CHAPTER 1

INTRODUCTION

1.1   Background

"Urbanization is the movement of people from smaller community to generally larger, whose activities are primarily centered in government trade manufacture or allied interest (Thomson 1957).

The term "urban refers to town or cities having market secondary and tertiary function along with a municipality or notified area committee.

Land use changes in urban areas drastically due to urbanization. Urbanization is the process by which large numbers of people become permanently concentrated in relatively small areas, forming cities. Internal rural to urban migration means that people move from rural areas to urban areas. In this process the number of people living in cities increases compared with the number of people living in rural areas. Natural increase of urbanization can occur if the natural population growth in the cities is higher than in the rural areas. This scenario, however, rarely occurs. A country is considered to be urbanized when over 50 per cent of it is population live in the urban areas (Long 1998: Wikipedia).

In the 19th and early 20th centuries, urban growth was occurring mainly in the developed nations. The reason for this was the spread of industrialization and the associated rapid increase in the use of fossil fuels. Urbanization at present is growing at greater rate than past and it is prominent in Third World countries. Today the largest and fastest growing cities are in developing countries, because of the new urban-industrial development (Envio Facts 2001, Girardet 1996: Wikipedia,).

Nepal is a country of geographical and environmental diversity thus different places have different types of land use pattern. Land is an important natural asset for human beings. People use it to gain different kinds of resources and development practices i.e. farm base production system, human settlements, roads, industry areas and so on. Therefore with the base of time its value has been closely associated with the

human livelihood. Urbanization is growing in Nepal with its own bae and rural lands are being converted into urban ones. Land values of urban areas are rising sharply due to increasing urban pressure and supply of residential area has been scarce, this has also contributed to increasing prices of land.

Figure1: Urban growth (% per annum)
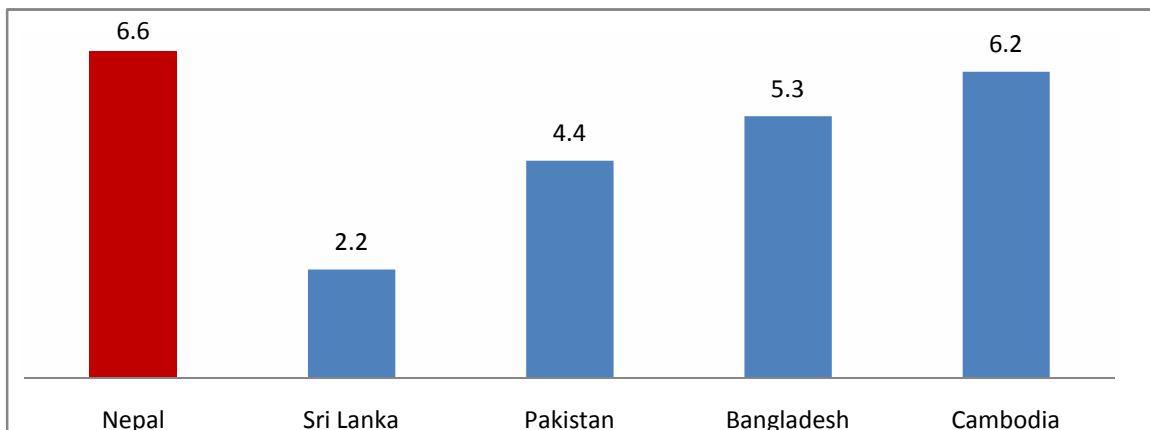
(Source: Portnoy, Adhikari & Schwartz, 2007: Thapa & Murayama. 2009)

From the data itself urban growth in Nepal is higher compared to other Asian countries. The task of managing urban growth has increased in both scope and complexity and has become one of the most important challenges of the 21st century.

The level of urbanization in Nepal was only 3.24% in 1952/54 that grew to, 3.57% in 1961, 4% in 1971, 6.37% in 1981, 9.12% in 1991, 13.94% in 2001, 17% in 2011, and it accounted for 40 % in 2015 (MOUD). Urbanization in Nepal is in initial stage and there were few urban centers which have been densely populated as compared to rural areas. In 2011 census, there were 58 municipalities in Nepal and out of 58, there were fifty-four municipalities, three sub-metropolitan cities and one metropolitan city and according to recent report, there are altogether 217 municipalities, out of which 204 are municipalities, 12 Sub-Metropolitan cities and one metropolitan city. (MOUD) The level of urbanization in Nepal is rapidly increasing as compare to other countries in the South and South East Asia but the infrastructure required for urban area is yet poor as well as insufficient.

The level of urbanization of any country is determined by the population size, infrastructure development and urban land use pattern (MOUD) Land use in the urban area as well as in the rural area is often changed. In general residential, manufacturing, transportation etc. dominate the urban land use, whereas in rural areas agricultural land use is the major economic activity.

Kathmandu is a capital city Socio-economic processes such as migration; urban sprawl, agricultural patterns also often contribute to landscape changes. As a city grows, the increasing concentration of population and economic activities demand more land for public infrastructure (road, water facilities, and utilities), housing, and industrial and commercial uses. Therefore, the urbanization can be considered as the observable transformation of the spatial pattern of land use and land cover, such as the transformation of agricultural and forest land uses into built-up area or the gradual transformation of rural landscape into urban forms. The transformation of rural landscape to urban landscape has caused various impacts on ecosystem structure, function, and dynamics [Thapa .2009]. Persistent dynamic land use change processes are expected to accelerate in the next several decades. Worsening conditions of crowding, housing shortages, insufficient infrastructure, and increasing urban climatological and ecological problems require consistent monitoring of urban regions (Thapa 2009)

The fundamental characteristic of urbanization is structural shift in unemployment to employment, agricultural to non-agricultural, labors to technology, low density to high density; traditional to modern etc. (MOUD) relatively high density and diversity of population are basic features associated with urbanization.

1.2   Statement of the Problem

Urban land use is dynamic. Infrastructure and built up areas in city are continuously increasing which bring about change in land use pattern of the city. The increasing demand of land in urban areas results in conversion of agricultural land into built-up areas to serve urban functions and facilities. But such urbanization was occurring in a haphazard manner in absence of clear policies, acts and regulations haven't concerned to land use. Therefore it results in several problems.

Chandragiri municipality is slowly developing but a very important suburb Kathmandu valley. The urbanization rate is increased after the formation of the Maoist insurgency 2005. It has changed both land use and land value. Before the formation of the Maoist insurgency 2005 there was a small market centre, which was dominated by agricultural land use. But now, population and built up area are slowly increasing. Chandragiri is a newly designated municipality, which was declared as municipality by the government in 2015. Due to adjoining with the Kathmandu metropolitan city, the land use of Chandragiri appears being affected by the rapidly growing. For this purpose it is necessary to be explored. The land use and land value pattern of Chandragiri the consequences of urban growth. The new infrastructure development leads to the high rate of urban growth. But the infrastructure is most important in the Chandragiri municipality.

The population of Chandragiri municipality is increasing due to the migration of people from surrounding areas for searching facilities and services, because of the proximity Kathmandu metropolitan city and it is accessibility major transport link. Chandragiri is one of the major fringe areas of Kathmandu as it serves as a gateway to the Metropolis and is the major transportation link. So, unmanaged increment in built up area has created physical as well as environmental problems. There is lack of land use policy in Chandragiri municipality, which adds the problems to the sector of land use management.

In the study area, it can be exported that overall scenario has been undergoing rapidly change from agricultural uses to infrastructure development. But it is still dominated by agricultural activities. The reason of selected this area because to know the land use and land value pattern and how the scenario change over time.

Thus for urban land management and development, the knowledge of land use change and its factors and consequences are essential. Following question can be raised this context.

) How has land use and land value changed over time in Chandragiri municipality?

) What are the causes of change in land use and land value?

) How can the pattern land value be used for land use zones?

1.3 Objectives

The major objective of the study is to understand in-depth the changes in about urban land use and land value of the study area.

The specific objectives of the study are as follows.

➢ To examine the dynamics of land use and land value between1996 to 2014.

➢ To explore the factors of change in land use and land value.

➢ To analyze the impacts of land use changes and land value on urban growth.

1.4 Signification of the study

Understanding of land use changes the dynamic of each category of land use to certain time interval provide the clues over the pattern of resource utilization, conservation and management.

A comprehensive study and up to date information on physiographic, climate and land resource is vital for planning and managing sustainable land resource.

This study gives the latest information about land use and land value infrastructure development and pattern of urban growth, which in fact helps if the researchers want to research in this area give the latest information and go to the ahead easy in this thesis.

1.5 Limitations of the study

The study concerns with change in land use and land value in Chandragiri municipality. This research work has some limitations due to lack of budget and limited time. The work has been carried out using field study within short period of time. This study covers the Chandragiri municipality and sample size has been taken only along the high-way road and sub-high way road within the buffer zone of 1000m, 500m and 100m.

1.6 Organization of the study

The study is composed of following contents.

) Chapter I includes introduction part of the study, statement of the problem, its objectives, significance and limitations.

) Chapter II comprises review of literature

) Chapter III deals with the research methodology of the study.

) Chapter IV deals with the study area,

) Chapter VI describes land use change

) Chapter VI deals with land value change and impacts

) Chapter VII concern with conclusions and recommendations.

Chapter 2

# Literature review

2.1 Theoretical Review

Theoretical review gives the idea for the research study to relate studies with theories that have developed by the scholars in the past. Different theories and models have been developed to address implication of spatial phenomenon and their relationship Bed-rent theory. But not related Von Thunen model in this study area. Von Thunen model was developed in 19th century. In the past hadn't developed physical infrastructure. So, this model hasn't related in this study area.

2.1.1 Von Thunen Model

The Von Thunen model developed early in the 19th century describes how market process determine local land use pattern in rural region. Johann Herinrich Von Thunen (1783-1850) was a skilled farmer who was knowledgeable in economic. This model was created before the first large-scale industrialization and is simplest explained in terms of agricultural land use around a central market city, his findings are however not restricted to agricultural alone, as discussed below.

In the past physical infrastructure like, school, road, hospital etc were not quite developed as present days and traditional means of transport like *Thelagada*, animals, self haversack etc were used for transport and hauling. At present with the advent of modern public and private transport vehicles and transport medium like roads, rails, waterways, air routes etc. this model seems to be obsolete. The land use pattern in the study area doesn't strictly show the von Thunen model.

Figure 2 Von Thunen model & Study area
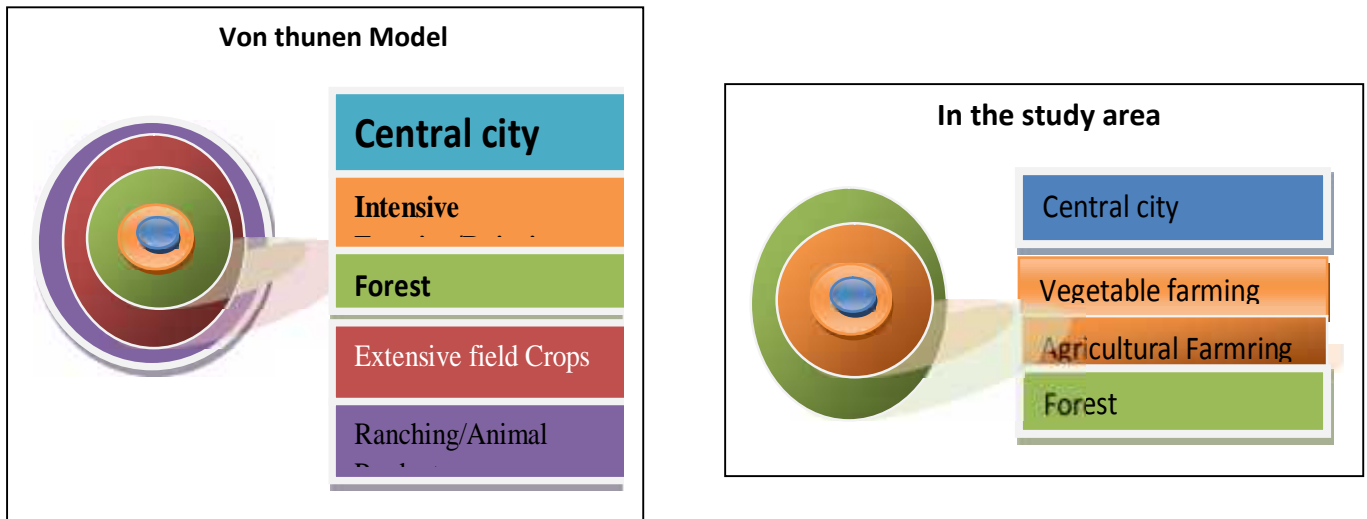
This figure evaluates the Von Thunen model in context of the present study area. Von Thunen model has been formulated with studies in Western country. There place had based of made develop in this model. In that time traditional transport like Thelagada, animals, self haversack etc. At present advent of modern public and private transport. So this model hasn't suitable in this study area.

2.1.2 Bid-rent Theory

The bid rent theory is an economic geography theory that refers to how the price and demand for real estate change as the distance from the central business district (CBD) increases. It states that different land users will compete with one another for bidding land close to the city center. In the study area the land value is seen decreasing as we go far from urban center. Similar scenario can be observed in the study area particularly in Thankot Chowk, Purano Bus park Thankot, Gurjudhara, Balambu, Satungal Chowk, Naya Naikap, Tinthana, Dhunge aadda.
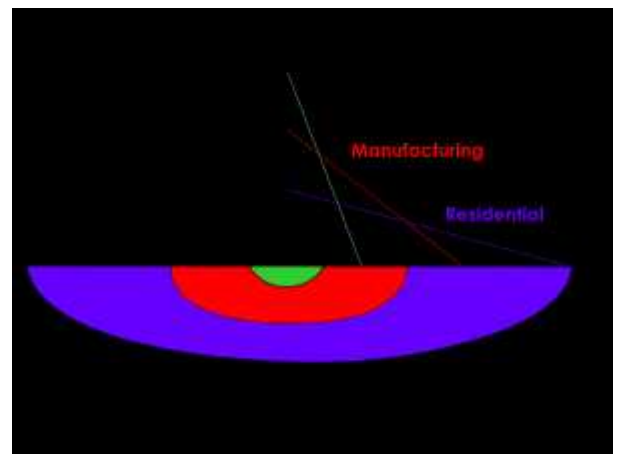
2.2 Land use Model

Land use models use economic theories and simplified statistic methods to explain and estimate the layout of urban land uses.

Land use models use quantitative method to predict future changes in land use, socio-economic and demographic data based on economic theories and social behaviors.

As urban areas grow over time they become increasingly complex. Each urban area has a variety of functions. The different activities that take place mean that the way which humans use the land changes throughout the urban area. Due to the complexity of land uses found throughout a city a number of models have been created to identify patterns of land use. In that context some selected models have been used here.

2.2.1   Concentric zone (Burgess EW)

The Concentric ring model also known as the Burgess model was the first to explain distribution of social groups within urban areas. Based on Chicago, it was created by sociologist Ernest Burgess in 1925. This concentric ring model depicts urban land use in concentric rings: the Central Business District (or CBD) was in the middle of the model, and the city expanded in rings with different land uses.
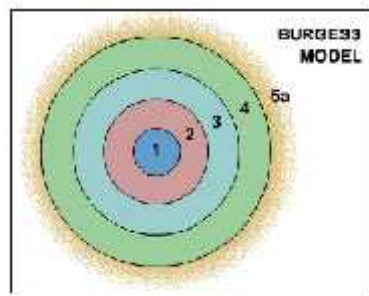
Figure 3 Burgess Model

1. Central Business District.

2. The Transition zone

3. Zone of independent residential

4. Zone of better residence

5. Commuter's zone

In that time the physical infrastructure like, School, Road, Hospital etc. had already built in western countries and this model had made by land use pattern of western country. But the context of Nepal, this model is not suitable because here has not reached the accessibility of infrastructure every part of the country.

2.3   Studies land use Nepal

CEDA (1990) published a research work entitled as a study on the environmental problems due to urbanization in some selected Nagar Panchayats of Nepal. It reports that the demand for housing exceeds supply and land value is skyrocketed at a tremendous rate beyond reaches of the low-income groups.

Manandhar and Ranjitkar (1981) have studied the change in land value in Kathmandu city (1954-78) and have written that result of enormous demand of agricultural land for non-agricultural purposes in the urban fringes with the development of basic infrastructure all around the city. They have concluded that there was a gradually increasing demand for agricultural and non-agricultural land use.

Ranjitkar (1982) has written an article on "the loss of agricultural land in Kathmandu city" and concluded that the preservation of agricultural land is to be given more stress to, but increasing trend of urbanization has been rendering a great loss of agricultural land in the present world.

Ranjitkar (1983) has studied "the change in agricultural land use and land value in urban fringe of Kathmandu valley" and the study starts use agricultural and non-agricultural views.

Ranjit (1983) argued that Nepal has been following the problem of migration of people from to urban centers like others developing countries of the world. The problem exerted a heavy pressure on the fertile land at the peripherals of city areas and caused changes in cropping systems in these areas.

Mandal (2013) has studied the land use and land cover change of Butwal municipality and showed the land use and land cover in five categories Agriculture, built-up, shrub, forest and water bodies were satisfactorily classified for both years: 1999, 2006. The overall results show increasing area of built-up and decreasing of agriculture land.

Bhusal (2010) has studied about the land use and land cover change and its causes and consequences in Madhyapur Thimi municipality during 1978 to 2008. This study reveals that the agricultural land is decreasing at the cost of increasing built-up area over

the period. The highly increasing trend of change in built-up area delineates the necessity of the introduction of appropriate regulation land management. To discourage the haphazard increase in the built up area and to control the negative effect of land use and land cover change, the researcher recommended the proper implementation of land use policy and amendment of the existing laws, rules and regulation.

Pathak (2014) has studied about the land use and land cover change of Panchkhal municipality. The change patterns in land use and land cover in the study area are changing at a rapid rate between 1978 and 2013. Basically, agricultural land is being changed continuously into other types of land use in the area. The larger percentages of agriculture land are converted in to built up area and only a little part goes to other types of land. The decreasing rate of agricultural land in the area is high. On the contrary, the built up area is being increased at rapid a rate from the beginning till end of the study periods.

Dahal (2008) has studied about the land use and land cover change in Dhulikhel municipality stated that the major causes of land use and land cover change area A) development of several educational, business, and establishment of governmental and in governmental organizations. It has created employment opportunity to people and people started to live there and they bought parcel of land and made the house there that produced increase in built up area in it. B) Development of transportations facilities over the municipality area and having tourist places that attract the other people towards those places also encourage people to establish tourism business in the places, which are responsible to carrying out the change in the area. Particularly agricultural land is decreasing rapidly at the nearly some rate at cost increasing built up area.

Shrestha and Brown (1995) argued that the sustainable use and management of forest has the greater matter of concern. The forest coverage is decreasing where agricultural and is increasing towards upper elevation.

Dhakal (2012) has studied about the land use change in Pokhara sub-metropolitan city. The study is maximum change in land use between 1978 and 2012. The focus of study is in land use shown that the pattern in changing very much. The urban area is

increasing rapidly. It means there is need of planned settlement. The agricultural area is decreasing and converting in to built up area.

Khanal (1999) has studied the agricultural land use change in the Kathmandu valley; a case study of Manamaiju VDC. He has concluded that agricultural land use is fast changed into built up area due to the close vicinity of Kathmandu city. Due to the fast declining of agricultural land there were several negative effects like unemployment, migration, social crime and rise of land value.

Rai (2000) has studied the changing pattern of urban land use and land value in Dhankuta municipality. His objectives were to analyze the land use pattern, to study the present land value and its effects on land use and to study the trend of urban growth in relation to the infrastructure in the municipality. He has concluded his study that agriculture land has been changing into non-agriculture land. As a result the built up area has creased and land value has also increased. There is a close relationship between land use and land value.

Sah and Suselo (1996) have studied the shifting of the Koshi River and its impact on the land cover and land use in Koshi Tappu. They discussed on present land use pattern in the Koshi river has suggested that sudden changes of its course is due to increase in sedimentation in the Koshi Tappu region north of the barrage and it has brought profound impact on land cover land use pattern not only within the reserve area but also outside of the reserve area. So River has also played vital role in changing the land cover/land use mostly in Terai region.

There is a need to develop a national land policy that takes into consideration of geographical diversity, which reflects regional specificities of resource for endowment. The country must protect its productive land as a resource for long-term agricultural use for food security and suitable legal instruments and a network of institutions with sufficient human resources (Subedi, 2011)

2.3.1 Land use policy Nepal

Urban development programmes began since the early 1990s and then throughout the national plans in the following years, the urban sector has consistently been keeping up its efforts on providing basic infrastructure, but these have been left behind as compared to the rate of urban growth. Few large urban areas have expanded greatly, while majority of small towns are either with limited facilities or with sluggish growth.

⟩ In the Seventh Five-year Plan (1987-92) urbanization was included as a separate policy component.

⟩ The Eighth Five-year Plan (1992-97) considered urban development as a contributing factor to the national economy.

⟩ The National Shelter Policy approved in 1996 took initiatives for the development of the housing sector. Similarly, the Town Development Act 1998 incorporated legal provisions for land development. It was in 1997 with the formation of Apartment Act that Nepal initiated the concept of group housing for the management of urban population.

⟩ The three-year interim development plan (2008–2010) provided the most recent guidance on urban sector priorities, highlighting the need to address the effects of rapid urbanization on service levels, water quality, and scheme maintenance. It proposed the full integration of sewerage, on-site sanitation, and solid waste management in all urban schemes and specifically endorses cost recovery from consumers. The interim plan has underpinned the government commitment to achieving the MDGs.

It appears that, all the past policies and guidelines were scattered and did not have an integrated policy framework to guide the urbanization process and to conserve the urban environment.

⟩ The National Urban Policy (NUP) formulated in 2007 aimed at creating a balanced, healthy and economically vibrant urban structure along with effective urban management. NUP addressed the issue of historical imbalances and

haphazard nature of urban development in Nepal. It viewed urban centers as catalysts for economic development to link the north–south and east–west access corridors. The policy has proposed to build the capacity of municipalities to plan and manage integrated local development activities including the preparation of urban master plans to be moderated by central and regional authorities. Further, it has clearly mentioned about encouraging investment from the private sector to achieve balanced and economically vibrant urban development and the public-private partnership (PPP) is considered to be the best model for urban development.

2.3.1.1 Current context of land use denote in Nepal.

At present the general land use of Nepal has the following area:

) Agricultural 27%
) Forest 39.6%
) Open space 12%
) Snow and rocky area 17.2%
) Water 2.6%

2.3.1.2 Land use policy, 2069 has classified land into following 7 classes.
) Agriculture area
) Residential
) Commercial
) Industrial
) Forest
) Public use
) Other specific area.

2.4 Studies on land use in abroad

The following section reviews the studies on land use pattern and changes at the international level. Most of these literatures are confined to studies in India and United States of America. Husain (1968) carried out a study in Ganga-Yamuna Doab region and showed the land utilization pattern by soil type. He classified the land into three categories like cultivated land, forest land others. He has concluded that the soil type and the size of household in Ganga-Yamuna Doab region significantly influenced the agricultural practices.

World bank (2009) states that agriculture still comprises a significant share of overall growth and household income, and provides essential food security, in many of the poorest countries, a fact amplified by the recent food price crisis. Improved agricultural performance can lead to dramatic improvements in the incomes of the poor, provide affordable food, and spur structural transformation.

FAO (2009) status that much of the suitable land not yet in use is concentrated in a few countries and much of the potential land is suitable for growing only a few groups not necessarily the crops for which there is the highest demand. Also much of the land not yet in use suffers from constraints (chemical, physical, endemic, diseases, lack of infrastructure etc), which cannot easily be overcome. (Or it is economically not viable to do so.)

Riebsame et al. (1996) has studied land use and landscape change in the Colorado mountains. According to them residential and commercial land development quickened during the 1990's in Colorado, increasing the pace and extend of regional land use and landscape change. Unlike previous in the secondary and tertiary economics, services, recreation and information business booms in mining, cattle, or energy, the current development wave is driven by growth-instead of commodity production. The result is sprawling land use conversion, mostly from agriculture to residential in even the most rural areas.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research methodology

Methodology is like a heart that organizes the total part of research and result depends on it. It is a set of rules and procedures that indicate how research and arguments are to be conducted within the framework of disciplinary research areas. It deals with information collection, processing, and organization as well as analysis techniques. The use of methodology allows accumulation of a disciplinary store of knowledge and the result of works aimed at comprehending a particular topic which is accepted as valid because they were collected within the criteria of epistemology and ontology that are part of the relevant theory (Johnston, 1984).

Kothari, "Research Methodology refers to the various sequential steps to adopt by a research in studying problem with certain objectives in view".

Contemporary human geographers study places, people bodies, discourses voices and fragmented landscapes. The research targets of today's human geographers require a municipality of conceptual approaches and methods of enquiry (Hay 2000) that allows researcher to draw a concrete idea for researcher. Carefully selection of research methodology is very difficult task and philosophy concerns the purpose of research. Likewise, each approach has an underlying ideology. Many geographers doubt that philosophical issues are actually relevant to geographic research. However, no research (geographic or otherwise) takes place in a philosophical vacuum. (Kitchine and Tate, 2000)

Figure 4: Methodological framework of this study


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                  │ Result, findings and conclusion │
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3.2 Methodological framework of the study

The study was done by using both spatial as well as attribute data. There is equal role of both types of data. First of all collection of required maps and images are done. The maps and images can be collected from different map producing agency mentioned above. The major collected maps are of Toposheet 1996, Google image 2004, and Google image 2014 is also collected.

The collected map of study areas land use 1996 was scanned separately. The scanned map is being geo-referenced by using ARC GIS 9.3 software. The layers of land use 1996 can be prepared by digitizing the geo-referenced map. Similarly the land use 2004 and 2014 can be prepared by digitizing the geo-referenced Google image. The topographic data layer and Google image are prepared by digitizing the geo-referenced maps and image. The digitization process is conducted by using Arc GIS 9.3 software.

The next step was to compile vector layers of different land use (1996, 2004, 2014) prepared by digitizing process. The change in land use can be analyzed separately. First of all the change in land use 1996 and 2004 is analyzed. Then the land use of 2004 and 2014 can be compared. At last change in land use of 1996 and 2014 is also analyzed. The whole analysis is conducted in GIS environment.

After completing the change analysis the observation and checklist survey of the built up change occurred area was conducted by method of purposive sampling method. The checklist survey was conducted for finding the causes of land use and land value change. In this method researcher can choose the sample of study road are within 100m, 500m, 1000m buffer. The methods of collecting data are useful for finding cause of land use and land value change.

The last step of the study was to find the result and conclusion. Similarly the recommendation was also given based on the analysis. The results findings and conclusion can be drawn by using the both spatial as well as the attribute data analysis.

3.3   Research Design

The research design is the detail and scientific plan of the investigation. For the good research work and reliability, I will apply the scientific method. This study will focus on the Land use and land value of Chandragiri municipality.

3.4   Source of data

The sources of data for this study were both secondary and primary. Primary information was collected from the field survey and secondary information was collected from published and unpublished documents.

3.4.1. Primary Data

The primary data was collected through field survey. Those data are for the purpose of finding cause of urban land change and land value. Similarly the data from ground verification of urban land change and land value in field are primary data. I was being using various tools and methods, like field survey observations, and check list that's data. A total of 35 checklists have been used in those zones in Chandragiri municipality.

3.4.1.1 Ground survey

Ground survey was used for verifying the land use change verification. In this method the unclear land use change in image was verified with direct observation in field.

3.4.1.2 Observation

An observation is an inevitable tool for any type of research. Research has been taken and understood overall field information by staying in close proximity of various sites of the study area during the field study period. In the other hand direct field observation is the major weapon of geographer to collect the fact information. Researcher collects the data by direct observation without acquiescence of respondents. In this research researcher had prepared a field note of every observation of field during the whole period of field survey.

3.4.2 Secondary Data

Chandragiri municipality was taken as the study area for this research. The mean source of data for research was secondary data such as municipality map, different image from Google, Toposheet of concerned area the reliability of the study was best on secondary data collected from various sources both published and unpublished documents, Chandragiri municipality office, Department of topographical survey, the central bureau of statistics (CBS 2011) was major source of data. In addition to that construed authorizes report, journals related paper etc. The following data types, sources and resolution of the secondary data have been used. This study has the following limitations, which is summarized under following points.

Table1: **Secondary Data**

Data type and date	Sources	Resolution	Scale
Toposheets 1996	Department of survey, Government of Nepal	2.5ha.	1:25000
Google image 2004	www.Googleearth.com	4m	2015 September
Google image2014	www.Googleearth.com	4m	2015 September

Source: - Google image & toposheet 1996

3.5   Sampling

The sampling has been taken on the basic of base map which is prepared by Google map are Toposheet map of study area.
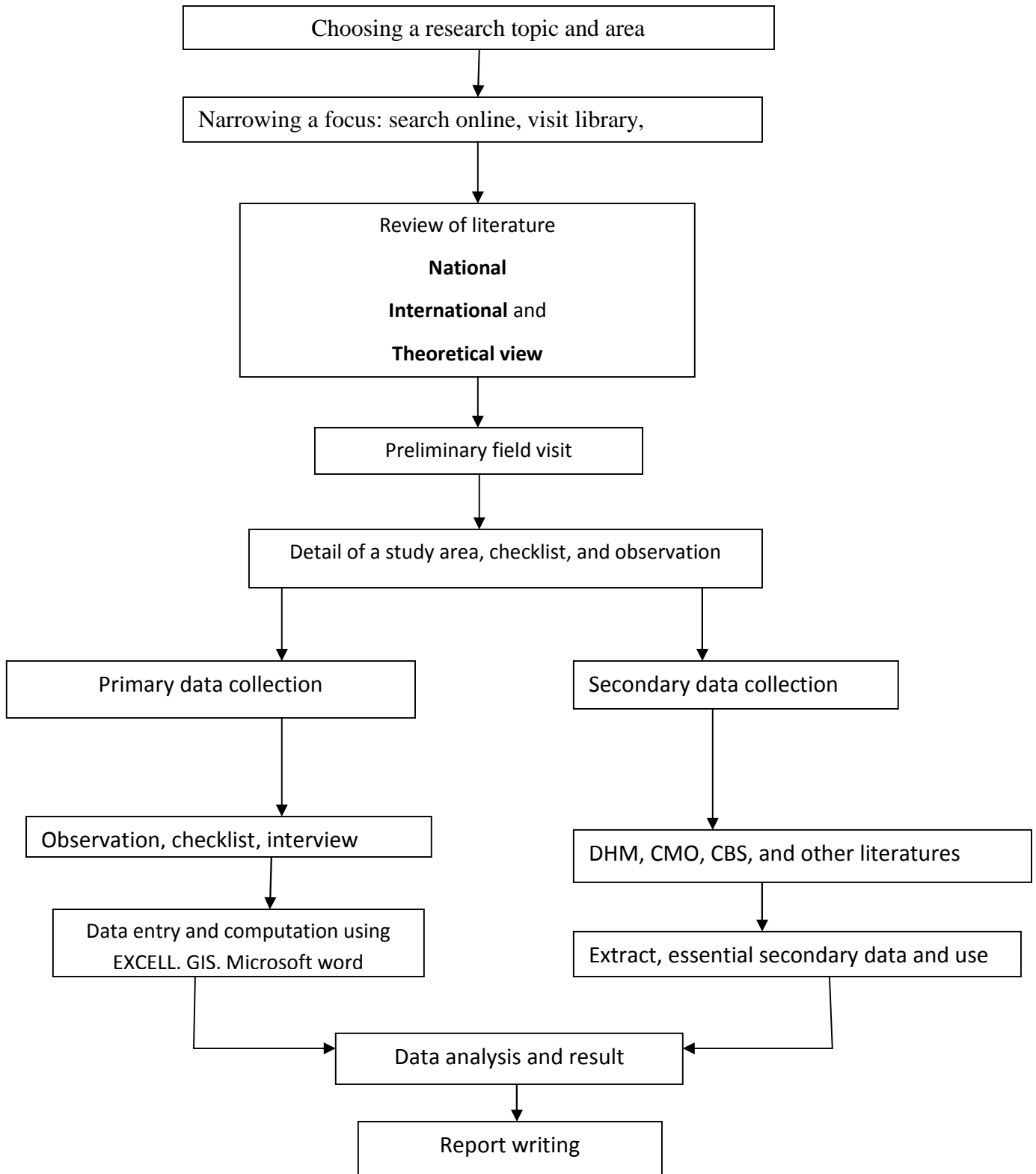
To fulfill objectives it used the purposive sampling method for the sample collection. I collected 35 sample units by major road buffering in three categories 100m, 500m and 1000m respectively.

3.6   Data analysis and interpretation

The collected data has analyzed in two ways one is statistical tools such as excel and descriptive method of analysis which has covered the information collected from check lest, field observation various tables, charts, figures and maps has created by using

computer software programs GIS, Micro soft word and Micro soft Excel. The analysis is guided by both quantitative and qualitative techniques.

Figur5: Research design

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│        Choosing a research topic and area      │
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3.7   Method of Preparing Map

Google image and Toposheets data interpretation was carried out to delineate various land use types. Ground checks were also done to finalize the maps. The maps prepared by survey Department, Government of Nepal in the year 1996 on the scale 1:25000 and Google image of 2004 and Google image 2014 were used as the basis for detection in present land use change.

 The land use maps prepared from Toposheets 1996 and Google image 2004 and 2014 show the spatial distribution, extent and location of the following various land use types present in Chandragiri Municipality.

Classification Scheme for various type of land use mapped from Toposheet 1996, Google image 2004 and Google image 2014 is done as follows.

S.N.	Land use categories
1	Built up
2	Cultivation
3	Dense forest
3	Sparse forest
4	Open space
5	Road
6	River

3.8 Concept and Definition

3.8.1   Land use Introduction

Land use deals with the spatial aspect of all human activities on land use pattern is the arrangement of different types of uses i.e. cultivation land, forest, grazing land, built up area etc. it is an expression of man's interaction with his environment. Land is a basic natural resource of human begins, which is available at every corner of the geographical unit of the earth and also it fulfills the basic need of the living beings. Therefore the

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whole life of living being depends upon land resource. Land use is the surface utilization of land, at a given time and space.

"Land use is characterized by the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it" (FAO/UNEP, 1999) (Adopted during the course of development of the land cover classification system, LCCS). A more inclusive definition of land use is often used in practice. 'Land use' actually includes near-surface water (see the definition of land). Any given area of land is usually used to satisfy multiple objectives or purpose. Land use information provides answers to one or more of the following questions concerning the current use of the land.
• What: the purpose of activities undertaken - e.g. the specific products and services, that are sought
• Where: the geographic location and extent of the spatial unit under consideration
• When: the temporal aspects of various activities undertaken - e.g. the sequence of carried out operations like planting, weeding, etc.
• How: the technologies employed - e.g. technological inputs/ materials such as fertilizer, irrigation, labor, etc...
•How much: quantitative measures - e.g. areas, products
• Why: the reasons underlying the current land use – e.g. land tenure, labour costs, market conditions, etc.

Agricultural land-use data are important for many of the regional to global activities currently undertaken by FAO (e.g. the validation of agricultural land evaluation; the preparation of perspective studies on agricultural production and food security; early warning for food security; natural disaster relief operations; farming systems studies; policy formulation). Thus, knowledge of current land use (land resources) is needed for formulating changes leading to sustainable use of the resources.

Land is the important property and economic resource where all the development activities are concentrated. Lang-term and scientific land use planning on the basis of physical features, composition, quality and capability of the land is essential for balanced and sustainable development (Oli, 2001).

Land-use and land-cover (LULC) change, as one of the main driving forces of global environmental change, is central to the sustainable development debate. It affects a wide range of environmental and landscape attributes including the quality of water, land and air resources, ecosystem processes and function, and the climate system (Lambin, Rounsevell, Geist, 2000).

Land use change is influenced directly by infrastructural development, where all types of human facilities are concentrated. Migration, globalization, government plan and policies, and political condition are the other factor of urban development and land use change of city (Rimal, 2011).

Agriculture is the predominate activity of the people in Nepal. It plays a crucial role in the Nepalese economy as this sector still contributes more than one third to Nepalese GDP, and more than tow-third of its population depend on it for their employment and livelihood. The share of agriculture in total GDP is 33.1 (MOAC, 2013). Cultivated land area for agriculture is estimated 26532.70 hectare, which is about 18 percent of the total area of country. The major portion of agriculture land is in the Terai zone and it account for 57 percent of the total cultivated area and remaining 43 percent cultivated land covered by Hills and Mountains (Karki, 1993).

About 17 percent land area of Nepal is agriculture land (MOF, 2011) and most of the other land is marginal and rugged. Due to continue fragmentation of land, the land holding capacity per household across Nepal is found to be relatively low. Paddy, maize, wheat and millet are the major crops grown in Nepal. The proportion of agriculture households cultivating paddy is 72 percent, 57 percent cultivate wheat, 64 percent cultivate summer maize and 38 percent of agricultural households in the country cultivate millet. Similarly, 27 percent of households cultivate soybean, 31 percent cultivate lentil, 53 percent cultivate winter-potato, 39 p percent cultivate mustard, 72 percent winter-vegetables and 69 percent cultivate summer-vegetables (NLSS, 2011) diverse climatic condition permits the cultivation of different kinds of fruits and vegetables in Nepal.

The land use/ land cover pattern of a region is an outcome of natural and socioeconomic factors and their utilization by man over time and space. Land is becoming a scarce resource due to immense agricultural activities and demographic

pressure. Hence, information on land use/ land cover and possibilities for their optimal use is essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare. This information also assists in monitoring the dynamics of land use resulting from changing demands of increasing population.

The land use change encompasses the greatest environment concerns of human populations today, including climate, biodiversity loss and the pollution of water, soil and air. Monitoring and mediating the negative consequences of land use and land cover while sustaining the production of essential resources has therefore become a major priority of researchers and policymakers around the world.

Geographical information system (GIS) is a tool used for the analysis of spatial data, which support the decision makers, planners, developers, politicians etc. GIS tools are conveniently used in change detection of land use and cover. Precision and accuracy of GIS technologies to handle of the spatial data is much satisfactory these days. So demand of GIS for analysis of geographic data and change detection of land/cover is increasing day by day.

All urban lands are classified according to their use. Any urban area is considered either developed or vacant or water area (Mayor and Khon 1967) Chandragiri municipality is the least urban centre. There are different types of lands and the land use of this municipality is changing slowly.

Classification of land use

Cultivated area:

The sciences, art, or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products. (WEBCRAWLER.COM)

The major agricultural products can be broadly grouped into foods; fibers, fuels, and raw materials, specific foods include cereals (grains) vegetables, fruits, oils, meats and spices. Fibers include cotton, wool, hemp, silk and flax. Raw materials include lumber and bamboo. Plants, such as resins, dyes, drugs, perfumes, bio fuels and

ornamental products such as cut flowers and nursery plants produce other useful materials. Over one third of the world's workers are employed in agriculture, second only to the services sector, although the percentages of agriculture workers in developed countries has decreased significantly over the past several centuries.

3.8.2.1 Built up Area

Settlement refers to the characteristic groupings of population into occupancy units, together with the facilities in the form of houses and streets, which supply the inhabitants. The settlement system of a region includes farms and villages as well as urban places. The study of settlement is concerned basically with the location, size, and function of settlements, and their relationships to their hinterlands.

Built up land is comprised of areas of intensive use with much of the land covered by structures. Included in this category are cities, towns, villages, development along highways, transportation, power, and communications facilities, and areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from urban areas.

As development progresses, land having less intensive use may be located in the midst of urban or built up areas and will generally be included in this category. Agricultural land, forest, barren land, built up area, water bodies areas on the fringe of urban or built up areas will not be included except where they are surrounded and dominated by urban development. The urban or built up category takes precedence over others when the criteria for more than one category are met. For example residential areas that have sufficient tree cover to meet forestland criteria will be placed in the residential category.

3.8.2.3 Forest Area

A forest is a large area of land covered with trees or other woody vegetation. Hundreds of more precise definitions of forest are used throughout the world, incorporating factors such as tree density, tree height, land use, legal standing and ecological function. According to the widely used United Nations Food and Agriculture

Organization definition, forests covered an area of four billion hectares (15 million square miles) or approximately 30 percent of the world's land area in 2006.

Human society and forests influence each other in both positive and negative ways. Forests provide ecosystem services to humans and serve as tourist attractions. Forests can also impose costs, affect people's health, and interfere with tourist enjoyment. Human activities, including harvesting forest resources, can negatively affect forest ecosystems

Forest lands have a tree-crown areal density (crown closure percentage) of 10 percent or more, are stocked with trees capable of producing timber or other wood products, and exert an influence on the climate or water regime. Forestland generally can be identified rather easily on high-altitude imagery, although the boundary between it and other categories of land may be difficult to delineate precisely. Lands from which trees have been removed to less than 10 percent crown closure but which have not been developed for other uses also are included. Forestland, which is grazed extensively, would be included in this category because the dominant cover is forest and the dominant activities are forest related. Auxiliary concepts associated with forestland, such as wilderness reservation, water conservation, or ownership classification, are not detectable using remote sensing image. Such concepts may be used for creating categories at the more detailed levels when supplemental information is available. At level 11, forestland is divided into three categories: deciduous, Evergreen, and Mixed. To differentiate these three categories effectively, sequential data, or at least data acquired during the period when deciduous trees are bare, generally will be necessary. These forest units are sub classified further based on dominant species group types.

3.8.2.4 Water bodies

The delineation of water areas depends on the scale of data presentation and the scale and resolution characteristics of the remote sensor data used for interpretation of land use and land cover. Water area includes all areas within the landmass that are persistently covered by water. Water bodies include lakes, ponds, river streams as well as reservoir for water supply, manmade ponds etc with standing or flowing water. There are several large and small natural and manmade standing and following water bodies in the municipality of the study area. There are several small ponds used for fish farming. Running water bodies include rivers, stream and canal.

# CHAPTER 4

The Study Area: Chandragiri Municipality

4.1   Location of the study area

Chandragiri Municipality is a gradually growing urban centre of Nepal. It extends between $27^{\cdot} 41' 25''$ latitude north to $85^{\cdot} 13' 13''$ longitude east.

Chandragiri is a municipality in the central development region of Kathmandu district in the Bagmati zone of Nepal. This is a new municipality, being formed by merging eleven existing villages:- **Baad Bhanjyang, Balambu, Dahachok, Mahadevsthan, Machhegaun, Matatirtha, Naikap, Naya Bhanjyang, Naikap purano Bhanjyang, Satungal, Thankot and Tinthana** on 2 Dec, 2014. The municipality comprises of 25 administrative wards covering total area.

The total area of Chandragiri municipality is 43.9 km^{2} it spreads 9 km north to south and 8.5 km from east to west. The latitude is from 2730m the sea level. Source: www.helloChandragirimunicipality.com

Map 1: **Location of Chandragiri municipality in Kathmandu**
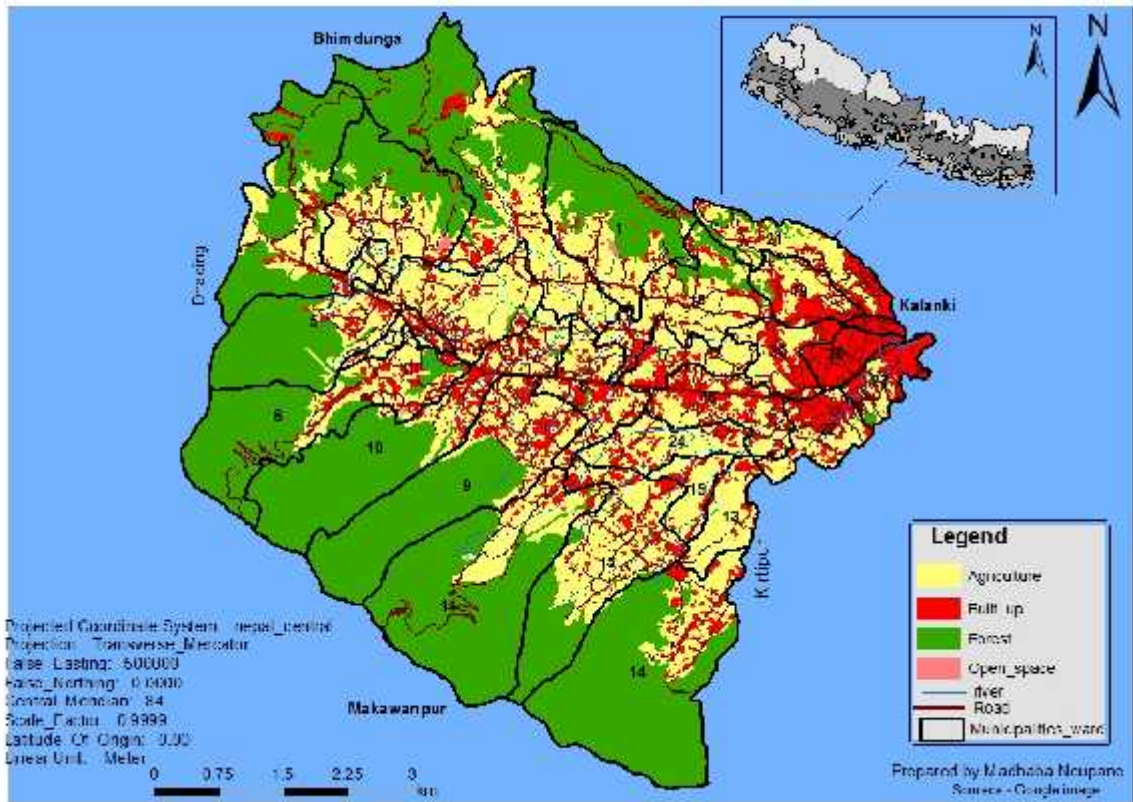
Source: Google image and Survey department of Nepal

Chandragiri hill is one of the best hiking trials around Kathmandu valley. Chandragiri (2730 meters above sea level) lies on the south west of Kathmandu Valley though the area itself has abundant natural resources including flora and fauna for developing tourism activities, but has been left behind from being a popular tourist destination because of lack of promotion. Chandragiri hill lies just above the popular picnic Park of Kathmandu named Tribhuvan Park. Soon this hill will be facilitated with Nepal's second cable car service, which is now on under construction. The total length of this cable car services is around 2.5 km, which takes about 10 minutes to cover the total distance. As like visitors will be facilitates with much more services around this hill. Baleshwar Mahadev temple is one of the major attractions of this hill. Secondly running project has designed 3 star hotel, resorts, Fun Park, mountain and valley view point, etc which will definitely influence domestic as well as international tourists to visit over this

majestic hill. A large number of people from different parts of the country thronged here to worship the Trishuli (trident) believed to be of Lord Shiva. A big fair is observed here on Baisakh Purnima night (a full moon night in May), every year. (www.nepalonetours.com. Nov.1, 2015)

This hill also carries great historical importance. During the time of unification of Nepal by shah dynasty. It is said that Prithvi Narayan Shah was attracted with the beautiful valley while he was walking through this hill on his way to maternal uncle´s home in Nuwakot from Makawanpur and developed the concept of unifying the three cities Kantipur (Kathmandu), Bhadgaon (Bhaktapur), and Patan (Lalitpur) with the then Gorkha state. He later entered with his Gorkha Army in Kirtipur via the same hill. The king then attacked and got victory over the Kathmandu Valley.

4.1.1 Physical aspect

1. The visitors can access to this hill by means of Nepal's second cable car service within 10 minutes.

2. Visitors can access to this hill by means of 4wheeler transportation means.

3. Visitors can access to this hill by hiking from godam, Thankot (7 Km. Upward climbing, about 3 hrs. walk through graveled road or small hiking trial).

4. Visitors can reach to this land by hiking through Kabrebot, Matatirtha (around 9 km. upward climbing, about 4 hrs. walk through graveled road or small hiking trial).

5. Visitors can hike to this hill from Pushpalal Park, champadevi (through small steep hiking trial for 6 hrs walk).

4.1.1.2.Climate:-

The study area has mild climate however this area is extended in medium variation of altitude and slop. Generally the climate of the area is monsoon type. But climatic condition is almost equal in all parts of Chandragiri municipality.

4.1.1.3.Water supply

Water supply and sanitation facilities are provide by the Kathmandu Upatyaka Khanepani limited (KUKL) there is a severe shortage of water for household purpose

such as drinking, bathing, cooking, and washing. People have been using pipe and well takes for the purpose related to water. (Source Field survey)

4.1.1.4.   Topography

Chandragiri municipality claims to have plenty of fertile soil for agricultural use the municipality is gradually sloping towards the northern part with average elevation of 2660 m the plain area of Chandragiri is very important from agricultural point of view.

4.1.2 Social aspect

4.1.2.1 Population and household

As Chandragiri municipality is located in the Middle mountain region area, there are good transportation facilities. It is easily accessible from Kathmandu city. As a result, the flow of migrants is increasing over the 10 years. (Field survey) this municipality has total population is 85195 out of which 42891 male and 42304 female. The municipality consists of 20532 households

Table2: Population and household

Word NO.	House Hold	Total population	Percent
1	362	1737	2.04
2	516	2299	2.70
3	500	2260	2.65
4	317	1519	1.78
5	1342	5563	6.53
6	647	2796	3.28
7	831	3688	4.33
8	1142	4838	5.68
9	1282	5259	6.17
10	1307	5417	6.36
11	867	3699	4.34
12	546	2283	2.68
13	518	2250	2.64

14	354	1599	1.88
15	348	1500	1.76
16	1354	5102	5.99
17	1285	5307	6.23
18	449	2016	2.37
19	658	2763	3.24
20	1096	4352	5.11
21	396	1783	2.09
22	967	3876	4.55
23	1540	5850	6.87
24	1024	3850	4.52
25	884	3592	4.22
Total	20532	85195	100

Source CBS 2011

Table 1 shows the ward no 23 has highest population about 6.87% in the Chandragiri municipality, followed by ward no. 5 and 10 in the second and third positions6.53%, 6.36% and Ward 15 has lowest population about 1.76%, followed by ward no. 4 and 14 in the second and third about 1.78%, 1.88% respectively.

Map 2: Settlement of Chandragiri municipality, KTM valley
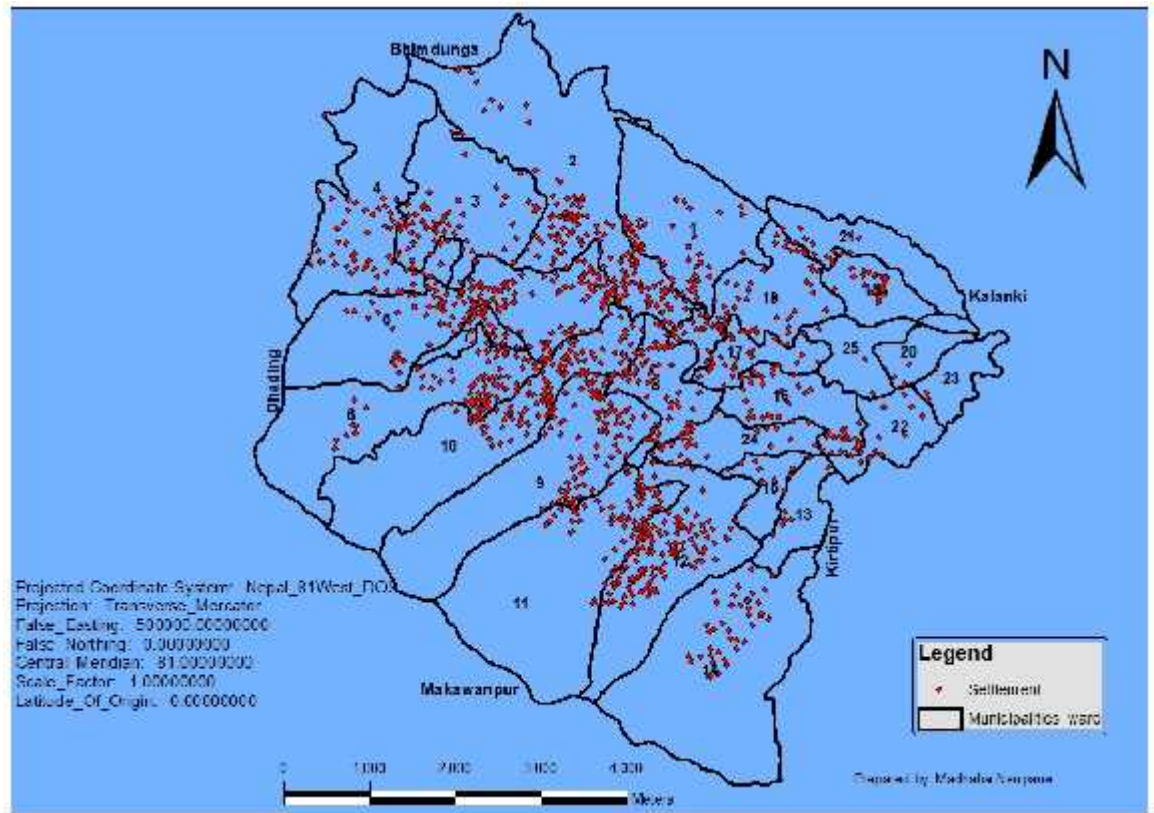
Source: Survey Department of Nepal & Google image 2014

4.1.2.2 Sex composition of population

The most commonly used method of analysis sex composition is the pyramid, which is commonly known as sex pyramid. Table 2 presents sex group of ward wise for Chandragiri municipality.

Table3: Sex composition of population in Chandragiri municipality (2011)

Word NO.	Male	%	Female	%	Total population
1	844	1.96	893	2.12	1737
2	1147	2.66	1152	2.73	2299
3	1131	2.63	1129	2.68	2260
4	742	1.72	777	1.84	1519
5	2888	6.72	2675	6.32	5563
6	1394	3.24	1402	3.31	2796
7	1824	4.24	1864	4.41	3688
8	2427	5.65	2411	5.7	4838
9	2615	6.08	2644	6.25	5259
10	2689	6.26	2728	6.45	5417
11	1842	4.28	1857	4.39	3699
12	1162	2.7	1121	2.65	2283
13	1112	2.58	1138	2.69	2250
14	772	1.79	827	1.95	1599
15	713	1.65	787	1.86	1500
16	2700	6.29	2402	5.68	5102
17	2645	6.16	2662	6.29	5307
18	`980	2.83	1036	2.45	2016
19	1376	3.19	1387	3.28	2763
20	2217	5.16	2135	5.05	4352
21	875	2.03	908	2.15	1783
22	1945	4.52	1907	4.51	3876

23	3021	7.03	2829	6.68	5850
24	2012	4.68	1838	4.34	3850
25	1808	4.21	1784	4.22	3592
Total	42891	100	42304	100	85195

Source: CBS 2011

Table no. 2 shows that ward no. 23 Male population has been highest in the Chandragiri municipality about 7.03% and male population has been lowest word no. 14 about 1.65%. Similarly Female population has been highest word no. 23 about 6.68% and Female population has lowest word no. 3 about 1.65%. In the Chandragiri municipality.

4.1.2.3 Transportation

Transportation built up includes roads network (high way, arterial roads, pathways and other) public transportation parking area, bus stations/ stops.

CHAPTER 5

LAND USE PATTERN IN CHANDRAGIRI

5.1   Land use Pattern 1996

Digital GIS data from 1:25000 scale Topographical maps prepared by survey Department, 1994 were used as base data for GIS analysis. Digital GIS datasets including contour, land cover, river features and other topographic features were used as additional data for GIS based analysis and the study of existing land use pattern.

The following table depicts the average of the each of the land use categories, without river and road.

Table 4: Land use in 1996 in Chandragiri

Categories	Area (Ha)	Percent
Cultivated land	2279.09	51.88
Forest	1621.13	36.9
River	337.91	7.69
Road	143.75	3.27
Built up	8.17	0.18
Open space	2.6	0.059
Total	4392.65	100

Source: Toposheet map, 1996

Chandragiri municipality is agriculture based economic centre. Agricultural land use covered 51.88% of land the Municipality. More than 80% people were depended on agricultural activities in 1996. Here, Agricultural system depended on water and some area have depended cannels and underground water. (Source: field survey) were the major crops of produced vegetable, paddy and wheat.

Chandragiri municipality had limited built up area before 1996. Out of the total area about 4392.5938 hector built up area covered 8.17 hector (0.18%) built up area was extended into Santugal, Machchhegau, Balambu and Thankot etc. in the form of classic settlement.

Forest covered 1621.13 hector in total area of municipality. In past time there were not many people in this area. Poor transportation lack up drinking water, infrastructure and services. Therefore People to settle here dense forest is existed in this municipality.

Road network is very necessary for development of any area. Chandragiri municipality is ancient city so there is more main track road, but the Motor able hadn't accessibility every word in 1996. Road has covered area 143.75 hector in that time. The people often had to on foot walk.

Without water imposable in life. River network has covered 137.91hector total area in this Chandragiri municipality.

Table 4 gives the information of land use pattern of 1996, the highest percent of land use is occupied by cultivated land which accounts 51.88 percent and the least value of lands use is open space which account only 0.059percent similarly forest, river, road and built up area occupied been seen covered area 36.9, 7.69, 3.27 and 0.18 percent respectively. This figure indicates in 1996 most of the people were engaged in agricultural farming due to high proposition of cultivated area and settlement (built up) was scattering. It might be the land value becomes low.
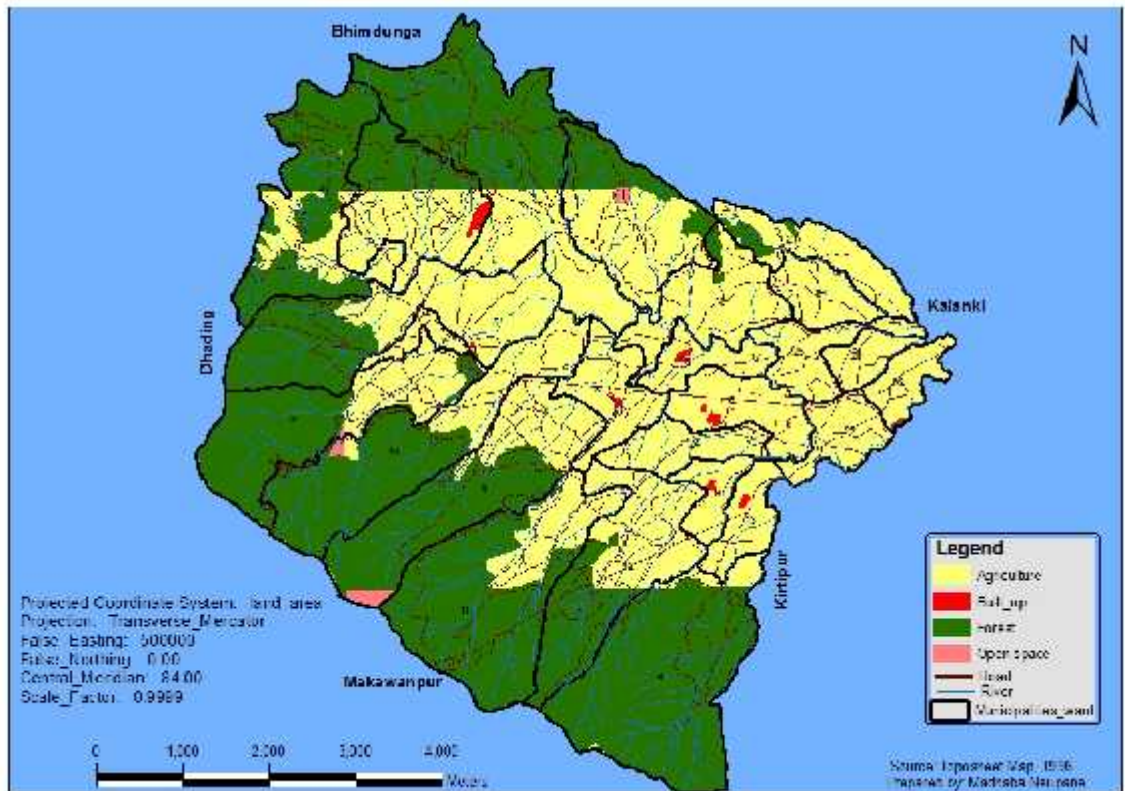
Figure 6: Land use category, 1996
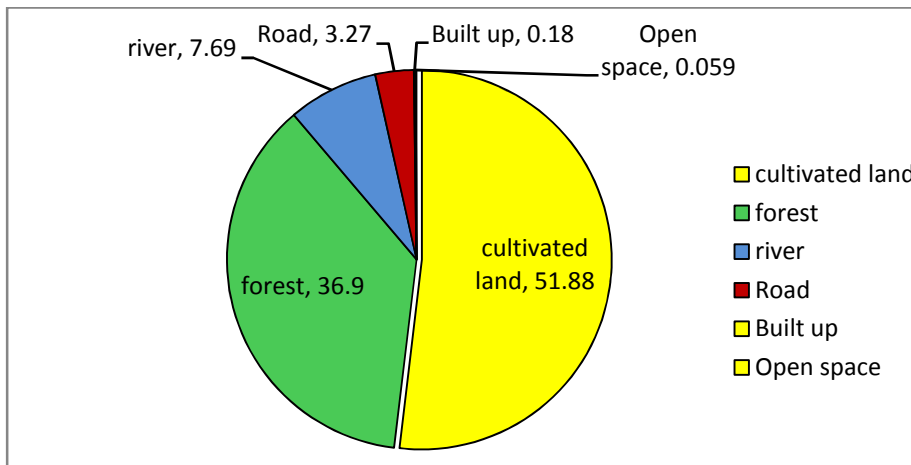
Source: Toposheet map 1996

Highest area is covered by cultivation and lowest area covered by open space of total area in this Chandragiri municipality.

Map3: Land use Category, Chandragiri Municipality of Ktm, 1996

## 5.2   Land use Pattern in Chandragiri Municipality, 2004

Land use pattern in 2004 has been shown in map 3, which is computed from Google image 4 m. high-resolution imagery 2004 with field verification. The land classified into six categories i.e. built up, cultivation, forest, open space, road, river, table 7 shows the area under different land types in Chandragiri municipality in 2004.

Table 5: Categories of Land use in Chandragiri, 2004

Categories	Area (ha.)	Percent
Cultivated land	1955.58	44.52
Forest	1587.41	36.14
Built up	489.17	11.14
Road	209.18	4.76
River	147.23	3.35
Open space	3.92	0.09
Total	4392.49	100

Source: Google image 2004

Figure 7: Land use category in Chandragiri municipality 2004
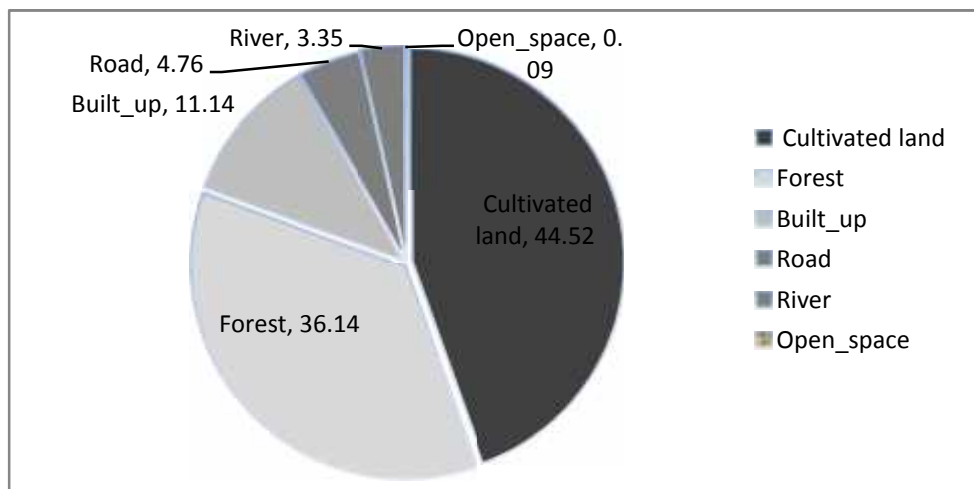
Source: Google image 2004

Table 5 shows that according to 2004 highest area has covered by cultivation area about 45 in this study area and lowest area covered by open space 0.09%. Similary forest has covered about 36%, built up area has covered about 11%, road area has covered about 5%, and river area has covered about 3%.

Map4: Land use Category, Chandragiri Municipality of Ktm, 2004
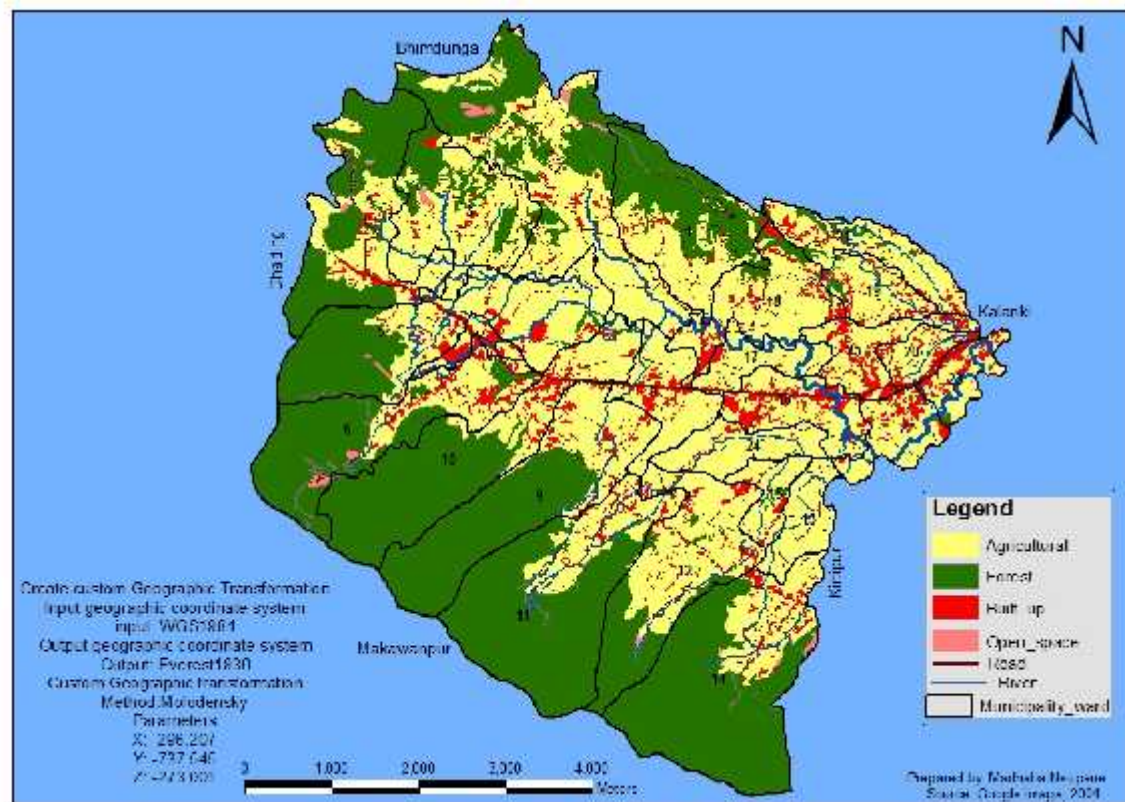
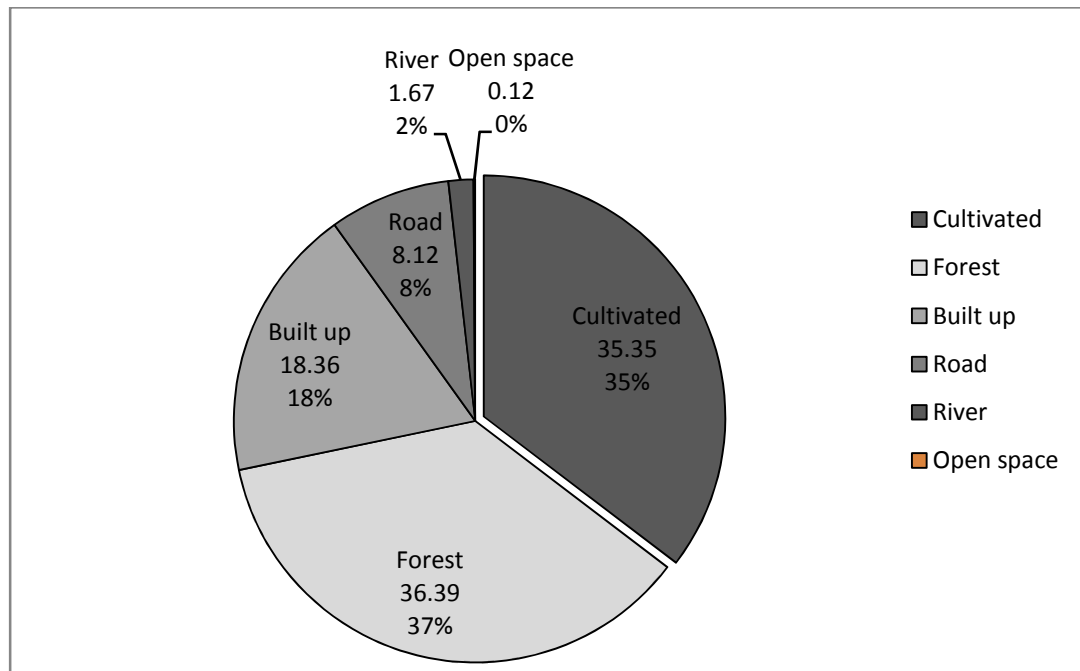## 5.3 Land use Pattern in Chandragiri municipality, 2014

Municipality level use map is prepared based on the available secondary and field based primary data sources. The interpretation of present land use carried out with a focus to classify the spatial characteristics and prevailing urban and agricultural land use specifically in the municipality and urbanizing context, land use is highly complex phenomeon. Land use classification based on imageries will strongly determined by diversified use types. In that case present land use can be prepared by digitizing in the Arc GIS software. Thematic data layers of topographical map are used as a reference data sheet for satellite imageries and are integrated with the help if Arc GIS. The major land use categories are as below.

Table 6: Land use Pattern in Chandragiri, 2014

| Categories	2014 (ha)	Percent
Forest	1598.53	36.39
Cultivation	1552.54	35.35
Built up area	806.36	18.36
Road	356.59	8.12
River	73.28	1.67
open space	5.26	0.12
Total	4392.56	100

Source: Google image, 2014

Figure 8: Land use category in Chandragiri, 2014

Table 6 shows that according to Google image 2014, highest area covered by cultivation area 35.35%, total area of Chandragiri municipality. Lowest area is covered by open space 0.12%. Second and third area highest area are covered by forest, built up area about 37% and 18% of total area in this study area. Similarly road and river area covered about 8%, and 2%, of total area in study area.

Map 5: Land use Category, Chandragiri Municipality of Ktm, 2014
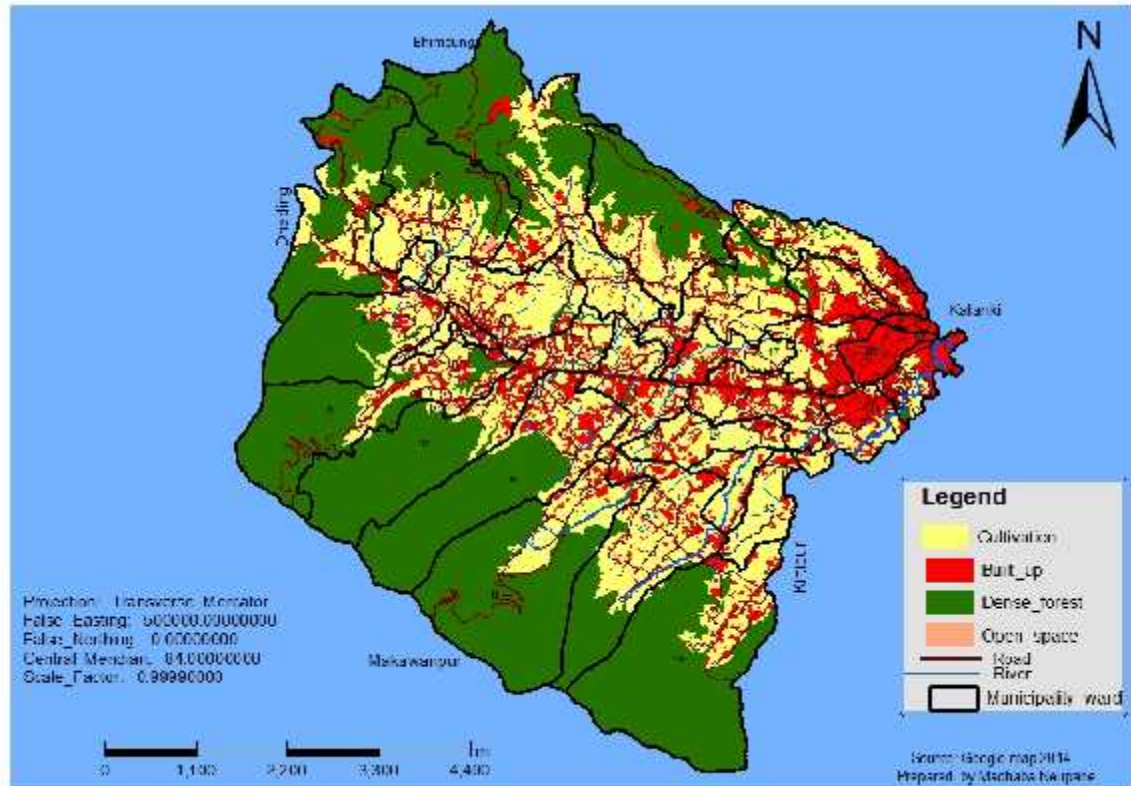
Source: Google image 2014

CHAPTER 6

Land use/ Land cover change analysis

Land use chnge is discussed in terms of actual area gained and lost in each land use categories. The land use change over time is continuous process. The land use change differs from one geographical region to another.
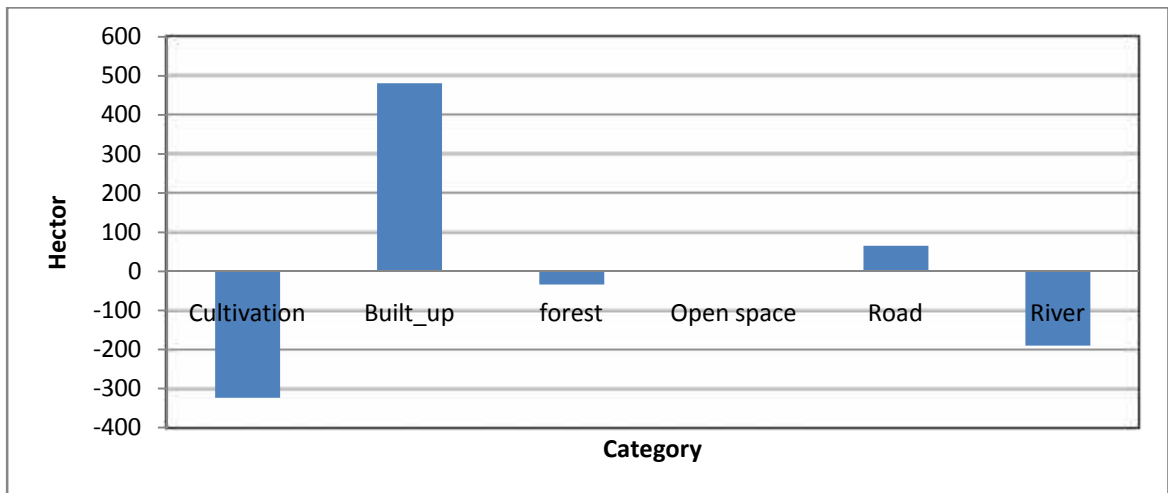
6.1 Land use change 1996 to 2004

Table7: Land use change 'between' 1994 to 2004 has been given as below":

Categories	Area (ha) in 1996	Area (ha) in 2004	Change (1996 to 2004)	Percent
Cultivation	2279.09	1955.58	-323.51	-14.19
Built-up	8.17	489.17	481	5887.39
Forest	1621.13	1587.41	-33.72	-2
Open space	2.6	3.92	1.32	50.76
Road	143.75	209.18	65.43	45.52
River	337.91	147.23	-190.68	-56.43
Total	4392.65	4392.49	0.16	5911.05

Source: Google image 2014 & Topo sheet map, 1996

Figure9: Land use change 1996 and 2004


Source: Google image 2004 & Topo sheet map, 1996

Table 7 shows comperative information reparing land use change between 1996 to 2004 poried of land. The cultivation area is decreased 16.54 percent (-323.51 ha) in 2004 than 1996. The built up area reflects that effect in by 98.32 percent (481 ha). Table shows the river area also decreased by 129.51 percent (-190.68 ha). The area of open space and road are gradually increased in 2004 than 1996 by 33.67 percent (1.32 ha) and 31.27 percent (65.43 ha) respectively. Similarly forest also has been decreased 2.12 percent (-33.72 ha) in 10 years duration there might be people covered the forest area for their personal use. In overall by this table the researcher conclude that due to population migration cultivation area has been change in to build up area.

6.2   Table 8: Land use change in Chandragiri, 2004 to 2014

Name	Area (ha) in 2004	Area (ha) in 2014	Change (ha)	Percent
Forest	1587.41	1598.53	-11.12	-0.69
Open space	3.92	5.26	1.34	34.18
Cultivation	1955.58	1552.54	-403.04	-20.61
Built-up	489.17	806.36	317.19	64.84
Road	209.18	356.59	147.41	70..47
River	147.23	73.28	-73.95	-50.22
Total	4392.49	4392.56		

Source: Google image 2014 and 2004

Figure 10: Land use change 2004 and 2014
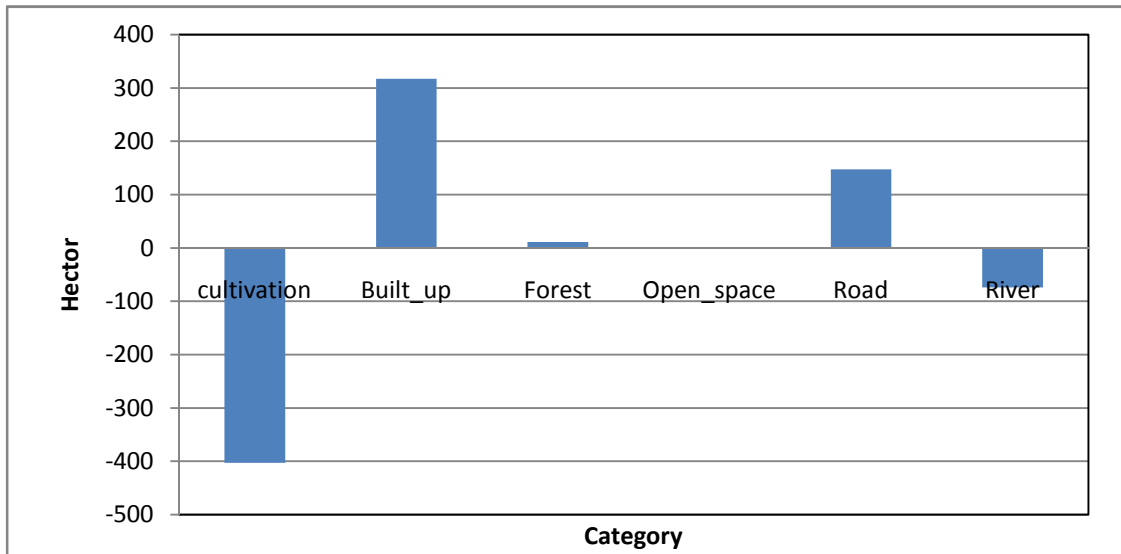
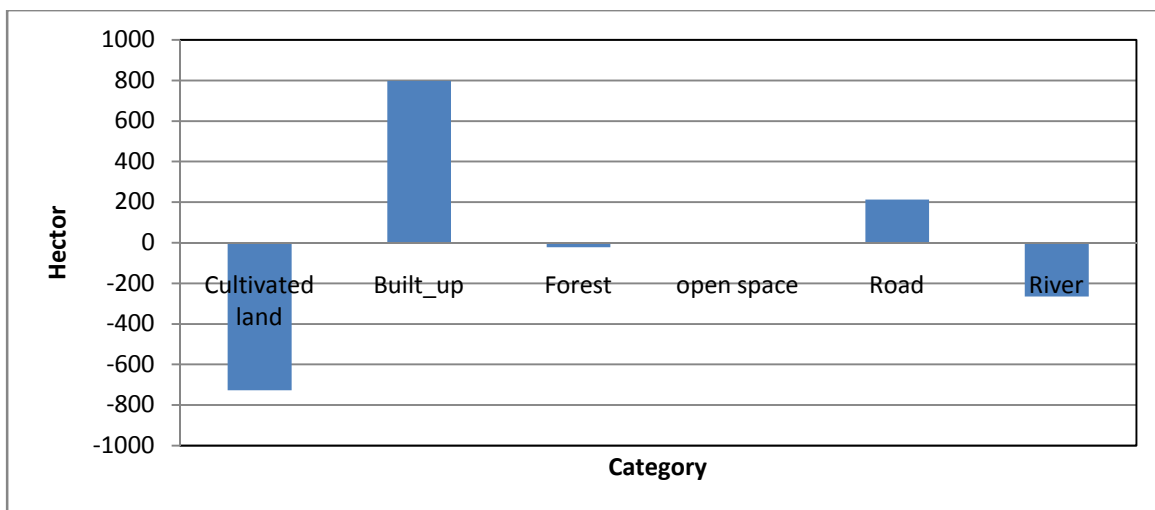*Source: Google image 2004 and 2014*

Table 8 shows the comparative information about change in of land use, between 2014 to 2004 maximum nagetive change occupied in cultivation area decreasing by 25.96 percent (-403 hector). That effect is reflected by the increase in built up area by 39.33 percent (317.19 hector). Table shows the river also decrease by 100.91 percent (-73.95 hector). Road and forest area are also increase by 41.34 percent (147.41) and 0.69 percent (11.12 hector). Table shows the data of study is different scale and there is not shown in the proper data in its class. Mainly scale different and in future people did not like the agriculture or farming. Educated people want to job and other people want to trade. Other young people go to foreign country for work and there is lack up labor for agriculture work in Nepal. People's concept have uneducated people have to work. But now, we can see foreign returned educated people interest to as in organic farming.

6.3 Table 9: Land use change in Chandragiri 1996 and 2014

Categories	2014 (ha)	1996 (ha.)	Change (ha)	Percent
Cultivation	1552.54	2279.09	-726.55	-31.87
Built-up	806.36	8.17	798.19	9769.76
Forest	1598.53	1621.13	-22.6	-1.39
Open space	5.26	2.6	2.66	102.30
Road	356.59	143.75	212.84	148.06
River	73.28	337.91	-264.63	-78.31
Total	4392.56	4392.65		

Source: Google image 2014 & Topo sheet map1996

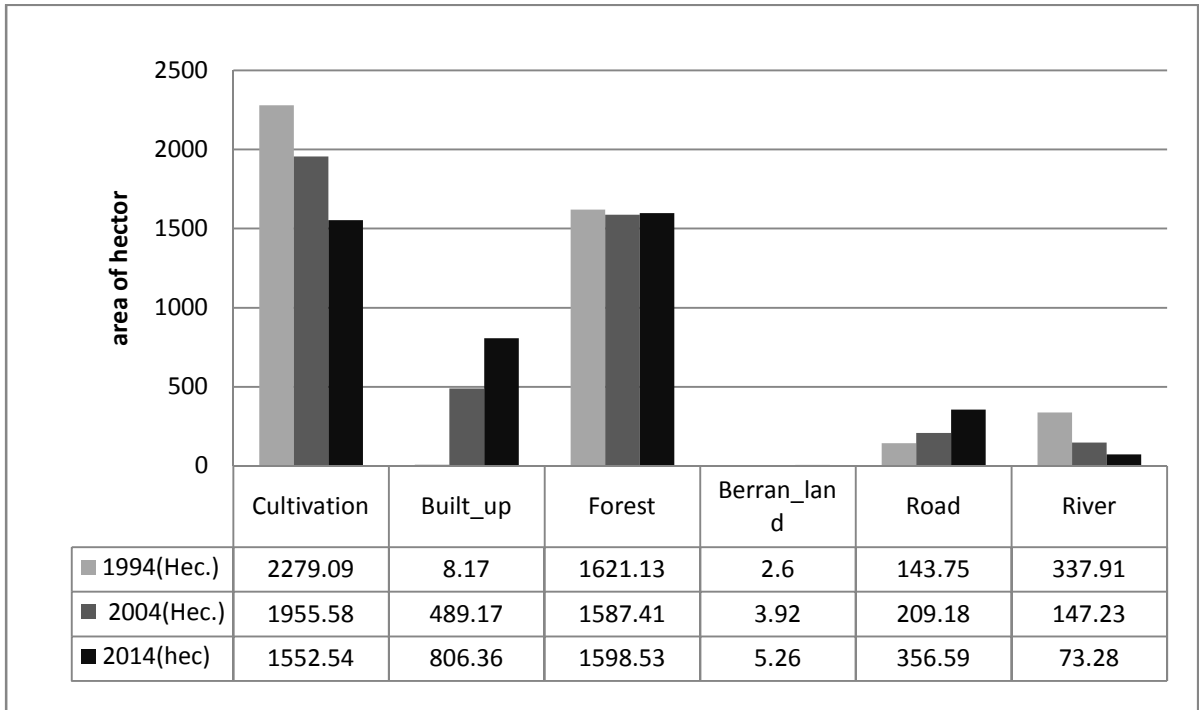**Figure11: Land use change in Chandragiri, 1996 to 2014**

Source: Google image 2014 & Topo sheet 1996

Table 9 shows the continnation of past trand in the 1996 to 2014 period. The cultivation area decreased by 46.79 percent (-756.55 hector) in 2014 than 1994. That effect is reflected in land use by the increase in built up area about 98.98 percent (798.19 hector). Table shows the river also decreased 361.12 percent (-264.63 hector). The area of road and open space have gradually increased in 2014 than in 1994 by 59.69 percent (212.84) and 50.57 percent (2.66 hector) respectively. Similarly forest also has been decreased by 1.41 percent (-22.6 hector) in 10 years duration there might be due to the

conservation of private community foerst. It can be study area conclude that due to population migration cultivation area has been changed in to build up area.

6.4: Land use change by different years: 1996, 2004 and 2014

Figure 12: Land use change by 1996, 2004 and 2014

	Cultivation	Built_up	Forest	Berran_land	Road	River
■ 1994(Hec.)	2279.09	8.17	1621.13	2.6	143.75	337.91
■ 2004(Hec.)	1955.58	489.17	1587.41	3.92	209.18	147.23
■ 2014(hec)	1552.54	806.36	1598.53	5.26	356.59	73.28

Google image (2004, 2014) & top sheet map 1996

Thefigure 12 compare 2014, 2004 and 1994 giving the information about comparison of land use. The table clear that the cultivation are is decreasing day by day and converting in to built up area in 1994 the cultivation area was about 2279 hector in Chandragiri municipality but in 2014 it amount only about 1552 hector within 20 years about 727 hector has decreased similarly the built up area was only 8.17 hector in1996 but in now it area has been changed in about 806 hectors, the figure shows that the cultivation area has changed totally in built up area. The decreasing rate of cultivation area and the increasing rate of built up area is high. Open space and road area has been increased in the last days but according to the figure forest area has seen decreased in 2004 than 1996 but increased in 2014 than in the 2004 it might be the awareness of community base forest and the stick rule of government to reserve the forest.

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CHAPTER 7

Land value and change

7.1   Land value change

Land is one of our most precious assets. Land is a very importantc element for the human to their daily activities. Because land is that place where all activities are depend and it protects human life. Land is determined by value. Value is that things which depends on price paid to purchase the land.

Land price is determine by many things or, elements like market extend, migrated population, infrastructure development, concentration of many facilitates like, road access, water supply, hospital, education etc. If concentration of these facilities attrect to the people migrate in that place. If the ratio of in migration is high than the land value of is automatically increased.

Increased land value in the market center that value affectes its hinterland. As a the value of land in the hinterland automatically high. The value is high in the hinterland because the market canter provides the facilities the land value high. People come in the market center product in the market center peoples are depends on the market center. They are attractive for livelihood in the hinterland because the value of land is relatively cheap and peaceful than core center in order the value of hinterland is respectively high.

The study of urban land value of   an urban region is the study of the urban economy. Land is important for human habitat. The land value refers to the market price of land at the time when the land is sold. But it is difficult to determine the exact value of land. The value of any land depends upon its uses. The land value is the assessed value. But while dealing with the land value, one must be careful of including the value of land along with land use and improvement. (Ray 1985:265)

Land has a peculiar characteristic feature. Because of its immobile and heterogeneous character, its use differs from place to place, and on those various uses the land value has been reflected. There exists a close relationship between land use and land value. The value changes because of change in its use. Similarly the use of land also varies with the

change of value. The land value undoubtedly exerts a selective influence on land use. (Sited by Ranjitkar G.N)

The changing pattern of land value has been associated with the percent competitive use of land. There may be a lot of confusion between value and price of land. Value is an overall general quality of worth, which exists in a thing, while the price can be quoted in terms of sale price registered in the market. (William C. Murrey, 1963, from Ranjitkar)

Recent years have witnessed a reawakening of interest in land value in the city. The increasing trend of urban encroachment on agricultural land has greatly changed the financial value of land in the city. The changes in the uses of a plot of land may involve significant and unearned increment of land value. (World Bank)

Land value is divided in two categorize, they are

Government price

Local price

Government price:- government price refers to that price which in determine by the government. The government has divided land in many categorize and determine the price accordingly. Like high way, graveled road, gallie and other road) etc.

Local price:- the local price is determines by the local people. The government has not involve in that prices. The local people buy and sell and determine the price.

So we can find large differentce between government price and local price.

7.2   Comparison of Land Value between Field Survey Price and Government Price

Table10: Land use Price of Chandragiri Municipality, between 2014 and 2015

Site	Local price (aana)	Government price (aana)
Thankot_ (high way)	1200000	700000
Thankot (100)	700000	300000
Matikhel (500)	600000	300000
Matikhel (1000)	400000	300000
Purano bus park Thankot (high way)	1500000	850000
Jakhel (100)	1000000	325000
Jokhel (500)	800000	325000
Jokha (1000)	700000	325000
Pargati tol (above 1000)	400000	325000
Gurjudhara (high way)	1500000	900000
Gurjudhara (100)	1000000	300000
Naya basti (500)	800000	300000
Matatirtha (1000)	600000	300000
Matatirtha (above 1000)	500000	300000
Balmbu (high way)	1600000	900000
Balmbu (100)	1000000	350000
Balmbu (500)	600000	350000
Balambu,18 (1000)	500000	350000
Satungal chowk (high way)	1600000	900000
Satungal (100)	900000	300000
Santungal (500)	800000	300000
Santungal (1000)	500000	300000
Naya Naikap (high way)	1800000	1000000
Jhole tol (100)	800000	400000
Jhole tol (500)	600000	400000
Tinthana-23 (high way)	2000000	1000000
Tinthana-23 (100)	1200000	400000
Tinthana-23 (500)	900000	400000

|		
Tinthana-22 (1000)	900000	400000
Tinthana-22 (above 1000)	900000	400000
Dunge aadda (high way)	2200000	1000000
Dhunge aadda (100)	1500000	800000
Dhunge aadda (500)	1200000	800000
Naya Basti (1000)	1000000	800000
Naya Basti (above 1000)	1000000	800000

Government & Field survey: - 2015

Established Chandragiri Municipality is relatively a new municipality of Nepal in 2014 Dec 2. It is located the capital city of Nepal. With diversities in topographic structural, in close visiting of Ktm, functional and human activities, it land value seems different. The researcher has taken about 35 sampling from Thankot to Dhungeaada (near Kalanki) along the high way road in three different distance-buffering categories. The researcher has found vast differences. Land values either government value or local value in the context of the research period.

According to the table 16 has presented the land value of structure within 1 km area from the highway road is lower value than 100 and 500m buffering area. Near to 500m buffering area from the highway road. The value is higher because of different human business types of activities but in 1 km buffering. The land is only suitable for the residential, livestock farming and vegetable production. During the field study researcher has found that the price of land near the area of Dhunge aadda is the highest fllow by and Tinthana Naya Naikap, Gurjudhara, Balambu, Purano Buspark in respectively either Government value or local value.

As shown in the graph

Figure13: Chandragiri municipality in Local price, 2015 & Government price, 2014
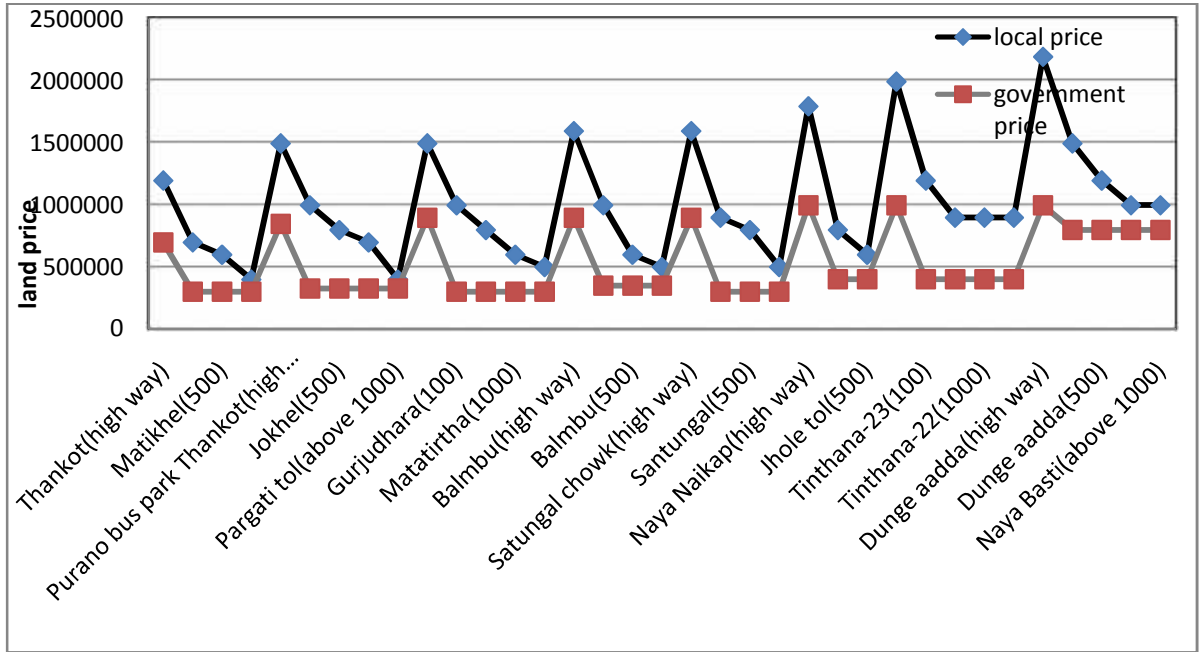

Government & local price 2014

7.3   Land price by years, 2004 and 2015

Although urban land use patterns are the result of the entire physical and human factors it can be argued that they are the out come of economic motives. As for the Bid rent theory the maps shows the land value decreasing from CBD towards periphery can be used to analyze the relation between land value and land use. City centre provides the most accessible location. Thus land is expensive at city center and the rents charged for it are at their highest (Hammond, 1985,239)

Per   ana,   price   (Thankot)

Bid rent theory
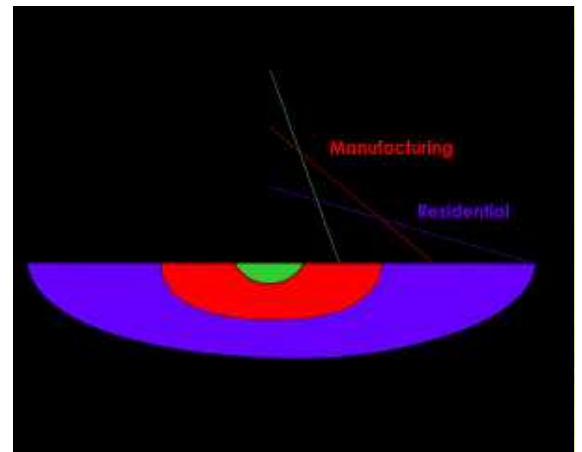
The land value of the city is not equal. Land value depends upon the demand of the land. Thus, as the demand for land decreases (away from the center) the land value is also found to be decreasing. Ultimately the land value of a city depends upon its use. According to Bid rent theory commercial land of the city center has higher land value and rent value, because it has the higher degree of accessibility than any other uses. The land value of commercial area is low.

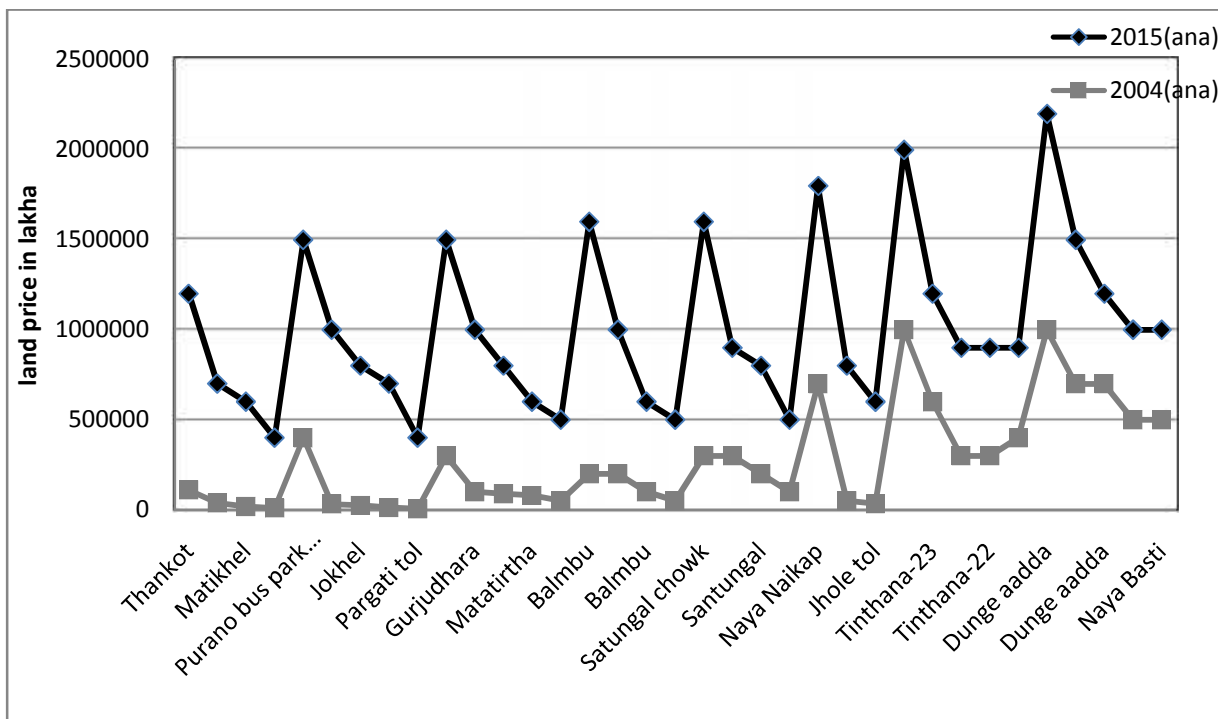**7.8   Comparison Land Value in Chandragiri municipality between 2004 and 2015**

Table11: Land Value by 2004 and 2015

Site	2015 (aana)	2004 (aana)	Within (buffer road m.)
Thankot	1200000	110000	0
Thankot	700000	37500	100
Matikhel	600000	18750	500
Matikhel	400000	9375	1000
Purano bus park Thankot	1500000	400000	0
Jakhel	1000000	31250	100
Jokhel	800000	25000	500
Jokha	700000	12500	1000
Pargati tol	400000	6000	Above1000
Gurjudhara	1500000	300000	0
Gurjudhara	1000000	100000	100
Naya basti	800000	90000	500
Matatirtha	600000	80000	1000
Matatirtha	500000	50000	Above1000
Balmbu	1600000	200000	0
Balmbu	1000000	200000	100
Balmbu	600000	100000	500
Balambu, 18	500000	50000	1000
Satungal Chowk	1600000	300000	0
Satungal	900000	300000	100
Satungal	800000	200000	500
Satungal	500000	100000	1000
Naya Naikap	1800000	700000	0
Jhole tol	800000	50000	500
Jhole tol	600000	35000	1000
Tinthana-23	2000000	1000000	0
Tinthana-23	1200000	600000	100
Tinthana-23	900000	300000	500

Tinthana-22	900000	300000	1000
Tinthana-22	900000	400000	Above1000
Dhunge aadda	2200000	1000000	0
Dhunge aadda	1500000	700000	100
Dhunge aadda	1200000	700000	500
Naya Basti	1000000	500000	1000
Naya Basti	1000000	500000	1000

Field survey: - 2015

Figure 14: Land price in Chandragiri municipality 2004 and 2015

Field survey: - 2015

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7.4 Comparison Land Value change by different years in Chandragiri Municipality

Table12: Land Value Change between 2004 and 2015

Site	Percentage
Thankot	990.9
Thankot	1766.66
Matikhel	3100
Matikhel	4166.66
Purano bus park Thankot	275
Jakhel	3100
Jokhel	3100
Jokha	5500
Pargati tol	566.67
Gurjudhara	400
Gurjudhara	900
Naya basti	788.89
Matatirtha	650
Matatirtha	900
Balmbu	700
Balmbu	400
Balmbu	500
Balambu,18	900
Satungal chowk	433.33
Satungal	200
Santungal	300
Santungal	400
Naya Naikap	157.14
Jhole tol	1500
Jhole tol	1614.29
Tinthana-23	100
Tinthana-23	100
Tinthana-23	200
Tinthana-22	200
Tinthana-22	125
Dunge aadda	120
Dunge aadda	114.29
Dunge aadda	71.43
Naya Basti	100

Field survey, 2014 & 2015

Table 12 Shows Comparative of land price of Chandragiri municipality between 2015 and 2004. To identify the condition of land value in difference by buffering categories. When the researcher has studied of two years 2004 and 2015 comparatively. The researcher found some difference in land value. According to the nature of data on the basic of field survey study within 0m of buffering the land value of 2004 and 2015 has been seen vast difference or the land value has been maximum increasing in the period of 11 years. All over the sampling area similarly within the buffering of 100, 500 and 1000m also has been seen highly increasing. When the researcher visited in the study area Asked to the local people the researcher found that the open space and cultivated area has been changing into built up area. Due to the population migration from the different areas and selling and purchasing activities has been increasingly after the Maoist insurgency period and the land value has been increasing highly.

According to above table the change of land value from Thankot to Dhungeada is seem highly changed but the changing rate from Thankot to Balambu is increasing and increasing change rate from Balambu to Tinthana gradually low but in over all the researcher conclude that land value is highly increases in a small amount of area in a short time.

Figure15: Land price change in 2004-2015
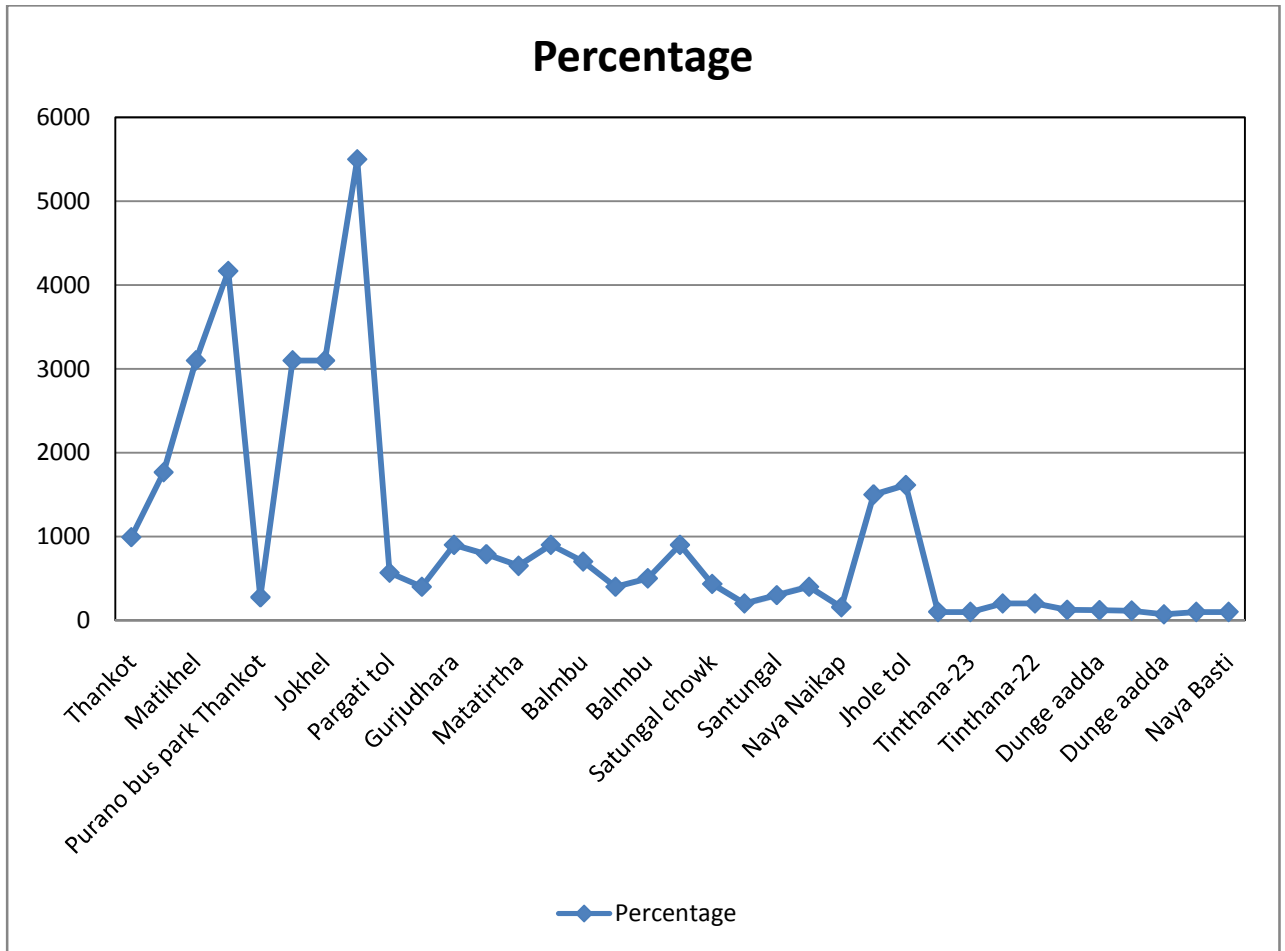
Field survey, 2015

7.5   Factors of Land value change

Land is the important property of human beings. The measurement of property is determined by its value. Land value is increased when the people use the land for different purposes in their daily activities and join the relation with the land. Similarly Chandragiri Municipality land value in has been getting increase before the days according to the different causes like, migration, good transportation, market and develop infrasture.

Table13: Factors of Land value change, Chandragiri Municipality

Cause	percentage
population increase/ market	25.71
Road	22.85
Market	14.28
Dalali/ planning	11.43
Migration	8.57
Planning	5.71
planning/market	5.71
road/migration	2.86
market/migration	2.86

Source: field survey, 2015

According to the 13 table the researcher found different views of local people in the time of field survey about the causes of land value change 25.71 % peoples viewed concern near to the market centre and migrated from the different places and second important aspect is road facility (22.85%) similarly 14.28%, 11.43%, 8.57% and 5.71% viewed the causes of land value changed is Market facility, Land Planning, population migration and planning   respectively. Only few people argued about land.

Figure16: Factors of land value change
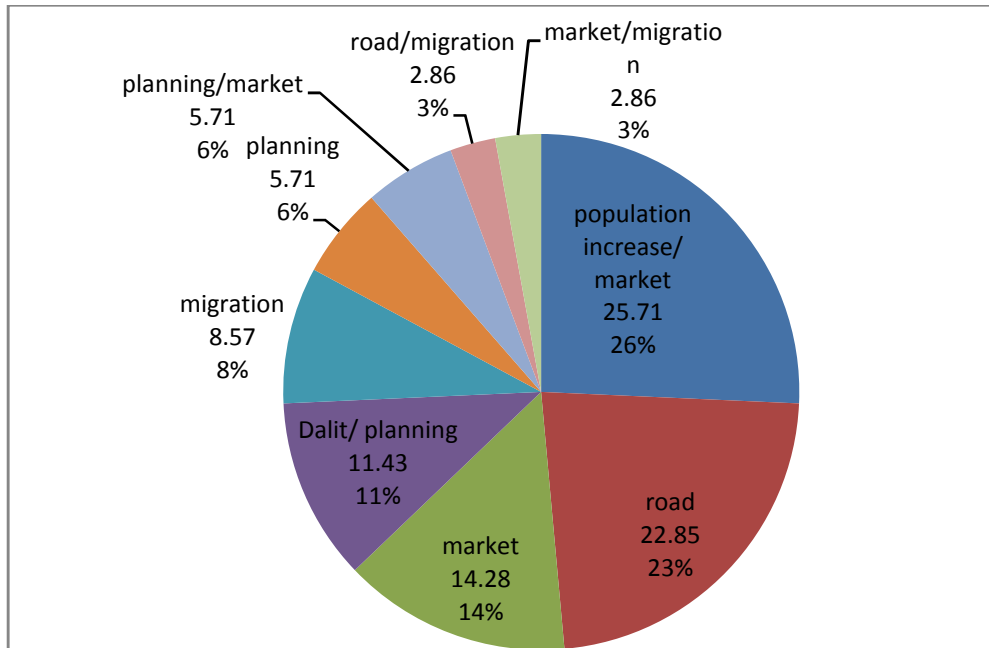
Source: field survey, 2015

7.5.1 Migration of Population - Places of Origin

Chandragiri is a newly established municipality. It was declared as municipality on december 2, 2015. People have come in this Municipality from many districts due to Maoist insurgence, poor economic condition and searching for other facilities. Situated by Kathmandu metropolitan city it process many opportunities like jobs, Education, Hospital, Road and many opportunities can create in this area. So, high concentration of people come for the from fulfillment of different purposes of their life. Different people from different places come to Chandragiri municipality.

Table14: Migration of Population - Places of Origin

Migration of origin Place	
Place	Percentage
Dhading	11.43
Jhapa	2.85
Rolpa	8.57
Baglung	8.57
Gorkha	5.71
Sankhuwasabha	5.71

Rukum	8.57
Mahendra Nagar	5.71
Dhangadhi	2.85
Terhathum	2.85
Myagdi	5.71
Makawanpur	8.57
Chitwan	11.43
Nawalpasi	5.71
Morang	5.71
Total	100

Source: field survey 2015

According to table 14, people have migrated mostly from Dhading, Chitwan, Rolpa, Baglung, Rukum and Makawanpur. It counts for 11.43%, 11.43%, 8.57%, 8.57%, 8.57%, 8.57% HHs respectively on the sampling household out of 35. Similarly Gorkha, Sankhuwasabha, Mahendra nagar,Myagdi, Nawalparasi, Morang, Jhapa, Dhangadhi and Terhathum. It counts 5.71%, 5.71%, 5.71%, 5.71%, 5.71%, 5.71%, 2.85%, 2.85% and 2.85%.

7.5.2 Purpose of Migration

People migrate due to many causes. They have different purposes like education, transportation, electricity, employment, health and Maoist insurgence to get fulfilled, and it is only in the city. They see that there is a probability to get them all. The table below shows the purpose.

Table15: Purpose of Migration

Occupation	Persons	Percent
Business	18	51.43
Jobs	6	17.14
Education	2	5.71
Industry	4	11.43
Other	5	14.29

Source: Field survey, 2015

7.6   Commercial Function of Chandragiri municipality

Table16: **Commercial function by 2015**

Services	Centre markets								Total	Percent
	Thankot	Imakhel	Post	Gurjudhara	Daha chowk	Satungal	Naikap	Dhunge aadda		
Trade	84	118	43	46	90	116	54	102	653	65.43
House	26	31	15	-	13	11	11	-	107	10.72
Petrol pomp	1	-	-	1	-	3	-	2	7	0.7
Open space	9	8	7	3	8	7	6	4	52	5.21
Furniture	3	1	8	2	8	-	-	-	22	2.20
Temple	2	1	1	2	-	1	2	-	9	0.90
School	1	1	1	-	1	1	3	-	8	0.80
Medical	1	1	1	-	4	3	-	-	10	1
Bus stop`	6	6	5	4	3	4	3	4	35	3.5
Bank	-	5	-	2	3	6	1	2	19	1.9
Agriculture	-	2	-	-	2	-	-	-	4	0.4
Garage	3	4	5	-	1	3	5	4	25	2.5
Hotel	-	2	-	-	-	-	-	-	2	0.2
Live stock	-	1	-	-	-	1	-	-	2	0.2
Cannel	-	1	1	1	-	1	-	1	5	0.5
Police station	-	-	1	-	-	-	-	-	1	0.1
Hospital	-	-	-	-	-	5	1	1	7	0.7
Horticultural	-	-	-	-	-	-	-	1	1	0.1
Forest	1	-	-	-	-	-	-	-	1	0.1
Vet nary	1	-	-	-	-	-	-	-	1	0.1
Industry	-	1	4	-	5	10	3	4	27	2.7
Total	138	183	91	61	138	173	90	124	998	100

Source: field survey, 2015

The researcher has analyzed from the different aspect in the study area along the highway road from Thankot to Dhungeaada. There are eight market centers. They are Thankot, Imakhel, Check post, Gurjudhara, Dahachowk, Satungal, Naikap, Tinthana and Dhungeaada according to the above table. The table shows that about 65% of occupied in trade. Imakhel, Satungal, Tinthana, Dhungeaada are the major market center respectively but Check post, Gurjudhara, Naikap are the lowest area respectively among the eight different market centers. There are 653 trading are running from Thankot to Tinthana and 107 house which used only for residence purpose but in Imakhel. There are altogether 152 services accept 31 houses and Satungal has also more services center, which indicates. It land value will be higher similarly Thankot and Daha Chowk also same number of services this is why their land value has seems similar but Tinthana, Dhungeaada has less number of services because of small area but there is no any residential types of house. All the houses has some short of business activities and less number of open space. There is high density of people and services because this site lies short distance from the Kathmandu. From Imakhel to Tinthana there are five cannel, seven petrol pump, eight schools and Nineteen banks. Not only that garage plays great role due to the maximum number of services in a short distance.

 The infrastructure development from the different types of services plays the great role to determine the land value where the low number of infrastructure, the land value will be low and where the infrastructure of development seems high the land value will be high. In the observer area from Thankot to Tinthana there determined different types of land value because of public services infrastructure and population follow.

7.7 Land use and Land Value Relationship in Chandragiri Municipality

   Table 17: Land use and land value relationship

S.N	Types of Land use	Average land value in Rs per aana (2015)	Average land value in Rs per aana(2004)	Percent increase in land price
1	Core area	1675000	488750	342.71
2	Commerical + Residential (Mixed area)	1042857.143	281250	370.79
3	Residential area	812500	185468.75	438.07
4	Agricultural area	612500	135046.87	453.54

Source: field survey, 2015

According to the above table, the direct field observation method has been used and taking the difference types of land use types and there land value in different two years 2004 and 2015. The land use types categories in four groups core area, mixed area, residential area and agricultural area.

Agricultural land value has seen highest increase (453.54%) in 2015 than 2004. Fllowed by Similarly residential area's land value also increasing 438.17% in 2015 than in 2004 and in third position mixed area covered 370.79% of the price value is increasing than 2004 in 2015 but the core area Shows lowest increase in land value according to the table, the researcher conclude that agricultural land is the highly increasing about their value.

Chapter 8

CONCLUSION AND RECOMMENDATION

8.1   Conclusion

Chandaragiri municipality is situated in the southwest of Kathmandu Metropolitan city. The municipality Comprise of 25 administrative wards covering the total area of about 44 sq. km. In 1996 51.88 percent of the total area of Chandragiri municipality was covered by cultivated land. The remaining land uses categories included 0.18 percent built up area, 0.059 percent open space and others area 3.37, 7.69, 36.9 are road, river, and forest area respectively.

There is a drastic change in land use from 1996 to 2004 and 2014. The proportion of cultivated land reduced 14.19 percent of the total area of the Chandragiri municipality. The built up area covered 11.14 percent and open space covered only 0.09 percent. Between 1996 and 2004 cultivated land decreased to 14.19 percent and built up area increased to 5887.39 percent. Similarly forest area decreased 2 percent. Open space and road increased to 50.76 and 45.52 percent but river is decreased to 56.43 percent.

 There was also a remarkable change in land use between 2004 and 2014. In 2014 the cultivated area covered 35.34 percent of the total area of Chandragiri municipality. Where built up area covered 18.36 percent of the total area of Chandragiri municipality, forest covered 36.39 percent similarly road covered 8.11 percent, river 1.67 percent and open space covered only 0.12 percent. From 2004 to 2014 there has been changed in the land use patterns. There was a remarkable change in land use from 1996 to 2014. The cultivated land in 1996, the cultivated area was 51.88 percent of the total area of Chandragiri municipality built up area 0.18 percent forest area 36.90 percent, open space 0.059 percent, road and river are 3.27 and 7.69 percent of the total area of Chandragiri municipality. So in 2014 the cultivation area decreased to 31.87 percent of total area. Where as built- up area increased to 9171.84 percent. The forest decreased to 1.39 percent 1.39 percent only the area covered by road increased to 148.06 percent. River area decreased to 78.31 percent. Where as open space and road increased to 102.30 and 148.84 percent in over all 1996, 2004 and 2014, the cultivated land and river area has

been seen decreased but built up area, open space and road area is increased but forest decreased in 2004 than 1996 and in increased in 2014 than 2004.

From 1996 to 2014 the land use covered such as built-up area, health services, school, petrol pump road, agro farming, road, river, forest and cultivation area.

There are many reasons for this land use changes according to the respondents. The most important one is population migration due to fulfill. Their demands and reaching safe land in the moust insurgency near the capital city Kathmandu of Nepal. Not only that for the higher education their children. Population migrants from the different places and population follow in the Chandragiri municipality and constructing house in the rapidly then Built up area increased at a short time. The infrastructure of development also increased like road, school, hospital, health post and other services have been established in this area after the moust insurgency period. So, the cultivation land is covered into built up area. This is way we conclude that the land use pattern has been changed in different year specially converting in to the built up area road area.

Similarly when land use pattern is changed in to the built up area land value will be high, or where the demand land is high the land value will be high, so the different market center of the Chandragiri municipality. The land value has been seen increased according to the Bid-rent theory. The core area of Chandragiri is the main bazaar of the municipality most of the commercial market was established like Thankot, Imakhel Gurjudhara, Balambu, Satungal, Naikap and Dhungeaadda etc. So their land value is high and according to the Bed rent theory. The periphery of the center area the land value gradually low than the center area.

The main causes of land value change of Chandragiri municipality are accessibility to Kathmandu city. Occupational change of local people and development of infrastructure all these caused the pull force for the people for migration from different places. Which ultimately caused the change in land use and land value.

8.2   Recommendation

There are some problems relating to the land use and land value of Chandragiri municipality. Furthermore there are some problems, which directly affect the further growth of town. The following recommendations can be found helpful in controlling the land use and land value and for the growth of town.

Many of the areas of Chandragiri municipality are affected by the lack of, electricity pure drinking water supply, sewerage, the environment pollution (like brick factory) and narrow road, which is a very big problem for the vehicles. It should be manged by taking appropriate measure before settlement expansion.if thuse problem slove, land value will be repidly increase.

There is only one hospital in the bazaar area. Many people are walking a long distance for treatment. The hospital of Chandragiri is located at the edge of the bazaar areas of santungal (Samaj hospital).

The bus stop has occurred in narrow space. So, the bus parking facility should be properly managed.

Almost all wards have no systematic sewerage collection and disposal system. The collection of existing sewerage system is also very critical. Proper sewerage collection system should be immediately made.

The core area of Chandragiri municipality has been extended haphazardly which, some rules to make a planning area.

Majority of people have not got the fundamental basic of needs from government level such as pure drinking water, fresh air, good education, facilitated health post etc. The government should take it seriously.

The government level of Chandragiri municipality always thinks to make the good area of the Nation.

Chandragiri municipality local people and civil societies should work together to develop the Chandragiri municipality.

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ANNEXES

Photos

Photo of perceive information about land value at Thankot in Chandragiri municipality.

Photo of perceive information about land value at Tinthana in Chandragiri municipality.

Photo of Agricultural farming at Jhokhel in Chandragiri municipality.

Photo of Agricultural farming at Jhokhel in Chandragiri municipality.

Checklist

Check list land use and land Value change, Chandragiri Municipality, KTM valley

Date………

Highway-1   Local road-2   Native-1   Migrate-2

Sn	Location	Highway	Name of respondent	Occupation	Recent price	Previous price	Within	Na/Mig	Date	Cause	Remarks