distance from road networks. This finding is similar to the findings of (Timothy, 1995) about the growth of peri-urban areas in Dar es Salaam. According to Timothy (1995), transport networks contribute to the growth of settlements particularly in low income settlements Public transportation takes an advantage of road networks to provide service to low income settlements and thus influencing locational decision of settlers. However it's not always that public transportation which influences the growth of settlements. Travel cost minimization is also an important factor which should be taken into consideration. Households select location that reduce their travel time, hence the concentration of settlements is seen along the roads. But if there is no more land available along or next

to roads to cater for the increase in the number of households seeking residential plots, new settlements develop in areas where there are no transport routes as well.

### **3.1.8 Settlement and landform analysis**

Despite the larger area of Gaindakot municipality, the wards 1, 2, 4, 5, 6 and 8 are urbanizing faster because of better accessibility to Bharatpur metropolitan city.

### **3.1.9 Characteristics of Urban fringe areas**

The urban fringe interface is the place where a process of urbanization is very intense and where some of the most obvious environmental impacts of urbanization are allocated. This study identified the following characteristics in the Gaindakot as fringe areas of Bharatpur.

**Change in land use:** Land conversion takes place mainly in the form of agricultural land and vacant land converted to settlement.

**Settlement pattern:** Previously the settlements were seen along the main road and closer to Narayangarh city. But at present the settlements are increasing along western sides and northern sides as well.

**Infrastructure Demands:** The increasing number of housing and rental units is also an indication of increasing demand for infrastructure and services. There is increase in educational institutions, health centers, co-operatives, etc. to meet the demand of increasing population. Increase in infrastructures and services play a vital role in development process. But if they are not well organized beforehand they may create various problems resulting to the unsuitable growth of the fringe area.

**Level of urbanization:** Higher level of urbanization is characterized by higher level of service provision. Finding from this research indicate that there is high level of accessibility of urban services like electricity and piped water supply.

## **CHAPTER FOUR: INFERENCES & ISSUES**

This chapter deals with the major finding from the research by adopting the methods and strategies to answer research questions. It contains two sections: first section presents the inferences of the study after the extensive study and the extent of the discussion in the earlier chapter and the second section presents the main problems and issues.

### **4.1 Inferences**

#### **4.1.1 Physical aspect**

- The growth of settlements can be seen along the major and minor road alignments and nearer to central business district. It shows that the growth of the area is dependent on transport related vehicles. It also shows that the growth of the area is dependent on the easy accessibility of services nearby.
- The local authorities have limited tools and resources to generate strategies that can control the current tendencies of growth which is leading to unsustainable nature of growth.
- Almost all of the surveyed households have access to some urban services like piped drinking water and electricity supply but there is general lack of sanitation systems like sewer systems and solid waste disposal mechanism. This results in unsustainable nature of disposal of solid waste making the environment polluted.
- The areas which are at closer proximity to transport related variables have greater tendency to grow in future due to potential benefits such as ease of access, economic, opportunities, social services, etc.
- The fringe area is characterized by larger number of migrants, higher proportion of rented accommodation. Most of the rented units are found near the main road corridor and market places which is probably due to economic opportunities.

#### **4.1.2 Socio-economic aspects**

- This study shows that migration is common activity in the fringe area which is related to socio-economic and land factors like job opportunities, educational facilities and affordable land or cheap housing.

- Since the settlements are a heterogeneous society, people lack strong socio cultural bond.
- There is gradual change in lifestyle of people in fringe areas. Higher proportion of single family dwelling indicates that the fringe area settlers prefer a nuclear family than extended or joint family.
- Land affordability and land value are the major influential factor for the emerging unplanned fringe growth. Generally people would prefer a cheaper land with minimum accessibility for the residential development. In spite of absence of basic services like drainage and sewerage they would rather choose a relatively cheaper plot. This has resulted into the haphazard and unplanned growth of the fringe area.

#### **4.1.3 Policy aspects**

- No effective policies have been implemented to regulate the growth of fringe area. Due to lack of comprehensive policy guidelines including land use zoning, the fringe area is facing the problem of haphazard urban expansion.
- Besides building byelaws, there are no further individual plans and policies to manage the growth. Building byelaws are applied to control the building construction processes.

#### **4.2 Problems and Issues**

From the study of the wards through field observation, household survey and its analysis, some of the existing problems and issues area identified which are described below:

- Road network and transportation problem: The road networks are haphazardly developed without proper planning. The figure 4-1 clearly shows the haphazard road networks near Pulchowk area in ward no. 2.
- Sewerage and Drainage problem: Issues of drainage and sewer management is major problem. During rainy season, the area gets flooded.
- Environmental Degradation: Due to haphazard building construction and inappropriate land use pattern there is growing problems of loss of natural vegetation, open spaces and fertile arable lands.





Figure 4-1 Haphazard road network

- Inappropriate land use pattern: The process of land use change is very common in the study area. Cultivable lands are haphazardly plotted and buildings are being constructed. The figure 4-2 shows haphazard land plotting done in cultivable land without any infrastructure development in ward no. 4.



Figure 4-2 Haphazard land plotting in cultivable land

## **CHAPTER FIVE: RECOMMENDATIONS**

### **5.1 Land Use and Land Development Plan**

- Guided development of municipality through land use plan and land use zoning
- Identifying agricultural areas, conservation areas and water recharge zones and prohibiting development activities in such areas
- Revisiting the existing building bye laws
- Proper enforcement to regulate the growth of the municipality
- Launching planned housing development projects

### **5.2 Increasing Accessibility**

- Construction of new bridges or operation of feris on northern and southern sides of existing bridge for increasing connectivity with Narayangarh
- Planned road networks rather than need driven
- Construction of roads following the guidelines set by Nepal Road Standard 2070, with basic roadside infrastructures like zebra crossing, pedestrian pathway, cycle lane, lighting, etc
- Encouraging public transportation within the municipality

### **5.3 Adequate, Safe and Affordable Water Supply**

- Provision of continuous water supply in each HH
- Provision of public drinking water in public areas
- Control in extraction of ground water
- Promoting rain water harvesting

### **5.4 Proper Drainage and Sewerage System**

- Construction of toilet with septic tank in each HH
- Provision of drainage and sewerage network along the road side

### **5.5 Economy**

- i. Commercialization of agriculture

- a. Adaptation of modern agricultural system
- b. Provision of irrigation facility
- c. Provision of cold store
- d. Promotion of collection of medicinal herbs
- e. Promotion of fish farming, poultry farming and livestock farming

ii. Industries

- a. Establishment of agro based industries
- b. Focussing and facilitating the existing small-scale textile industries, boring industries, metal industries, gas refilling industries, rice mill, etc

iii. Tourism

- a. Promoting maulakalika hill hiking
- b. Operation of river cruise
- c. Promotion of homestay in Dhodeni (cultural village)

## CHAPTER SIX: CONCLUSION

Findings from this research indicate that land conversion mainly took place in the form of agricultural land and vacant land converted to the built up. Mainly the areas which are closer to Narayangarh, are in the process of being turned into the urban because their physical set up has greatly adapted to urban area itself. The findings of the study also reveal that the high population influx coupled with centralization of socio-economic and political activities and the hope of employment opportunity and better life has pulled the people towards the fringe area. Lack of proper policy for the land use development and lack of strategies to control the present growth has a significant influence on this type of scattered development in urban fringe. An appropriate housing program should aim to safeguard prime agricultural land and shift construction to less fertile areas. The local government should formulate an urban land use management policy, with land categorization for different purposes, develop land zoning, particularly for the zoning of the agricultural land. The concerned authority should take measures and plan for environmental conservation and formulate urban growth management policy through strong controlling mechanism such as UGB. The deficiency of infrastructure services and their maintenance are the major problem of the study areas. The local authority should provide an emphasis more on road maintenance, environmental awareness, traffic management, water quality, solid waste management, waste water treatment, etc. to achieve clean, green healthy city in upcoming years.

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## APPENDIX A: QUESTIONNAIRE SAMPLE



TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
PULCHOWK CAMPUS

### QUESTIONNAIRE SURVEY

### DATA COLLECTION FOR THESIS FULFILMENT

### MSC IN URBAN PLANNING

"Impacts of Urbanization on Land use in Urban Fringe:

A case of Gaidakot (wards 1, 2, 4, 5, 6 and 8) Municipality"

**Ward no:**

**Tole:**

#### General Information of Surveyor

- Name of surveyor:
- Gender:
- Age:
- Cast:
- Religion:
- Family size:
- Occupation:

| No of working members | Where is workplace? | Distance | Travel Mode | Travel Time |
|-----------------------|---------------------|----------|-------------|-------------|
|                       |                     |          |             |             |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |

- Education

| No of children | School, +2 | Bachelor or higher | Where | Distance | Travel Mode | Travel Time |
|----------------|------------|--------------------|-------|----------|-------------|-------------|
|                |            |                    |       |          |             |             |
|                |            |                    |       |          |             |             |

- Market place

| Market | Distance form home | Distance from office | Travel Mode | Travel Time |
|--------|--------------------|----------------------|-------------|-------------|
|        |                    |                      |             |             |
|        |                    |                      |             |             |
|        |                    |                      |             |             |
|        |                    |                      |             |             |

- Recreation Place:

### Migration

- Did you migrate or your previous generations did?
- When did you/previous generation migrate?

- Place of origin:
- Why did migration take place?
- What your job initially?
- How far was your job?
- When did you buy land?
- What is the area of land?
- Did you come alone or with family?
- What was the price of the land then?
- What is the price of the land now?
- Did you look for land in Bharatpur?
- If yes, why didn't you buy land there?
- Land Price difference between Gaidakot and Bharatpur then?
- When did you construct house?
- No. of storey:
- Building permit from municipality

- If not, why?

### Infrastructures

| Services     | Then | Now | Quality | Date of establishment |
|--------------|------|-----|---------|-----------------------|
| Road         |      |     |         |                       |
| Water Supply |      |     |         |                       |
| Telephone    |      |     |         |                       |
| Solid Waste  |      |     |         |                       |
| Drainage     |      |     |         |                       |

- No. of tenants in the house:
  - Tenant 1

| No of working members | Where is workplace? | Distance | Travel Mode | Travel Time |
|-----------------------|---------------------|----------|-------------|-------------|
|                       |                     |          |             |             |
|                       |                     |          |             |             |
|                       |                     |          |             |             |

| No of children | School, +2 | Bachelor or higher | Where | Distance | Travel Mode | Travel Time |
|----------------|------------|--------------------|-------|----------|-------------|-------------|
|                |            |                    |       |          |             |             |
|                |            |                    |       |          |             |             |
|                |            |                    |       |          |             |             |

| Market | Distance form home | Distance from office | Travel Mode | Travel Time |
|--------|--------------------|----------------------|-------------|-------------|
|        |                    |                      |             |             |
|        |                    |                      |             |             |
|        |                    |                      |             |             |
|        |                    |                      |             |             |

○ Tenant 2

| No of working members | Where is workplace? | Distance | Travel Mode | Travel Time |
|-----------------------|---------------------|----------|-------------|-------------|
|                       |                     |          |             |             |
|                       |                     |          |             |             |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |

| No of children | School, +2 | Bachelor or higher | Where | Distance | Travel Mode | Travel Time |
|----------------|------------|--------------------|-------|----------|-------------|-------------|
|                |            |                    |       |          |             |             |
|                |            |                    |       |          |             |             |
|                |            |                    |       |          |             |             |

| Market | Distance form home | Distance from office | Travel Mode | Travel Time |
|--------|--------------------|----------------------|-------------|-------------|
|        |                    |                      |             |             |
|        |                    |                      |             |             |
|        |                    |                      |             |             |
|        |                    |                      |             |             |

**Others**

- Why did you choose Gaidakot?
- What differences have you experienced regarding your neighborhood during your migration days and now?

- How did Gairdakot developed over the years?
- What is the relationship between Gairdakot and Bharatpur?
- Is the relationship changing?
- What should be done for development of Gairdakot?
- Do you have future plans for migration from Gairdakot?

## APPENDIX B: RESEARCH PAPER

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

### Impacts of Urbanization on Land Use in Urban Fringe (A case of Gaindakot as fringe of Bharatpur Metropolitan City)

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#### Abstract

The urban fringe areas go through lots of transformations due to urbanisation but lack of proper planning and policies in such fringe areas leads to haphazard and unplanned growth, placing enormous pressures on natural resources, existing services and infrastructures.. Bharatpur Metropolitan City is one of the fastest growing cities in Nepal which serves as commercial centre of Chitwan district. The city has been growing bigger and it will have its impacts on its fringe areas. Since migration rate is increasing in Bharatpur, this is likely to spread urban sprawl in adjoining areas, Gaindakot municipality being one of them. This paper uses multiple theoretical framework and qualitative research approach to find out the effects of urbanization on various aspects and the patterns of land use changes in Gaindakot with the increasing urbanisation over the years. Managing rapid urbanization poses challenges that require urgent policy attention. Otherwise, this may lead to rapid and uncontrolled sprawl; irregular, substandard, and inaccessible housing development; loss of open space, and decreased livability as in Kathmandu valley due to unplanned urban development.

#### Keywords

Urbanization, Urban fringe, Urban sprawl, Land use, Gaindakot.

#### 1. Background

Urbanization is the phenomenon of increase in urban centers and migration of people from rural and suburbs to such centers ultimately increasing the population living in urban areas. As a city grows, more people are attracted in the cities and the increasing concentration and economic activities demand more lands to be developed for public infrastructures, housing, and industrial and commercial purposes. Thus, the need of planned and organized urbanization become a great concern with the addition of new urban areas [1]. For the growth of new development areas, the most suitable locations may be found adjacent to existing amenities such as roads and urban centers [2] [3]. Although urbanisation of these fringe areas provides opportunities for employment, better housing, education, etc., it also places enormous stress on natural resources and existing social services and infrastructure [4]. Since several studies have found out that the anthropogenic activities greatly influence the urban environment, it is required to give proper attention towards monitoring the land use and land

cover changes in urban areas[5] [6].

Nepalese cities have been urbanizing haphazardly. The fast growing urbanization process and the consequences of land acquisitions for construction of buildings and expansion of real-estate areas demands urgent policy responses from the government to address the problems brought by the rapid urbanization and real-estate development in Nepal [7]. Rapid urban population growth increases various urban uses, specially housing and this certainly affects the fringe areas [8]. The rapid expansion of urban centers into their "fringe zones" (peri-urban, peri-agricultural, agricultural and undeveloped land) and the impact of urbanization on ecosystem sustainability two issues that at present are not considered to the extent their impact merits, particularly in regional and urban planning are [9].

Bharatpur Metropolitan City is one of the fastest growing cities in Nepal which serves as commercial centre of Chitwan district. It is located at the centre of Mahendra Highway and Kathmandu-Birgunj road corridor thus, has important geographical location. The population of Bharatpur was 199,867 population



according to census 2011 [10]. The population has now reached 280,502 and it is the now fourth largest populated city in Nepal. It has large shopping areas, big hospitals, colleges, agriculture-based industries (small-scale processing industries, poultry industries, honey, mushroom, floriculture) and service industry (education and health). Further, multinational companies like Coca-Cola and San Miguel are also situated in Bharatpur. Major business and trading houses have opened branches in Bharatpur, leading to steep rises in land values. Now with the proposal of developing Bharatpur as Smart City, the city will even grow bigger and it will have its impacts on its fringe areas. Since migration and the population growth is increasing in Bharatpur, this is likely to spread urban sprawl in adjoining areas, Gaindakot municipality being one of them. The population of Gaindakot is 55,205 according to census 2011 [10]. The migration rate is increasing in Gaindakot now and the trends of unplanned settlements, unorganized land plotting and unplanned growth are already taking place. If the process continues and the concerned authorities are not able to make proper policies for the area, the municipal area is likely to suffer from haphazard settlement and unplanned urbanization in near future. Thus, the efforts should be made to study the challenges that comes along with the opportunities of urbanization. This research tries to find the contextual reality of effects of urbanization in fringe areas with the case of Gaindakot, with the objectives of studying the pattern of land use changes and identifying urban sprawl.

## **2. Literature review**

### **2.1 Urban Fringe**

The rural-urban fringe is the boundary zone outside the urban area proper where rural and urban land uses intermix. The term urban fringe was first used by T. L. Smith, to describe the built-up area just outside the corporation limits of the city. To analyze the “elements of urban fringe pattern”, Andrews, in his study, has tried to distinguish between the urban fringe and rural urban fringe. He defined, “the adjacent peripheral zone of the urban fringe . . . as the area of intermingling zone of characteristically agricultural and characteristically urban land use structure obtained in the area” [11]. It is believed that the rural urban fringe development started post World War II. After world war II, there was widespread inner city development but could not develop housing units

for all those needed. So, they went on to build houses on the edge of towns and cities. Thus, residential growth started outwards into the suburbs where population density as well as the land price are lower than that of inner city. As the trend continued, many shopping centers, offices and factories also move to the edge of the urban area for cheaper and larger areas, still being able to take advantage of the facilities in nearby city. Also the traffic congestion is less and the environment is more pleasant in such areas. Thus, this led to the expansion of smaller towns and villages in the areas nearby cities. However such areas do not grow in well-defined patterns rather sprawls haphazardly resulting into incoherent landscape which is the characteristics of the fringe. The general characteristics of the fringe areas are conflicting land uses, rapid residential expansion, mobile population, low or moderate density, inadequate services, change in land occupancy pattern, poor public transport network and intensive crop production [12].

According to Kivell, there are many forces that affect rural to urban conversion of land uses, ranging from macro scale (social, political and economic diagnosis) to meso and micro scale (housing and land market, planning decisions, ownership patterns, land characteristics, infrastructure and transportation structure and roles of actors within this process) in the fringe areas [13]. According to Velibeyo lu, developers also decide on buying the land, parceling and constructing infrastructure and houses directly affect the land-use decisions at urban fringe [14]. The research work carried by Timothy analysed the role of rural to urban migration in the developing countries play vital role in development of urban fringe as the new city immigrants with low income could not be absorbed by the city and hence they had to look for affordable accommodation within the fringe [15]. According to Bryant, improvement in transportation system increases the individual’s ability to commute which contribute to growth of fringe in developed countries [16].

### **2.2 Urban Sprawl**

Urban sprawl is basically the spatial dispersion of settlements. Altshuler defined urban sprawl as “a continuous low density residential development on the metropolitan fringe, ribbon low density development along major suburban highways, and development that leapfrogs past undeveloped land to leave a patchwork of developed and undeveloped tracts” [17].

The orienting powers affecting the development of sprawling are urban growth, increased mobility, transportation and technology, economic development, consumer demand and public policy. The movement of rural people to urban areas led to pushing of dense population of central cities to further into the surrounding country side. Thus, urban growth pushes the cities further out[18]. Similarly, the main driving force for urban sprawl in increased transportation accessibility, public investment in roads and associated infrastructure have played significant role in relation to the urban sprawl. The other driving force is information and communication technology like internet, local and wide area networks, fiber optics, portable computers, etc. The research work carried out by Velibeyo lu gives the knowledge about municipal fragmentation frequently associated with urban sprawl is likely to intensify problems like conflicting land uses, pressures and agricultural and open space, high costs of service provision, adverse consequences on traffic and public transport, social disparities etc[14].

### 3. Methodology

The study of real and existing scenario in the study areas is based on the positivism in ontological position which provide the idea and concept of urban sprawl and urban fringe development in terms of land use and housing expansion, infrastructure and series, road networks, street patterns and transportation, and socio economic status. Constructivist paradigm is used to study real and existing scenario of social behaviors of the study areas. The social observations are treated as entities and real cause of social outcomes are determined reliable. Constructivist paradigm is used to gather knowledge of the urban fringe development trend in epistemological position. Since the explanations are generated inductively from the data that is observed, constructivist paradigm is used. Thus the research is based on descriptive method.

The study of related articles, thesis, scientific papers, journals, reports, acts and collection of relevant maps, etc are done to collect wide range of data on various related subjects like urban fringe development, characteristics of urban sprawl,urbanization and urban land management process, etc.

Primary data is collected using different approaches like field observation, questionnaire survey and

interview of local experts and key informants. The field observation was made to know the physical status of study area as it helps to know the pattern of current urban development trends, infrastructure development and land use types. Secondary data was collected in the form of published data, records, reports etc. from different sources like DUDBC, Municipality offices, Ward offices, etc.

Stratified random sampling is used to carry out questionnaire survey. According to CBS 2011, the selected wards for the study have 6687 households. With the desired margin of error as 10 percentage, confidence level of 95 percentage and value of population proportion as 50 percentage, the sample size was obtained 95.

The data obtained from questionnaire and maps were analyzed using excel, GIS and AutoCAD to see association between variables and interviews were interpreted to explain the phenomenon.

### 4. The Study Area

Gaindakot is municipality situated in Nawalparasi District in the Lumbini Zone and has an area of 159.93 sq. km. It was declared municipality in May 2014 by merging the then existing three VDCs: Mukundapur, Amarapuri and Gaindakot. Ratanpurj VDC was also later merged in the municipality. The municipality is bordered with Chitwan and Tanahun districts on east, Devchuli Municipality on west, Bulingtar Rural municipality and Tanahun district on north and Chitwan district and Chitwan National Park on south.

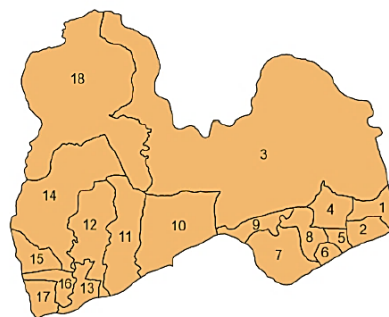


Figure 1: Gaindakot Municipality

Gaindakot municipality doesn't have native people of

**Impacts of Urbanization on Land Use in Urban Fringe (A case of Gaindakot as fringe of Bharatpur Metropolitan City)**

its own. Rather it is developed through migration because of which the caste/ethnicity seems to be a mixed one comprising of Brahmin, Chhetri, Janajatis and Dalits. Most of the people use Nepali language for communication but besides Nepali language, other languages like Newari, Tharu, Gurung, Tamang, Magar, etc. are also used. People from various caste/ethnicity and religious groups celebrate various festivals like Dashai, Tihar, Chhath, Lhosar, Teej, Buddha jayanti, Maghi, etc. Thus, Gaindakot municipality demonstrates multi culture and multi ethnicity. Similarly, there are various cultural heritages in the municipality like Maulakalika temple, Divya dham temple, Koteswor Shivalaya temple, Radhakrishna temple, Ram mandir, Ganesh temple, Harihar temple, Kalika temple, Durga temple, Boudhha gumba, Chaitya gumba, Boudhha stupa, etc. Maula kalika temple, British camp, Dhodeni and Narayani River are major tourist attraction areas in Gaindakot municipality.

**4.1 Population**

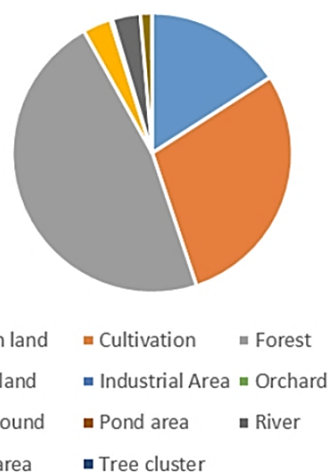
Since Gaindakot is developed through migration, the municipality seems to be mixed settlement ethnically comprising Brahmin, Chhetri, Janajatis and Dalits. The demographic status of municipality is shown below:

**Table 1: Population Statistics**

| CBS  | Households | Total popn. | Male popn. | Female popn. |
|------|------------|-------------|------------|--------------|
| 1991 | 5105       | 28892       | 14148      | 14744        |
| 2001 | 8333       | 43060       | 21352      | 21708        |
| 2011 | 13623      | 58841       | 28209      | 30632        |

**4.2 Existing Land use of Gaindakot Municipality**

Land use consists of the percentage shares of total land area for various uses like agricultural, residential, recreational, industrial, etc. In Gaindakot municipality, the majority of land is covered by forests which is nearly 47 percentage of the total area. The forests provide great variety of trees like sal, saj, jamun, etc. and the forests provide various products and services like grass, fodder, timber, fuel wood, medicinal herbs, etc. The existing land use of Gaindakot municipality is given as below:



**Figure 2: existing land use of Gaindakot municipality (source: draft report of IUDP Gaindakot)**

**4.3 Economic Condition**

Since the municipality shows the characteristics of both rural and urban areas, there are various activities through rural urban linkages that generate economy. Agriculture is the main occupation of the people in Gaindakot. However, there is need of commercialization in agriculture as the prevailing system is subsistence and traditional one. The major crops produced in the municipality are rice, maize, wheat, mustard, etc. Vegetable farming, poultry, fish farming, etc. are gradually increasing and becoming an important source of income in the municipality. Besides, Gaindakot has got small and medium scale industries like textile industries, gas refilling industries, rice mill, water factory, plastic factory, block factory, chocolate factory, hatcheries, oxygen plant, cotton mill, etc. which generate employment opportunities. There are various financial organizations in the Gaindakot municipality like saving groups, co-operatives, remittance exchange firms and banks. Wage labor and service are other sources of income. Foreign employment is another main source of economy in Gaindakot now. The mobility of the people for employment ranges from different parts of India to Gulf countries, USA, Australia and various European countries as well.

#### 4.4 Urban Development Infrastructure Indicators

##### 4.4.1 Transportation and road network

Mahenda Highway runs through Gaidakot. Narayani Bridge is the only connector of Gaidakot with Narayangarh. Gaidakot municipality does not have an airport of its own and Bharatpur Airport is the nearest airport. For long route journey, the people of Gaidakot take vehicles from Narayangarh. Road networks have developed a lot over the past few years in Gaidakot. Nowadays, most of the roads are pitched and are of six meters width minimum. Public transportation is regularly available and a large number of people use private vehicles as well.



Figure 3: Transport Linkage

##### 4.4.2 Water Supply

The major water supply for the Gaidakot area is the Gaidakot pumping scheme water supply, situated in ward no. 4 and another is Jaluke drinking water supply, situated in ward no. 1. However, there are different sources of water like rivers (Naryani, Jayshree), tube well, open wells, etc.

##### 4.4.3 Education

According to CBS 2011, 80.35 percentage people are literate in Gaidakot [10]. There are several schools in the municipality, which can be government, private and community based institutions. Besides, many students go to schools in Bharatpur Metropolitan city for education. The students from Gaidakot mainly go to Bharatpur or other cities for doing graduation.

##### 4.4.4 Health

There are few health posts, clinics and private hospitals in Gaidakot but mostly people in Gaidakot go to hospitals in Bharatpur for major treatment.

##### 4.4.5 Drainage

The municipality has no proper sewerage system and drain facility. Due to poor drain facility, many areas of Gaidakot municipality have to face floods during rainy season. The waste products in the municipality are collected by municipality vehicle, however, there is no land fill site in the municipality. The provision of dust bin for waste collection in public areas is developing. Degradable wastes are converted into compost manure for farm lands.

##### 4.4.6 Irrigation

Narayani River, Jay shree khola, kakarsoot khola, dhunge khola, khahare khola, hadbade khola, etc. are the water resources for irrigation in Gaidakot municipality. The municipality does not have sufficient irrigation facility. A small irrigation dam is located on the way toward Dhodeni, north of Ranital.

##### 4.4.7 Selection of Wards

The study area of my research are the wards 1, 2, 4, 5, 6 and 8. Among the nine wards of the then existing Gaidakot VDC, ward no 3 is largely covered by forests and is far from Mahendra Highway whereas the wards for the study show major settlement growth. The land use in these wards is changing rapidly than remaining three wards of the then existing Gaidakot VDC. Thus these wards are selected for the research.



Figure 4: satellite image 2005

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**Figure 5:** satellite image 2010



**Figure 6:** satellite image 2015



**Figure 7:** satellite image 2019

**5. Development Pattern and Analysis**

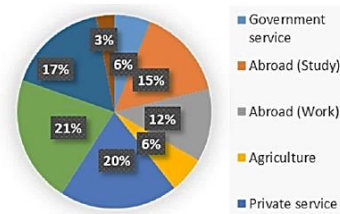
**5.1 Socio economic profile of study area**

Population: The ward wise population of the study wards according to CBS 2001 and 2011 are shown below:

**Table 2:** Increment in population

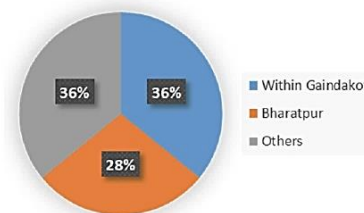
| Ward | Total population |      | Increment in Total population |      |
|------|------------------|------|-------------------------------|------|
|      | 2001             | 2011 | 2001                          | 2011 |
| 1    | 3405             | 5042 |                               | 1.48 |
| 2    | 4556             | 7517 |                               | 1.64 |
| 4    | 2115             | 3818 | 1                             | 1.80 |
| 5    | 2836             | 5319 |                               | 1.87 |
| 6    | 1833             | 2518 |                               | 1.37 |
| 8    | 2243             | 3056 |                               | 1.36 |

Occupation: The major occupation of most of the people is private service followed by business then abroad study and work. As per the survey data, the agriculture is not the main occupation in these wards.



**Figure 8:** occupation

According to the survey data, employment opportunities are available both in Gaindakot municipality and Bharatpur Metropolitan city for the people residing in these wards. Previously, people of Gaindakot mainly were dependent on Bharatpur for job opportunities but now days since Gaindakot municipality is itself growing and developing, the economy is being generated within the municipality itself.



**Figure 9:** work place

Education: According to survey data, the students going to schools and colleges is higher within the municipality as the schools and colleges are increasing in number and the quality is also getting better. But for undergraduate and graduate studies, people have to go either Bharatpur or other cities as there are very less colleges/campuses providing the degrees.

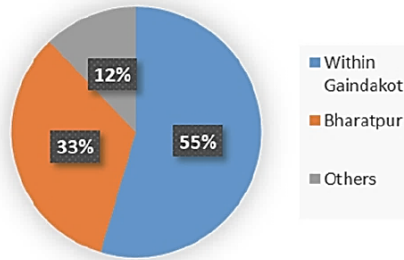


Figure 10: educational institutions

The students going to school nearby the houses prefer to go on foot whereas for farther distance, the students mainly use private motorbike or scooter as travel mode. According to survey data, the use of public vehicle is less.

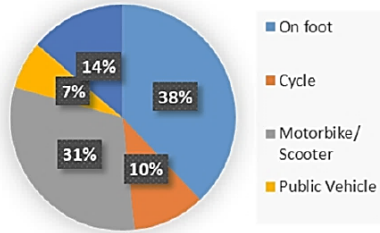


Figure 11: travel mode

Migration: From the survey data, it is seen that most of the people migrated themselves in search of job opportunities, affordable land, easy life and other facilities. As per the survey data, most of the people (41 percentage) were migrated from Baglung, followed by Gorkha and Tanahun.

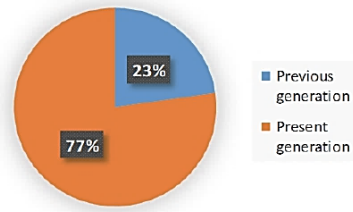


Figure 12: migrating generation

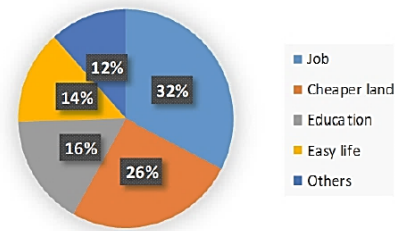


Figure 13: reasons for migration

## 6. Findings and Discussions

Whenever any projects or development works are done in Bharatpur Metropolitan city, it surely has at least some kinds of impacts on Gaindakot municipality as Gaindakot lies within the fringe of Bharatpur. The survey conducted in the municipality area also shows the relation between the municipality and metropolitan city. The survey shows that the migration trend started to increase in Gaindakot with the construction of Narayani Bridge which connects Gaindakot with Narayangarh. The bridge made access to the services and facilities easier in Bharatpur for the people of Gaindakot. According to the survey, the main reason for migration is employment opportunities followed by cheaper land prices despite being near to well serviced area. From the survey, it is found out that the people of Gaindakot are dependent on Bharatpur Metropolitan city for everyday use goods to employment opportunities, health facilities, higher education, shopping, entertainment purposes, etc. However the dependency of Gaindakot on Narayangarh for everyday goods is decreasing, as

## Impacts of Urbanization on Land Use in Urban Fringe (A case of Gaindakot as fringe of Bharatpur Metropolitan City)

Gaindakot itself is growing as a city and facilities and services are being made available in the municipality itself.

### 7. Conclusion

Since Gaindakot municipality is adjacent to Bharatpur Metropolitan city, separated only by Narayani River, the people of Gaindakot have easy access to all sorts of services available in the Bharatpur Municipality. Due to the accessibility of services nearby, migration is increasing in Gaindakot, settlements are growing, infrastructures are being built, development is taking place but the process is haphazard and not guided properly. If the process continues, Gaindakot municipality is very likely to face the problems in future which the fringe areas of Kathmandu are facing today. Over the years, the haphazard urbanization will directly affect the municipality contributing to degradation of declination of natural habitats such as wetlands forests, reduction of farmland and open spaces, increment in environmental pollution, etc. Thus the proper planning interventions should be made on time to ensure proper and sustainable development in the municipality.

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