CHAPTER 1

INTRODUCTION

1.1 Background

Land is one of the fundamental natural resource. Land is a source of economic power, social status and political power(Daily, 1997),a profitable path for investment(Patnaik, 1971), and the most valuable economic assets(Boulton, Libert, & Samek, 2000)in a country like Nepalwhere traditional society prevails.People's livelihood is dependent on this resource particularly in the rural areas. Land is a principal source of income and employment for majority of household in Nepal. Land has traditionally represented the principal form of wealth, the principal symbol of social status and the principal source of economic and political power(Regmi, 1976).Hence, land is prime important for the sustainable development of any country. Land is essentially a wealth accumulating agent to rural people. It has provided basic means of survival for rural people. In the rural area, land provides the food security, shelter and social status. Until the industrial revolution in the mid-18thcentury land was considered the only source of the wealth in the now developed countries of the world. But the scenario is quite different in developing countries. Despite the rapid urbanization and fall in the share of agriculture in the GDP in such countries, vast majorities of people are still dependent on the land for their livelihood.

Land resources are limited and finite. If human population continue to increase at present rate there will be twice as many people in the world in about 60 years. There is therefore an increasingly urgent need to manage land cover and land use in the most rational way possible in order to maximize sustainable production and satisfy the diverse needs of society while at the same time conversing fragile ecosystem and our genetic heritage (Food and Agriculture Organization, 2003).

According to the Shorter Oxford English Dictionary (SOED), a fragment is a piece broken off; a (comparatively) small portion of a thing; an isolated or incomplete part and fragmentation is a breaking or separation into fragments. In the context on land, a

fragment can arise as a result of subdivision. Two kinds of fragmentation can be envisaged: the division of rural property into undersized units unfit for rational exploitation and the excessive dispersion of the parcels forming parts of one farm(Moral-López & Jacoby, 1962).

Land fragmentation being the international phenomenon and literature and terminology used on the subject is wide ranging. In Australian research on rural land scape change (Gill, Klepeis, & Chisholm, 2010)state land fragmentation characterized by "Increasing diverse land ownership….[and].. an increase sub division of the farm for residential, hobby farm development".Sub division defined as the division of an allotment to create new parcel of the land for which separate certificate of title is obtained and freely sold.Land fragmentation, where a single farm consists of a large number of separate land plots, is a common agricultural phenomenon in many countries. Land fragmentation is said to be a constraint to efficient crop production and agricultural modernization, and in several countries this has resulted in the implementation of land consolidation programs.Fragmentation must always be a harmful process; it impairs or prevents the use of the object fragmented(Lusho & Papa, 1998). In mountainous country, where sharp variation in soils occurs, a farmer may require separate plots on the hills and in the valleys in order to grow different crops. Some degree of dispersion may also provide useful insurance against damage from the natural hazards such as hailstorms or irregular rainfall(Aexander, 1993).In many part of such countries, agriculture holding are tiny and comprise little scattered plots. Land has been degraded and thus the entire eco- system has been crippled through indiscriminate use of scare of land, forest and water resources by an exploding population. Land fragmentation can be defined as a situation where a farming household possesses several non-contiguous land plots, often scattered over a wide area. It is an observed phenomenon in many countries around the world, and is often viewed as an obstacle to agricultural productivity and modernization. Land fragmentation used to be closely associated with Europe, but it has been documented in all parts of the world. Examples are Taiwan, Malaysia, Japan, the United States, Kenya, Uganda, Peru and Mexico. The absence of a real standard objective measure of land fragmentation makes comparisons between countries difficult, and makes it hard to decide when a farm is too fragmented(Bentley, 1987).

Van Dijk (2003) distinguishes four types of land fragmentation: fragmentation ofland ownership; land use; within a farm (or internal fragmentation); and separationof ownership and use. Fragmentation of land ownership refers to the number oflandowners who use a given piece of land. Fragmentation of land use refers to thenumber of users that are also tenants of the land. Internal fragmentation emphasizes the number of parcels exploited by each user and considers parcel size, shapeand distance as the main issues. Separation of ownership and use involves thesituation where there is a discrepancy between ownership and use.

Land use implies the manner in whichhuman being employ the land and its resources. It deals with spatial aspect of all human activities onland; land use can be categories into cultivated land, forest, grazing land, barren land, urban land etc. Human use of land resources gives rise to land use which varies with the purposes it serves, whether they are food production, provision of shelter, recreation, extraction and processing of materials, and so on, as well as the bio-physical characteristics of land itself. The range of land uses is as extensive as human experience, covering residential, industrial, commercial, and recreational activities. Any physical development results some environmental impact. The degree or extent of that impact is dependent upon such factors as the category of use, the intensity of the development, and the physical characteristics of the site. Land is a resource and 'land use' means 'resource use' in different types.

Land cover refers to the physical and biological cover over the surface of the land. Land use and land cover change is a term used for the human modification of the earth terrestrial surface. Much of the world's natural land cover has been transformed by human activities(Vitousek, Mooney, Lubchenco, & Melillo, 1997), resulting in ecosystem degradation and biodiversity loss worldwide(Addo, Asiedu, & Alex, 2008).

The land use pattern of land varies from one region to another not because of diversity in the naturals grants alone, but more importantly as a result of variations in the adaptability of human beings under the inter functions of nature and man. In most parts of the world, land use can be considered an interface between natural conditions and anthropogenic influences. The driving forces behind land use pattern include all factors that influences human activity, including local culture (food preferences), economics (demand for specific products, financial incentive),environmental condition (soil quality, terrain andmoisture).Land use pattern is a dynamic phenomenon because it changes with time as

well as geographical unit. Generally, the time and geographical unit dominated by physical and infrastructural environment. In the recent year the land use pattern is also change due to government policy and technological development (Pandey, 2006).

In the view of unbalance constraints between population growth and land, need to take some untraced and terraced land out of the cultivation and also allowing for the increased area of settlements and roads.A proper land use system is required for increasing agricultural production, environmental sustainability and bio-diversity conservation. At present there are no strict norms regarding the land use system, which has led to haphazard location of settlements and industries in places where food production are very feasible. Similarly, the designing and infrastructures and protected areas are to be developed under a strict land use planning. Similarly, the rights and governance of different land uses are also important(Adhikari, Williams, & Lovett, 2007).

The region's good climate and relatively low value of land have it made desirable destination for seeking lifestyle. Urban employed migrants seeking rural living opportunities close to the urban center.Nepal is an agriculture country. Its economy based on agriculture. Out of the total area of the Nepal, 28 percent land is suitable for cultivation. Though 65.7 % population directly engaged in agriculture, about 80 percent of total population depends for their livelihood in agriculture land. Percentage of land use on agriculture land cultivated is 21% and uncultivated 7%. The average holding size is 0.80 hector and parcel size is 0.24 hector Ministry of Agriculture Development (MoAD, 2012). Similarly, per capita land holding is 0.17 hector. Almost half of the holding are less than 0.5 ha size about 70% land holding is less than 1.0 ha size(Poudel Sharma, 2009). Regional variation in the distribution of agriculture is substantial. The hill and mountains which cover 63 % and 20 % of the total area, accounts 44 % and 10% of the agriculture land respectively (MoAD, 2012). The undeveloped state of agriculture, lack of agriculture labor, irrigations and haphazard use of land causes agriculture land change into the other usages. So, land is burning issue in the formation of new Nepal and its distribution and holding are the serious challenges to the social justice and equity(Poudel Sharma, 2009).One of the obstacles to maintain this is a regular process of land fragmentation. So this thesis tries to discuss the land fragmentation and its use pattern's issues.

1.2 Statement of Problems

Nepalese economy is based on the agriculture sector as about 80% of the population is engaged in agriculture. But lack of the basic infrastructure, haphazardly farming practices leads to low agriculture production(Sharma, 2012).The agriculture sector contributes 34.9 % of the country's Gross Domestic Production (GDP) (MOF, 2010/11).Lack of farm commercialization and scientific management of land as well as growing urbanencroachment on the cultivable field are some other challenges facing Nepal. Land fragmentation is another problem in the country. There are about 3.3 parcels in each land holding, and the average size of a parcel was 0.24 ha in 2001. Such a small size of a parcel is also not conducive when using modern inputs, especially when building infrastructure such as irrigation facilities(Ghimire, 2005).The lack of a road network providing access to a parcel is a primary factor favoring abandonment or for parcels to remained uncultivated (Karouzis, 1977). Small fields often have no road access (Blaikie, 1971). Furthermore, the lack of a road network to access the land parcelsprevents the introduction of other agricultural infrastructure such as irrigation and drainage systems. Moreover, this problem causes conflicts among neighboring landowners.

Land fragmentation involves a complicated boundary network among parcels (hedges, stone walls, ditches, etc.), which cause land wastage (Bentley, 1987) because a part of a holding (especially in small parcels) remains uncultivated at the margins of the parcels. Moreover, the cost of fencing and neighboring conflicts between landowners increases due to this problem. Furthermore, the small size and irregular shape of parcels is another dominant problem associated with land fragmentation (Yates, 1960). Also, the implementation of soil conservation work isharder, the construction costs are higher, more fencing is needed and roads, which are usually adjusted to the shape of parcels, have low geometrical standards.Dispersion involves waste of time and effect in travelling from plot to plot; results in un necessary road and paths; creates difficulties in regards to fencing and water supplies and so remove the farmer of the benefits of farming or makes irrigation and the use of mechanical equipment difficult, if not impossible (Simpson, 1940).

Excessive growth of the population has forced the people to settle on agriculture land for the residential without any infrastructures. Likewise, lack of the proper planning and management, fragmentation of land holding into small size has further degraded the

problems. Thus, fragmentation trends and how the land is used first concern for the researcher, planer and people. Various relevant national issues in this context are the fragmentation of the land harmful for proper use patterns? May infrastructures and topography effect on land use patterns?

So, this study attempts to answer the following research questions:

- What is the present situation of parcel sizenear the city area?
- What are the responsible factors for land fragmentation?
- What is the existing land use when cadastral map was made?
- How the agriculture land use patterns of the study area has been changed?
- What are the causes for changing agriculture land use pattern?

1.3 Objectives of the Study

The broad objective of the research is to analyze pattern of changes in the landscape of the study area during the study period (from 1965 to 2015), with special focus on land fragmentation. The study usesGeographical Information System (GIS) with substantial input from the field to achieve the stated objectives.

This research concentrates on the following specific objectives:

a) To identifysize and distribution of fragmented land
b) To examineland fragmentation trends
c) To find out the factors of land fragmentation
d) To assess the change in land use patterns

1.4 Rationale of the Study

The major significance of this study is to know the factors for affecting land fragmentation and its uses. Land fragmentation is directly linked with the land administration, which could be handled carefully if a reliable cadastral data and information are available. It also impact on land productivity and management. So the importance of the present study lies in whether smaller farms sizes useful for agriculture or residential interests in deciding policy issues like land ceiling and land distribution and other form of land reorganization.Besides, the study can help in finding out the most

viable size of the farm. It can also assist to formulation policy on land taxation and can provide opportunities for revenue maximization of country like Nepal.

1.5 Limitations of the Study

The current research work has some limitations. The aim of the study is to find the precise information to fulfill the requirements of the objectives.The main concernof the present study is withthesituation of land fragmentation and its pattern of use after fragmentation in the village area. Cadastral map is used for land use analysis with respect to the field book of 1965. Cadastral map may not be generalization. All objects are equally important.

There are the technical problemsto merge the adjoined different map in Arc GIS 9.3. So, one map area is used for parcel fragmentand land use pattern analysis. Other physical and social aspect of the study area is analyzed in ward level with respect to the Village Development Committee (VDC). Due to the budgetary and time constraint; there is also limitation in field data collection and in application of GIS software. Besides the study, it is limited toTaukhel locality of MachchhegaunVDC-6, soit cannot be a representative of whole Kathmandu district.

1.6 Chapter Division of the Study

The whole research study will be organized in the following chapters:

The first chapter basically deals with various aspects like background of the study, statement of the problem, objective of the study, justification of the study, limitations and organization of the study.**The second** chapter deals with the review of literature from different books, journals, past research works etc.**The third** chapter mainly focuses on the data collection and research methodology that will include different techniques, tools and methods used for research study.**The fourth** chapter deals with the study area and its other prospectus like as Historical Background, Location, Ward Boundary, Accessibility, Physiographic, Land Use, Agriculture Land use and etc.**Fifth chapter** explain on the land fragmentation and land use patterns, advantage and disadvantage of fragmentation, factors affecting on fragmentation, cadastral process in Nepal. After the fragmentation, how land use prevail that plots are shown, causes of land use change is also analyst.**In**

chapter six, sums up the previous chapters and gives overview of the main findings from the analytical section.

CHAPTER 2

LITERATURE REVIEW

Based on available literature such as journals, books, dissertations and articles, though they arelimited land fragmentation in the study area, have been collected and reviewed.

2.1 Fragmentation of Landholdings: Causes and Importance

In abroad, fragmentation of landholdings is commonly regarded as a major obstacle to agricultural production growth in China. Study suggested that incomes from off-farm employment and land rental markets are associated with lower land fragmentation. Limited market access does not encourage land fragmentation. Instead, it find that landholdings in suburban areas are more fragmented, probably because farmers cultivate a wider range of (high value-added) crops in these areas (Tan, Heerink and Qu, 2006).They concluded that, although land fragmentation has slightly declined during the 1990s, it is likely to remain high in China if the current principles underlying land distribution within villages are maintained. Thus, policy options for reducing land fragmentation are suggested.

Di Falco, Penov, Aleksiev, and van Rensburg (2010) presented an empirical analysis of the role of land fragmentation, crop biodiversity and their interplay with farm profitability. The econometric results stress the ambiguous role of land fragmentation on farm profitability. On the one hand, land fragmentation reduces farm profitability. On the other hand, land fragmentation cultivates crop change. Study also found that crop biodiversity plays a beneficial role in farm profitability. Policies that aim to increase land consolidation and reduce fragmentation may overlook the positive link between diversity and plot heterogeneity. Policies that encourage land consolidation should, therefore, consider the crucial role that this has on other variables such as farm biodiversity.

Land holding patterns cause social injustice and economic unproductivity. Land is not distributed equally and is becoming fragmented and landholding becoming smaller and

increasing inaccessible to peasant(Alexander, Hubers, Schwanen, Dijst, & Ettema, 2010). Thus, the combination of all these factors affects the total process of development.

Griffin (1977)using data from seven Asian countries, argues that those countries are characterized by a highly unequal distribution of land. He notes that statically information usually relates to the distribution of the farm size. According to him, the ownership distribution is less equal than the distribution of farm size. He believes that the extension of it is highly unequal ownership of land during a period of rapid demographic growth has resulted in increased landless and near landlessness. In his imperial study he conclude that the basic causes of increasing poverty in Asia is not an assumed population explosion rather there are several causes; among them the unequal ownership of land and other productive assets, the locative mechanisms which discriminate in favor of wealth and a pattern of capital accumulation and technical innovation which is biased against labor are important.

In the study done byAlcantara (1974)on the impact of Green Revolutions, it is said that the large landowners were the beneficiaries. Through mechanization of farms, large landowners were able to maintain or increase their economic power, while the small farmers to become landless agricultural laborers. On the other hand, the situation of the landless became much more serious because their prospects for employment decreased even further as a result of the rationalization, commercialization and incipient mechanization of farming practices.

2.2 Factors of Change in Agriculture land in Kathmandu Valley

The growth of the urban area in Kathmandu valley during 1970 to 1990 has taken place in an uncontrolled manner and most of the agriculture land is being used for urban purposes. The agriculture land has decreased by 40%(Pradhan, 2004). The trend of land use change in Kathmandu valley during 1984 to 1998 has showed remarkable increase in urban area and slight decline of agriculture area(Koirala, 1999).Nepal also has been following the problem due to migration from rural to urban centers like others developing country of the world. The problem exerted a heavy pressure on the fertile land at the peripherals of the city areas and caused changes in cropping systems in these areas(Rangitkar, 1983).

The reasons for land use change in Kathmandu valley are: the massive in-migration and natural growth in Kathmandu valley, main political and administrative center, major

tourist gate way, cultural and economic hub, considered to have the most advanced infrastructure among the urban areas in Nepal (Koirala, 1999). Agriculture also in peri-urban area has been encroached for settlement and built up areas as well as the land value is skyrocketing(Sapkota, 2014). Most of the agriculture lands next to the core area followed by surrounding area have been converted urban build up during the decadal period of 2003 – 2012 (Shrestha, 2015).

Banskota and Karki (1995)in their work Rural Development and Environmental Consideration contends that there is the connection between an inequitable land distribution pattern and degradation of land resources. He argues that the rich do not cultivate their land. They rent it to the lack ownerships rights and thus, do not prevent it from weakening.The land gets fragmented through poverty, customary celebrations, illness and road and canal construction. Fragmentation affects the scale of farming for the cultivation and the allocation of time and labor(Bhandari, 2007). He concludes that the average size of land holding size has been decreasing gradually over time, accompanied by the fragmentation of land, which is caused mostly by the operation of laws of inheritance and donation of the land to others. This situation has been further exacerbated by the prevalence of poverty and in migration of people from hilly regions. He also finds that the economic inequality has been growing gradually along with the concentration and fragmentation of landholdings.

The report “An Environmental Assessment Emerging Issue and Challenges” published by ADB and ICIMOD realize that agriculture land is an important resource for agrarian people of Nepal. At national level both agriculture land and forest land have increased but per capita area of both resources has decreased and the productivity is also decreased in same manner.Most of the literature emphasized agriculture land in Nepal had deducted after 1980 and change into urban areas. That means, parcels had been more fragmented and converted it into use of the building.

2.3 Land Management Policies of Nepal

There are several laws and policies active in regulating and managing land resource in Nepal. Policy is rule that influences the behavior of an individual, firm, or organization (Holt, Subedi, & Garforth, 2002). Historically, policies are made by state, or agencies of the state, such as public institutions and bureaucracies. It is not merely a statement of

intention but determination of a course of public action towards of society, including the goals the government seeks to achieve and process of putting it into practice (Ellis, 1992).Policy statements are formulated to address the intentions towards achieving certain goals and it is implemented through specific policy instruments such acts, laws and regulations. After the overthrow of Rana Regime in Nepal 1951, a number of interventions have been initiated by the state to reform land use, ownership and its distributions.Significant of them are (1) Formulation of Land Reform Commission in 1957, (2)Agriculture Act 1960, (3) Land Act 1964, (4) land Measurement Act 1962, (5) Land use Policy 2012. Similarly, Agriculture Perspective Plan (1966-2016), Three Years Interim Plan (2013 -2016) and different circulation published in the Nepal Gazette in each fiscal year are also very important toward the land reform and management sector. Here is short description about some of them.

Land Act, 1964

Land Survey and Measurement Act 1976 are directly related to land use and management and to agricultural production and food security. Land Act 1964 was developed to guide the land reform. It also has some features on land use and management. But this Act was seen primarily as the one to reduce land holding by maximum fixing ceiling, land consolidation and to provide land tenure rights for those who cultivate others land. The Fourth amendment (1997) of the Land Act 1964 made the provision of termination of rights of unregistered tenants (who were not able to register within given time).

Table1. Land Ceiling Proposed by Government at Different Times (Land Act 1964 and Its Revision in 2001)

Category of areas	Ceiling provision	Additional areas provided for housing	Revised ceiling by Deuba government in 2001
Kathmandu Valley	50 Ropani (2.54 ha)	8 Ropani	25+5 Ropani (1.5 ha)

Source: Land Act,1964

Land Measurement Act, 1962

It was to measure and classify land resources in Nepal for the better land use system. This act defines quality of lands into *Abal*, *Doyam*, *Sim* and *Chahar* respectivelyand all land

records are based on the large scale Cadastral maps in which each and every parcels have their own unique parcel identification (ID).

Agriculture Perspective Plan, (1996- 2016)

It is a long term (20 years) plan in the agriculture sector, which was initiated with the view to produce tangibles impacts and realize economies of scale for commercialization. The plan identifies dual ownership of land and land fragmentation as constrain for agriculture development and recommends taking actions towards the termination of dual land ownership and initiating land consolidation based on the recommendation of High Level Land reform Commission (HLRC 1995).

National Agriculture Policy, 2004

This policy statement includes effective implementation and monitoring of land ceiling, establishment of land bank, leased provision of unutilized public land to the targeted communities.

National Land Use Policy, 2012

Nepal should have a LandUse Policy, 2012 for implementation inorder to ensure sustainable use of our land to conserveenvironment and biodiversity, eradicate poverty, promoteand economic growth. April 16, 2012 the council ofministers Government of Nepal approved the Land UsePolicy, 2012. It classified land into six classes namely: agriculture, industrial,forest, commercial, housing and public land. To manage land fragmentation and planned urban, it envisaged the following work policies.

- To promote the land consolidation program.
- To operate the land pooling for managed build up area.

It defines agriculture area, which are greater than 1000 square meters area used for fully agriculture and livestock activities and also less than 550 square meters area which have road, sewerage, electricity, communication, water and so many others urban infrastructures are defined in urban (build up area).

Thirteenth Plan,(2013- 2016)

In thirteenth plan several strategies and policy actions have been proposed for the achievement of sectorial objectives of land reform management. Maximum use of land

and land resources, implementation of land use policy, 2012, to control the illegal, uncontrolled and unmanaged settlements and strengthening of land information systemetc. are important strategies / policies stated in the three year plan. Plan has taken work policy and program for formulation of the national land policy and to subsidies tax for female, lower and indigenous cast, old and disable people and martyr families.National land use project is the main program of this plan(Commission, 2013).

Findings of this reviews is classification of land by their physical characteristics and sustainable relation development between the infrastructure, settlement and environment. These reviews provided the basis to develop an integrated framework for the study of land fragmentation and land use patterns. Land holding /ownership patterns depend on the state's political philosophy and the general policies toward the land. Due to growing concern about indigenous, minorities,stumpy casts, landless and near land less people, the government is becoming and enforcing more liberal for their betterment.That's why female land owner has increased now. But most of the studies of fragmentation carried out in 2004 to 2015 and land use have discussed through cadastral map of 1965 and 2015. Forest and barren lands have not included in this study.

The previous studies on land fragmentation in Nepal have dealt withhaphazardly land fragmentation, lack of proper legal provision, lack of efficient infrastructure specifications, and absence of spatial information system and therefore information about the land fragmentation is scanty and not adequate for policy and planning measures. This study deals with proper size of parcel, ownership transfer and land use by owner, which the land before and after fragmentation, which is not previously attempted. The methodology adopted for this study is discussed in next chapter.

CHAPTER 3

RESEARCH METHODOLOGY

Research is a process of systematic and in-depth study or search for any particular topic or subject of area of investigation on the basis of collection, compilation, presentation and interpretation of relevant details or data. It is actually a journey to discover some facts. And Research Methodology describes the methods and process applied in the entire aspects of the study. Research Methodology refers to the different techniques and tools used to make the study significant and efficient. It is the path from which we can solve the research problem systematically. According toKothari (2005)*"Research Methodology refers to the various sequential steps to adopt by a researcher in studying problem with certain objectives in view"*. This chapter deals with the procedures that were used to get the relevant information on the study of land fragmentation and land use patterns of Machchhegaun VDC in Kathmandu district. Therefore fulfilling the set objectives of the study, this chapter played an important part as all the Geographical research techniques tools have been used to get the result. For this several methods have been used to get the information. Apart of the methodology aspect this chapter deals with research design, nature of data, source of data and method of data collection, analysis, processing and frame work of the data analysis too. All the necessary input/output data were collected in physical units. Mainly dependent and independent variables, statistical tools may be used for analysis.

3.1 Research Design

Research design refers to conceptual structure within the research conducted. According to(Norman, 2009), research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance.The research design in this study basically follows the comparative evaluation of land fragmentation and land use patterns of MachchhegaunVDC in Kathmandu district. Analytical and descriptive approaches are used to evaluate the land use pattern due to fragmented land of the study area.

3.2 Sources of Data

The sources of data for this study are both secondary and the primary. Primary

information was collected from the field surveys and secondary information was collected from various published as well as unpublished documents. The section below includes the detail study, basically focused on interviews method. Structured questionnaire is used to collect data. Most of spatial data is collected from Department of Survey (DOS) and socio-economic data from the Central Bureau of Statistics (CBS), and web sites. The data used for the study are mainly two types.

3.2.1Primary data

Primary datawere collected through field verification; land owner survey, sampling and taking the photo graph of the spots. Those data are for the purpose of finding causes of land fragmentation,and tendencies of land use/land cover pattern. Similarly the data from ground verification of land use/land cover done in field are primary data and Desk study focused group discussion, field observation were carried out for the collection of primary data. The structured questionnaire is used to collect data. The questionnaire is attached in Appendix.

3.2.2Secondary data

Machchhegaun VDC has been taken as research area. The main source of data for research is secondary data such asVDC map; scale 1:25000, prepared by National Geographical Information Infrastructure Project (NGIIP), Kathmandu, 2002, image of Machchhegaun VDC from Google and cadastral maps prepared by DOS. The reliability of the study is based on secondary data collected from various sources both published and unpublished documents. The CBS is also the major source of data and concerned authorities, reports, journals, related papers etc. are also used. Some attributes data from the Machchhegaun VDC were collected.The Atlas prepared by Survey Department has also been taken as a reference. Due to time, resource and security limit there is inadequacy of data.

3.3 Data Collection: Tools and Techniques

Tools and techniques are the heart of data collection of any research. Most of the information of this study has been based on secondary information collected during one month field work in the study area. During the research work, more emphasis was given to collect accurate information and an effort was made to

get the reality of the people. Both qualitative and quantitative data were collected for fulfilling the objectives of this study using various techniques such as field observation, unstructured interview, interview, key informant interview, focus group discussion and field-notes taking.

3.3.1 Field observations

Observation implies the use of eyes rather than the ears and voicescited in (Dawadi, 2013). Direct field observation as a major weapon of geographer is to collect the real information for the study, which helps to minimize the possible fallacy and inaccuracy in information collection. Researcher collects the data by direct observation without permission of respondents. During the period of fieldwork, researcher observes the smallest pieces of land, land use pattern economic assets, infrastructure, life style, family occupation and people's behaviors. Thus, major visible changes were noticed and verified through informal conservation with locals of the study area.

3.3.2 Questionnaire

Questionnaire survey is one of the important techniques in research field,which helped gather both quantitative and qualitative data and information. The researcher used open and close questionnaire in this study, which was structured form questionnaire or schedules in cone shape (general to specific). In this study, it was used to collect the base line information, socio-economic condition, caste/ethnic affiliation, livelihood strategy, urban, facility provided by government in MachchhegaunVDC.

3.3.3 Landowner survey, Sampling procedure and Sample size

This study is focused on the land fragmentation and land use patterns in Nayabasti, Taukhel of Kathmandu. Total area of 6.5 ha under the different land use patterns and fragmented in different time series. 30 land owners and some related persons of this area were selected under the randomly.

3.3.4 Focus group discussions

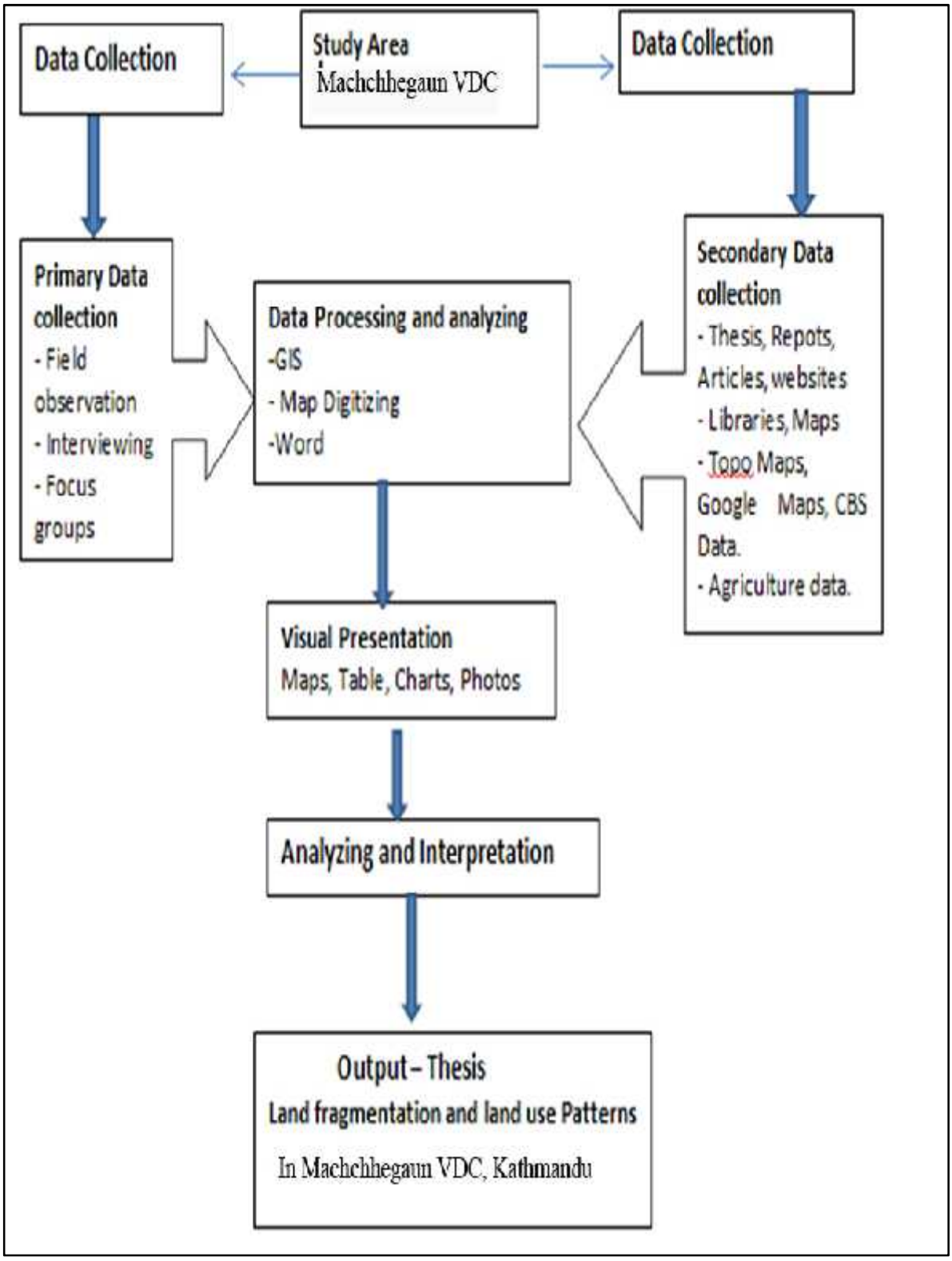
The focus group discussion method is a fairly inexpensive and effective way to get the real information from a small group of people. It can be defined as a research technique that collects data through group interaction on a topic determined by the researcher (Mergon 2001; cited in Banskota 2005). The main purpose of the focus group discussion was to obtain more detailed information about history of settlement, present and past situation of land, land use pattern, infrastructure, and policy of government and institutions towards the people living in the study area. It was held in the Nayabasti, Taukhel of Kathmandu, where the participants belonging to different sex and age groups were gathered. I had taken one focus group discussion in the gathering of 10 people (8 male and 2 female), which is more difficult to conduct, as people are busy in several sectors in different periods.

3.4 Methods of Data Analysis

Dataanalysisisoneoftheimportantandmajorstepsofany study.Itistheheartofthe work.Inthisresearch,dataareanalyzedin comparativeanddescriptiveway. Maps,tablesanddiagramshavebeenusedtopresenttheinformationonvariousaspects ofland and its used patterns.A computerbasedGISProgramslike Arcmap 9.3 wereusedtopreparemapsanddiagrams.Thesoftware's likeExcel,Word etc.arealsousedtocomputeandanalyzedata.Limitedmethodshavebeenadoptedto gainnecessaryinformationforthestudy.Problemsoffragmented land arebasedonsocialanalysisaswellassome availabledatafromdifferentsources. Butthisstudyhastriedtoanalyze suchfactorsinspiteofinadequacyofthedata.The land use pattern of parcels of road, river and public land do not change via parcel fragmentation, so average size of parcel were derived from the private parcels using the following formula.

$$\text{Average parcel size} = \frac{\text{Total area of map} - \text{area of public land}}{\text{Total number of parcel}}$$

Figure 1. Data Analysis Diagram



3.5 Limitations

Spatial change in land use of study area has been defined using existing island cadastral map. Thus reliability of map depends on the positional accuracy of cadastral map plus digitizing and processing error.This study limited to the small area of one village in Machchhegaun VDC of Kathmandu district, so the result may be not enough to generalization for the whole peri-urban areas of Kathmandu valley. Nevertheless, this study provides a general picture of peri-urban areas of the valley and like other cities. The majority of information used in this study is field visit, plot register and field book data of study area of survey office Kalanki. This is not legal data for other people, some modified by field visit.

CHAPTER 4

THE STUDY AREA

The study area includes Taukhel,Nayabasti which belong to Machchhegaun VDC, now Chandragiri Municipality – 13, of Kathmandu district. In this area, land has fragmented before some year ago. That's why, it helps to understand fragmentation trend of land and its impact on land use patterns. So this area was taken to study over the Machchhegaun VDC.

4.1 Physical Settings

The study has been carried out in the Machchhegaun VDC of Kathmandu district in the Central Development Region of Nepal. The administrative boundary of thisVDC is:Kirtipur municipalityto the east, Matatirtha VDC to the west, Thinthana VDC and Kirtipur municipality to the northand Makawanpur district to the south. This is the historical place of Nepal. Some religious places remain here.It iseasily accessedto its all villages and Kathmandu metropolitan areas by the roads. Its southern part has greenery which attracts tourist for enjoyment and multi land use patterns. The main occupations of people of this VDC are agriculture and services whereas some people have their own business. It is the peri-urban area of Kathmandu city. So directly link to Kathmandu and Lalitpur metropolitans.In the end of 2014, all VDCs of Kathmandu district are converted into the municipality. So this VDC also changed into the Chandragiri Municipality in 13 and 14 wards. This study area lies in ward number 13.

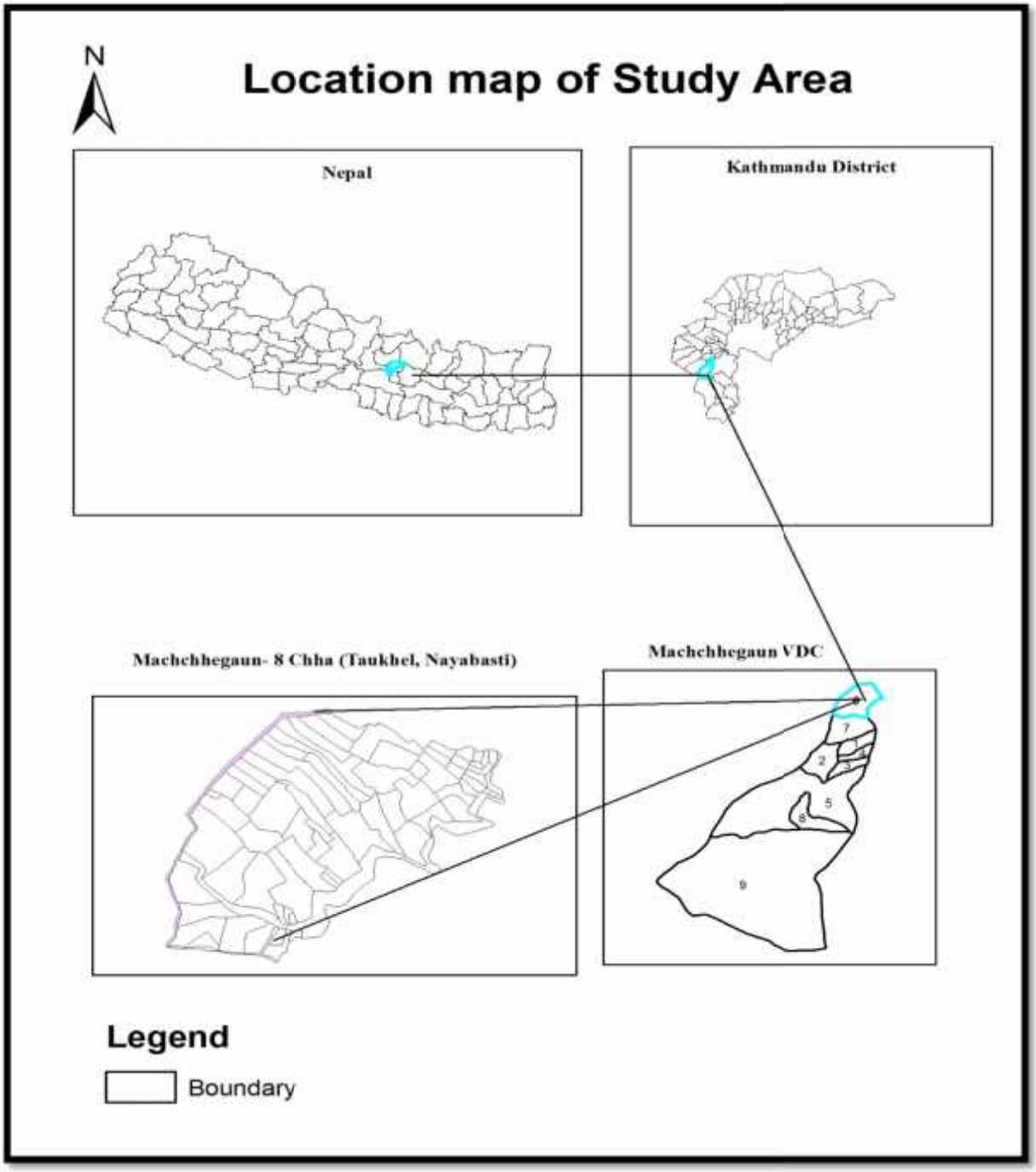
4.1.1 Land Use/ Land Scape

Settlements of this VDC has scattered around the Taukhel. Now, increase of the settlements towards the agriculture land. Most of the parts of ward no. 1, 3, 6 and 7 have more agriculture land. This area has irrigated by different drainage of Machchhenarayan pond. According to the village profile, 2010, about 22 % plain, 44% gentle slope, 8% slope and 26 % area has remained steep slope in this VDC.

4.1.2Location

Machchhegaun is remains in the south- west direction from capital of Nepal. Geographically, the study VDC is extended within latitude 24^0 52' 46" to 24^0 54' 42" north and longitude 76^0 42' 28" to 76^0 44' 2" east. It lies on height from1600 to 2000 meters above the mean sea level.

Figure 2. Location map of Study area, Taukhel, Nayabasti, Kathmandu



4.1.3 Accessibly

Main roads of the Machchhegaun VDC.

1. Tinthana – Machchhegaun Road
   This road connects with the Tribhuwon Highway in Tinthana chowk.
2. Thankot – Mahadevsthan – Matatirtha – Machchhegaun – Chalnakhel Road
3. Kirtipur Sajhapasal – Machchhegaun Road.
   This road helps to reach in Kirtipur Bazar.

Besides these roads, there are many gravel roads in this VDC.

4.2 Socio –Economic Settings

4.2.1 Population of the study area

According to the CBS population census 2011, the total population of MachchhegaunVDC is 3,849withtotalnumberofhouseholdsas 872 shown in table 2. This VDCisdividedinto9 administrativewards.ThisVDChasadensityof825person/Sqkmand accounting872 householdswith an averagehousehold'ssize of4.41.Highlighted ward number 6 is the study area of this VDC. The population is 686 and household 156 shown in table 2.

Table 2. Ward level Household and Population of Machchhegaun VDC

Ward	House hold Size	Total Population	Male	Female
1	120	547	261	286
2	38	172	71	101
3	51	276	132	144
4	26	134	70	64
5	103	446	218	228
6	156	686	345	341
7	178	711	365	346
8	117	472	222	250
9	83	405	200	205
Total	872	3,849	1,884	1,965

Source: - National Population and Housing Census 2011.

4.2.2 Settlement Patterns

Theappearanceofthe prominentsettlementsofVDCremainsin the formit is originally established.Mainly thesettlementsareinthecentralvalleyandperipheraluplands.Themorphology

ofVDCissimilartoother hilly villagesettlementsinNepal.Thereisvisiblevariationintheir size,geographicalsituationandeconomic activitiesofinhabitants.Thebuildingsare constructedalong theroadsinlinearpatternandconcentratedaround theconnectionpointsofroads. Verynarrowbrick/stonepaved roadsareseenintheoldsettlements and thebuildingsareconstructed inunplannedway.

4.2.3 Caste compositions

Table 3 shows that thepopulationofdifferenttypesofcastes/ ethnic groupssettlein MachchhegaunVDCaccording to VDC profileofNepal-2011,theethnicityandcastepatternofVDC showsdiversitywithmajor ethnic groupsasChhetri (13.56%),Newar(45.75%),Brahmin (14.42%),Tamang(6.18%)and Magar(12.86%) .

Table 3. Population by Caste/ Ethnicity and Sex of the study area

S.N.	Caste/ Ethnicity	Total Population	%	Male	Female
1	All Caste	3849	100	1884	1965
2	Chhetri	522	13.56	258	264
3	Brahman - Hill	555	14.42	273	282
4	Magar	495	12.86	236	259
5	Tamang	238	6.18	129	109
6	Newar	1761	45.75	854	907
7	Kami	118	3.07	54	64
8	Rai	19	0.49	7	12
9	Gurung	12	0.31	5	7
10	Sarki	68	1.77	36	32
11	Others	61	1.58	32	29

Source: - National Population and Housing Census 2011

Besidesthisothervariousethnicgroupscomprise small proportionsofthepopulation suchasSarki(1.77%),Gurung(0.31%),Rai(0.49) and Kami (3.07) shown in table 4.

4.2.4 Occupational structures

Itisimportantcharacteristicsofpopulation. Peoplehaveconducteddifferenteconomic activitiesfortheirlivelihood,whichisdenoted by occupation. Therearemainly twotypes ofeconomicactivitiesoneisagriculturewithinfarmactivitiesandotheroccupation withinnon-farmactivities.Thedistributionof population according to their mainoccupation isshown in theTable4. It characterized whole Machchhegaun VDC. More female engaged in

agriculture than male. 20.33 percentof totalpopulations are involved in agriculture,19.69 percentpopulation are involved inown economicenterprises andbusiness,18.40 percent population are involved inwage/labor, 40.41 percent population are involved in services and 1.10 percent population are engaged inindustries.

Table 4. Major occupations of population in VDC

S.N.	Occupations	Male	Female	Total
1	Agriculture	8.74	11.59	20.33
2	OwnEconomicEnterprises/Business	12.97	6.72	19.69
3	Wage/Labor	13.80	4.60	18.40
4	Services	31.92	8.19	40.41
5	Industries	1.10	0.0	1.1
	Total	68.53	31.47	100

Source: Village profile of Machchhegaun, 2010

Table 5 shows the major occupations of the study area. More population (112) has engaged in the services than others occupations. Only 7 male persons are engaged in the small industries. Equal male and female involve in labour.

Table 5. Major occupations of population in Study Area

Ward No.	Agriculture		Business		Services		Labour		Industries		Total		
	F	M	F	M	F	M	F	M	F	M	F	M	Total
6	27	12	11	22	22	90	12	13	0	7	72	144	216

Note: F = Female, M = Male

Source: Village profile of Machchhegaun, 2010

4.2.5 Service Centers

Different typesofservice centers are available in Machchhegaun VDC. Schools, sub health post, post office, public cooperatives and some private shops provide rational services to the people.

CHAPTER 5

LAND FRAGMENTATION AND LAND USE PATTERNS

Fragmentation of land use refers to thenumber of users that are also tenants of the land.

5.1Land Fragmentation and Its Consequences

Land fragmentation is usually understood by the word subdivision of the parcel, which is the division of parcel (i. e. piece of the land) by transaction purpose, decision of court, *anksa banda* (legal right property sharing), land pooling, or by the natural disaster. It is also a case of buying and selling of a parcel during the transaction. Land fragmentation activities are controlled by District Land Revenue Office (DLRO) with technical assistance of survey office (SO). As population is increasing day by day and all need a piece of land in their name, is seem to be main cause of land fragmentation. In Nepal land is considered to be the major property. It is also striking land use policies because agriculture land is changingtoward the plotting for housing purposeswhich a case of fragmentation also. Sometimes land fragmentation is done for preparation of land use planning maps. Optimum size of land for different uses for different countries may vary according to their physical, socio- economic conditions. Thus land fragmentation can have both positive and negative impacts in particular contents.

5.1.1Advantages of land fragmentation

Even though policy makers often point out the drawbacks of fragmentation there is no consensus that fragmentation is strictly a negative phenomenon. Bentley (1987)argues that the harm caused by fragmented land holdings is overrated and that the farmers own views often are neglected by policy makers.

It can be summarized by following points;

I. To reduce the risk of total crop failure by giving the farmer a variety of soil and growing conditions.
II. To use multiple eco zones.
III. The farmers might be unable to gather enough labor to meet seasonal peaks on largeparcels.
IV. To develop the suitable land parcel of house.

5.1.2 Disadvantages of land fragmentation

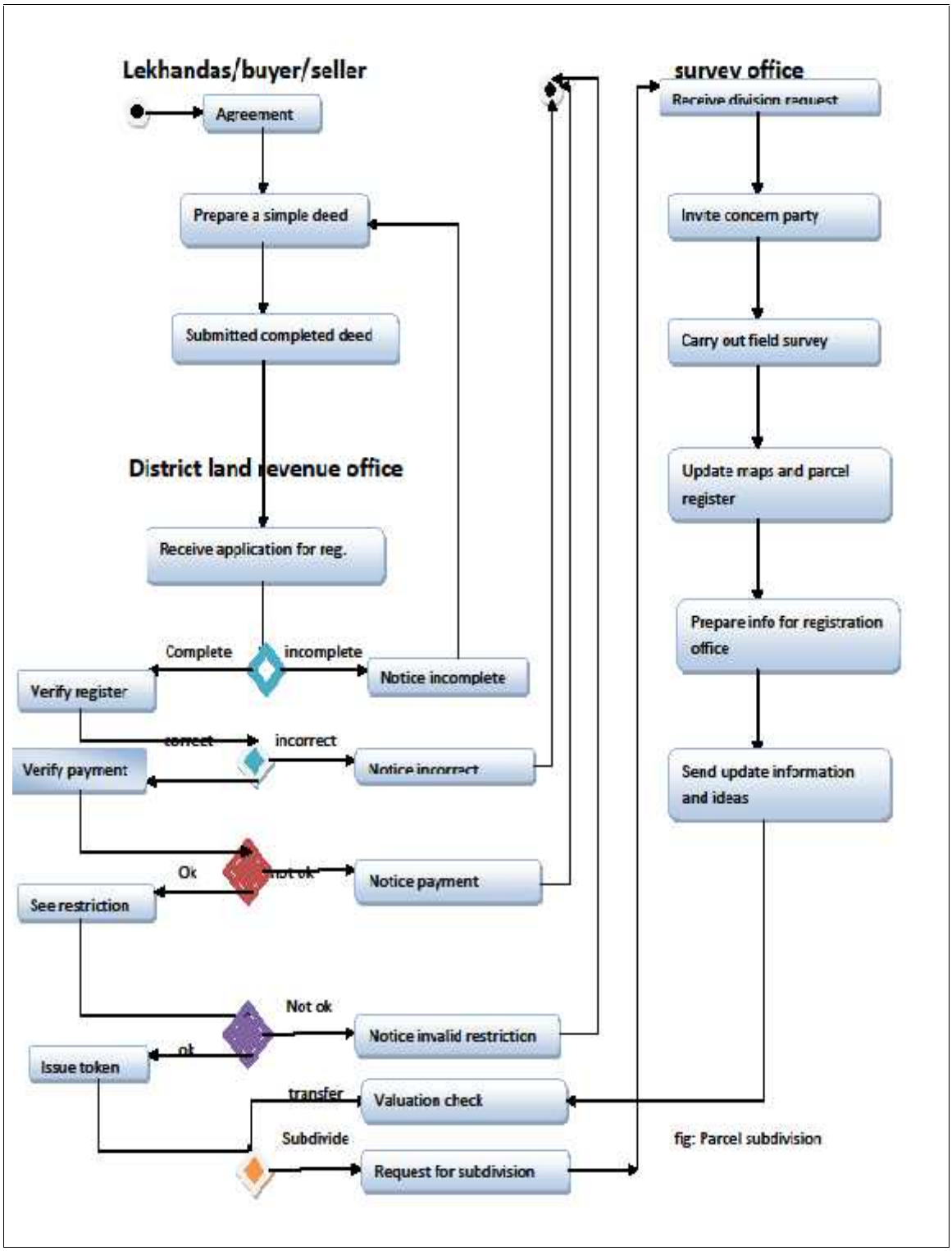
Land fragmentation is said to harm productivity in a number of ways. It can be summarized by following points:-

I. To increase transport costs. If the plots are located far from the home, and far from each other, there is a waste of time for the workers spent on travelling in-between the plots and the home.
II. Management, supervision and securing of scattered plots can also be more difficult, time consuming, and costly.
III. Small and scattered plots waste land area and require more land for fencing, border constructions, and paths and roads.
IV. Land fragmentation might also increase the risk of disputes between neighbors

5.1.3 Land fragmentationprocess in Nepal

Fragmentation is a parcel sub division so land owner request for parcel division during the transaction from DLRO, which is forwarded to the SO with token number (no.) for technical assistant.Sometimes field supervision is also made for the land fragmentation process. Original parcel identification (id) no is suspended and new parcel id number given to buyer and the following id number is given to original owner with the area of new parcel along with attribute information of parcel. New parcels are proposed in tracing paper and when registration is passed it is then transferred to the original cadastral map. These parcel divisions are maintained in plot register with defined rules. So spatial information of land fragmentation are maintained in the map and attribute information are maintained in the plot register. Fragmentation is also maintained systematically in land fragmentation dairy by the individual Amin (surveyor), which is attested by chief of the survey office.

Figure 3. Parcel Sub- division Process in Nepal



Sources:- Malpot Nirdeshikha and Kitta Napi Nirdeshikha

5.2 Analysis of Land Fragmentation Status

This study is firstly to quantitatively investigate fragmentation of the parcel during the past one decade.

5.2.1 Land fragmentation on western part from Bishnumati River

Most of the land administration work over the western area from the Bishnumati River of Kathmandu district is conducted by survey office Kalanki. Ministry of the land reform published annual progress report in different years. The data extracted from these reports and presented about the land fragmentations. Most authors who tried tomeasure fragmentation have used a simple average of the numbers of parcels perholding (either regional or national) and an average of holding size.

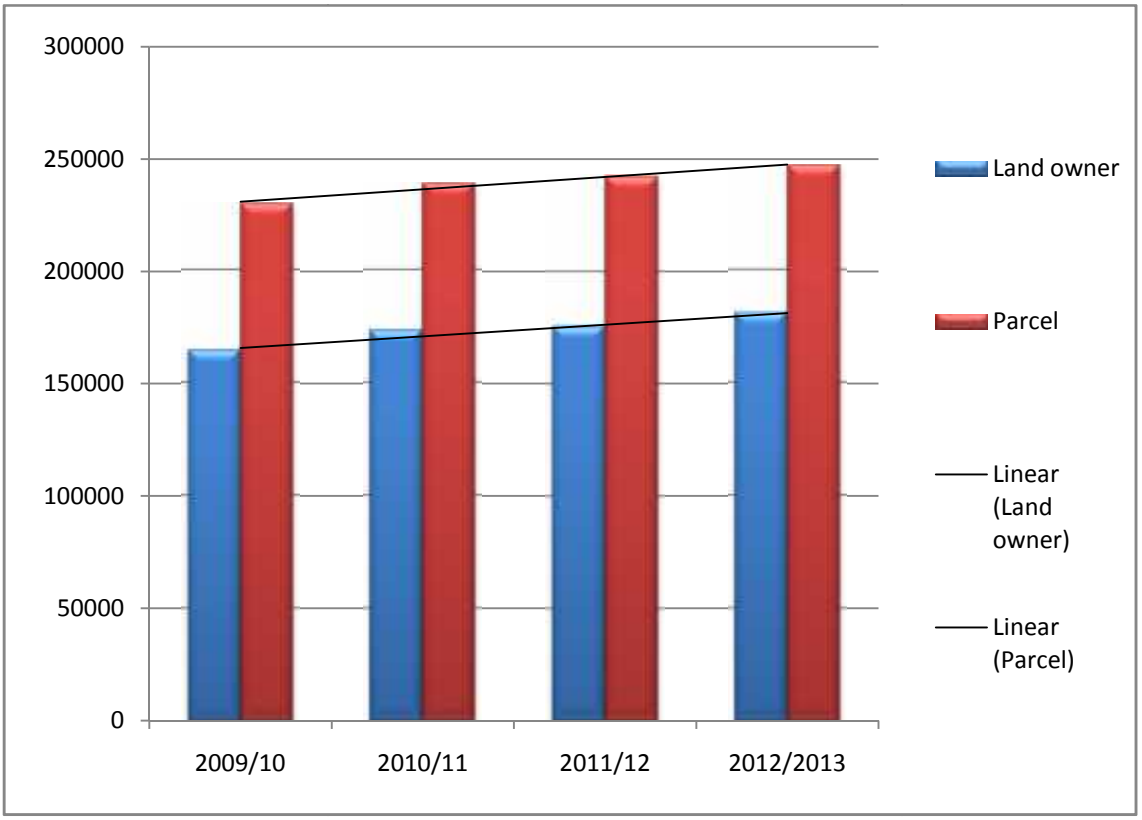
Table 6 shows that average parcel holding with respect to the time in fiscal year 2009/10 to 2012/13. It shows linear rising trend of land owner and parcel counts during the whole study period in 4 years. That's why average parcel holding of land is decreased. In 2009/10, 229549 parcels were hold by 164513 land owners in which had average parcel holding is 1.40. Gradually have increased parcel with increased land owners. In 2012/13, 246558 parcels were held by 180993 land owners and average parcel holding decreased to the 1.36. King (1982) cites that if holding size of the parcel has decreased in the area, there sould be more fragment of land. Land owners had increased by 5.4 % in 2010/11 with respect to the fiscal year 2009/10. And parcel had 3.8 %. Both growth percent had decreased in 2011/12. So land was more fragmented in 2010/11.

Table 6. Description of Landowners and parcel counts at Kalanki SO

S.N.	Fiscal Year	Land owner	Growth %	Parcel	Growth %	Av. Parcel Holding
1	2009/10	164513	0	229549	0	1.40
2	2010/11	173350	5.4	238386	3.8	1.38
3	2011/12	175731	1.4	242421	1.7	1.38
4	2012/2013	180993	3.0	246558	1.7	1.36

Source: - Annual progress reports of MOLRM.

Figure 4. Land Parcel and owners according to Survey Office, Kalanki



Fiscal Year

Figure 4 shows land owner and parcel with respect to the fiscal year 2009/10 to 2012/13.Both land parcel and owners are gradually increased. Fragmentation in land is mutuallyrelated with fragmentation of land ownership. The trend of land owners and numberof parcels are parallel to each other. It shows that the existence parcel owners did not purchase (or get by any means) the parcels to that area because the proportion at between owners and parcels number has equal ratio of various years. It means that there is existence of in-migration is that area from other areas.

5.2.2 Situations of land ownership in Machchhegaun VDC

Most of the land owners of this VDC are native land owner. They have own houses. Due to increase population and division with family, 80 % land owner lies on own houses with their family, remain 15 % two combine family and 5 % more than two families lied on one house (Village Profile, 2010). Farmers change his occupation due to impact of urbanization. So, most of land owners have less occupied land and some of them have dual ownership. Table 7 shows that the ownership of land according to the word no. of Machchhegaun and parcel size. Ward no. 6 is the study area, which have 93 land

ownersless than 3 Ropani areas. 8 native land owners have 7 – 13 Ropani land. So, we can see some parcels size is relatively greater than other which has not touch with roads.

Table 7. Land Ownership according to Ward no. and Size

Ward No.	0-3 Ropani	3-7 Ropani	7-13 Ropani	13-39 Ropani
1	86	22	5	1
2	21	10	3	0
3	37	6	5	2
4	25	3	0	0
5	54	30	5	0
6	93	28	8	0
7	90	29	10	1
8	76	6	0	0
9	75	6	1	0
Total	557	140	37	4
Percentage	74.93	18.83	5.01	0.54

Source: Village profile of Machchhegaun, 2010

5.2.3 Land fragmentation in study area

King (1982)state that the size of the parcel is one important indicator of the land fragmentation.This study firstly attempts to quantitatively investigate fragmentation of the parcel according to time span of one decade. We used cadastral map of Machchhegaun VDC – 8 Chha at scale 1:2500 and plot register data. The analysis was conducted for the year 10th April 2004 to 10th April 2015.According to the field book of this map, 1965, there were 73 parcel counts (Survey Office, 2015). Time series land fragmentation and average parcels size are illustrated in table 8. After nearly 40 years, total number of parcel was near about doubled and laid on 126 in 2004. But after the short period land was too much fragmented and average size werereduced from458.71 m^{2}in 2004 to a total number of 222 parcel and average size of the parcel was 256.22m^{2}in 2009. In April, 2015 total parcel no. was 269 and average size of the parcel was 211.45 m^2. Total number of the parcels split is 129. In land fragmentation system in Nepal, one parcel is split then generatesother parcels. So, it reduces total parcel number which affects the average size of the parcel. Thus, in study area, land is too much fragmented and size of the parcels is reducedaccording to the time series.

Table 8. Time Series Land Fragmentation of Study Area

S. N.	Survey Period	Parcel No.	Change in Parcel No.	No. of Split Parcel	Total Parcel no.	Average Size
1	April 2004	136	0	12	124	458.71
2	2005	150	14	6	132	430.91
3	2006	227	77	35	174	263.33
4	2007	264	37	16	195	291.69
5	2008	300	36	15	216	263.33
6	2009	310	10	4	222	256.22
7	2010	323	13	7	228	249.47
8	2011	359	36	14	250	227.52
9	2012	370	11	5	256	222.19
10	2013	370	11	5	251	226.61
11	2014	374	4	2	253	224.82
12	April 2015	398	24	8	269	211.45

Source: - Survey office Kalanki

Figure 5. Land Fragmentation Trend of Study Area

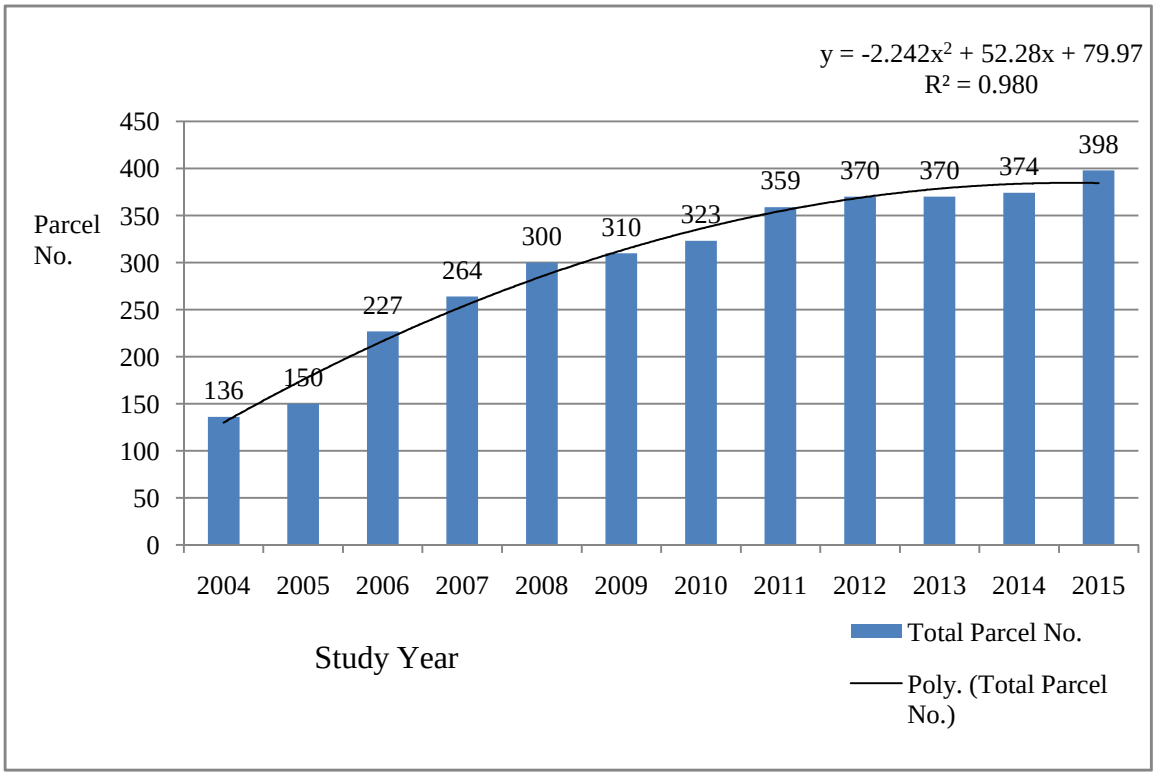
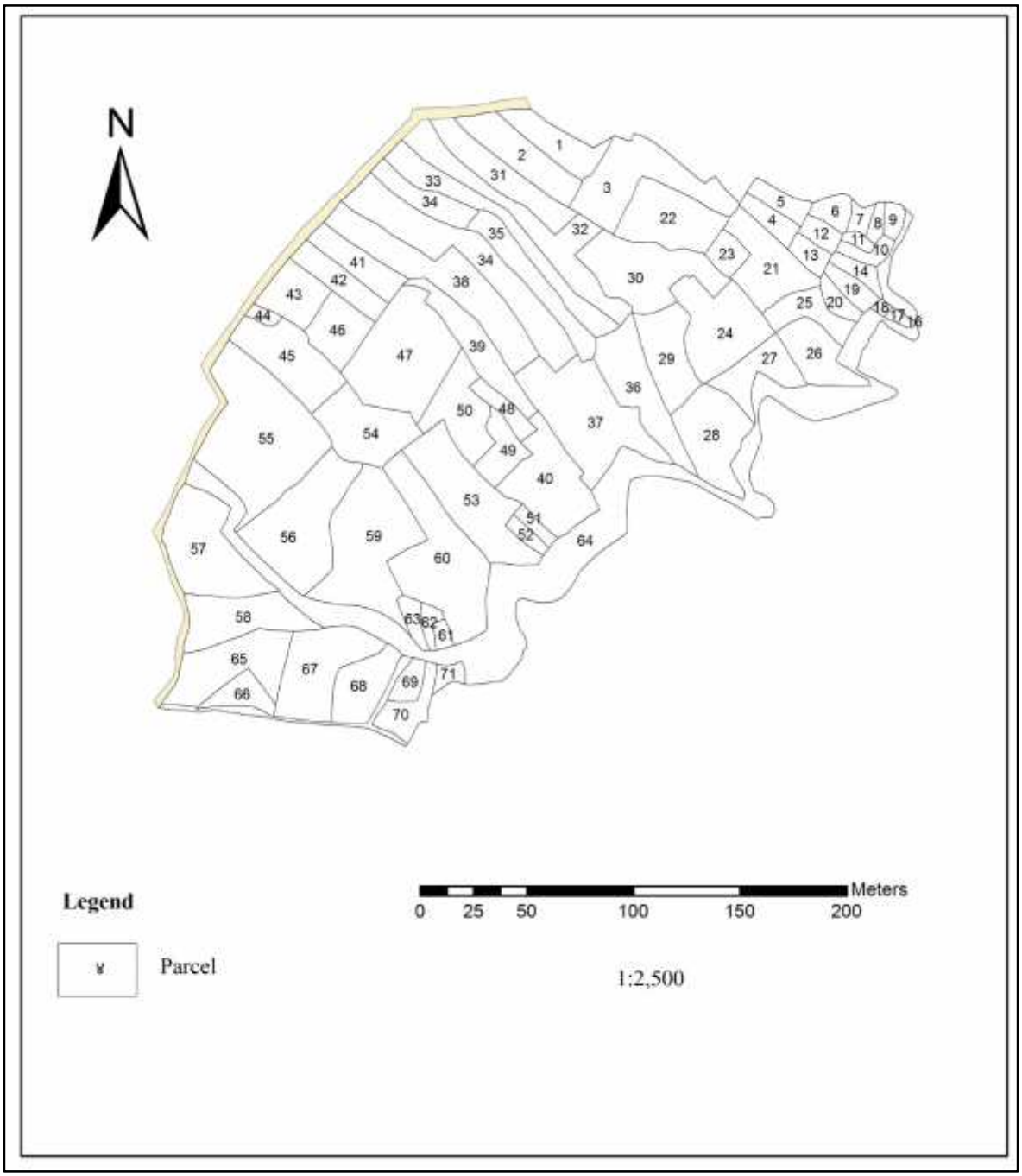


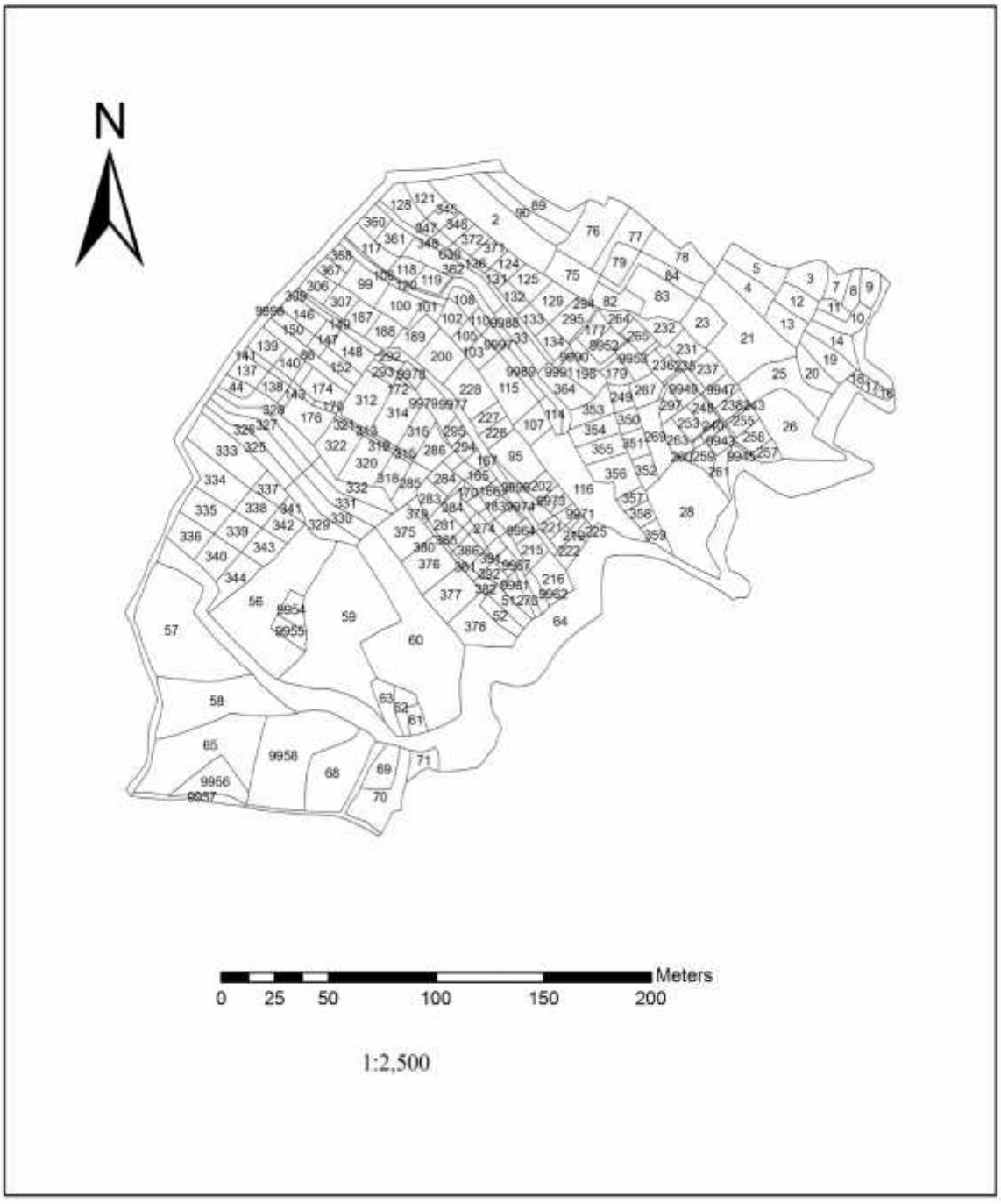
Figure 5 shows the land fragmentation trends. The rule of the urban development committee the minimum size of a parcel should be 0-2-2-0 (79.48m^2) and minimum distance of the site should be 20ft. So the maximum number of land fragmentation once occurs there is no probability to again fragmentation. So probability density function of the land fragmentation with respect to time is exponential function that's why the time series curve of 2015shows the trends to maximum land fragmentation. Figure 7shows some parcels may occur sub division. After 2015 the trend of land fragmentation may not occurmore, which saw from the figure 5. Size of the parcels intime (1965) of measurement of land shows in figure 6. In that time, only one road had remained in study area. Most of parcels have big size.

Figure 6. Parcel Divisions of Machchhegaun- 6, Taukhel, Nayabasti, Kathmandu, 1965



Source: Field book of cadastral map, Machchhegaun – 8chha and SO Kalanki

Figure 7. Parcel Division of Machchhegaun- 6, Taukhel, Nayabasti, Kathmadu, 2015



Source: Survey Office, Kalanki

5.2.4 Size of holdings by classes

Size of the land holding is the ratio of total land and land owners. If there are more land owners, it will be surely less holding size. 170 land owners had owned land in the study area, which had holding size been 380 m^2. Table 9 shows that the size of the holdings is categorized as 0-100 m^2,100-200 m^2, 200-300m^2, 300-400m^2, 400-500m^2 and greater than 500 m^2. More than 35% of parcelsare less than 100m^2.In class 400-500, only 7 parcels are remaining which hold 2.35 % of the total parcels. Rivers, roads and some native land owners are included in the more than 500 m^2 class. It is only 9.4 % of the total parcels. So, larger numbers of land owners have less than 100m^2 areas which indicate that their transaction purpose is to build residentialbuildings.

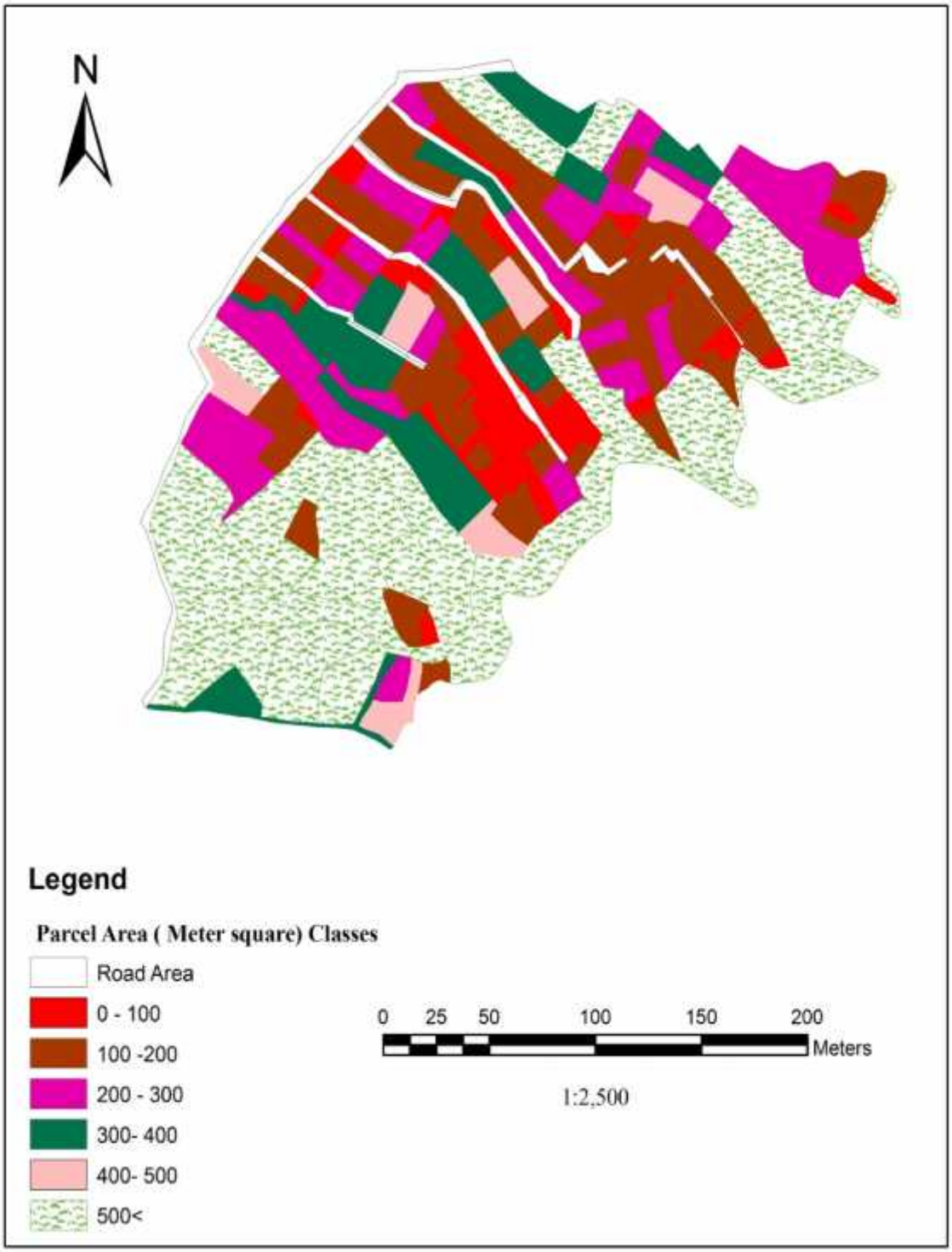
Table 9. Parcel Classes by Area

SN.	Area Class (m^2)	Parcel Count	Holding %	Av. Area	Total Area
1	0 - 100	105	35.24	50	5240
2	100 -200	96	32.21	142	13612
3	200 - 300	41	13.76	250	10238
4	300 - 400	21	7.05	345	7235
5	400 - 500	7	2.35	422	2531
6	500<	28	9.40	1428	25709
7	Total	298	100		64565

Source: DLRO, Kalanki

Table 9 is characterized in figure 8. Continuous white color denotes the access roads in that area. Less than 200 m^2area is in touch with the access of the road. It means that road access is the motivator factor for land fragmentation. According to the field survey 2015, of 30 land owners on 55 parcels, 23% parcel has size of greater than 200 m^2. People who have come from the out of valley, they have less than 200 m^2area and 1 or 2 parcel counts.

Figure 8. Parcel classes area



Source: DLRO Kalanki and Cadastral Map of Machchhegaun – 8 chha

5.3 Factors of the Land Fragmentation

Though factors of land fragmentation may vary from country to country and from region to region, some authors(Tan, 2006) tend to agree that the four main factorsrelates to fragmentation; population growth, land markets, and historical/cultural perspectives.

1. Sub- division of Parcel

Division of piece of land for various purposes is sub –division of parcel. If there is high transaction there will be high land fragmentation and vice versa. Table 10 shows that ownership of the parcel gained the different types. 6 parcel counts fragmented according to the decision of related Guthi and other remaining are related to the DLRO, Kalanki.

Table 10. Parcel According to Deed Type in Taukhel, Nayabasti

S.N.	Type	Guthi	Bakas Patra	Name Sari	Ansha Banda	Dakhil Kharej	Rajinama	Anya
1	Parcel Count	6	34	15	26	10	158	24

Note: Chhod patra, Sanmsodhan and Purano Darta are included in Anya column.

Source: DistrictLand Revenue Office, Kalanki up to April 2015

2. Decision of the Court

Land fragmentation also depend on the decision of courts so the more decision of courts for land division between two persons more will be the land fragmentation. But, there is no any decision of courts to fragment of parcels in the study area.

3.Inheritance

It is accepted that inheritance is the main factor of land fragmentation. According to the inheritance law in Nepal, fixed property is equally sub-division into among the heirs. As a result, land fragmentation hasbecome a continuous process with land holdings and land parcels getting smallerand smaller as they have been dispersed to successive generations(Mearns, 1999). According to the Land Revenue Act, (1977)Anksa Banda, Bakas Patra, Dakhil Kharez, Chhod Patra and Name Sari are the inheritance transfer process of the land ownership in Nepal. Land fragmentation is directly depends on anksa banda. More anksa band more will be land fragmentation. Table 10 shows that 26 parcel

are related to the Ansha Banda. 9 or 10 number of the parcels is holding one land owner due to the Ansha Banda (Field Survey, 2015).There is no managed that hole prime parcels divided into among their heirs. That's why; parcel is fragmented in no meaning full way.

4. Policy of the Government

Land fragmentation also depends on the policy of the government e.g. if tax rate of registration fee high, its rate will be low and fragmentation of land also be controlled. According to land revenue act, 1977, 25 % tax deducted for female to pass land their name. Most of survey showed that female landowners have increased now a day.

5. Loan Policy of Bank

Loan policy of bank also affects transaction system so does in the land fragmentation e. g. if there is easy loan process there will be high transaction otherwise there will be less transactions.

6. Land Market

Land markets play an important role inthe whole process of ownership restructuring because people wish to acquire apiece of land not only for agricultural activities, but also for other reasons such as investments and having secure current andfuture living conditions for the family.In some cases, land purchase may reduce landfragmentation when people acquire neighborhood pieces of land to expand theirholdings. Land value is related to its market.

There are many transactions where value of the land is less. So, land market contributes to the further land fragmentation of holdings. Table 10 shows that highly number (158) of the parcels is fragmented due to the Rajinama. Rajinama, a type of the Deed of registrations, is directly related to the buyer and seller not in heirs.

7. In- Migration

Out of the 273 land owners, 95 land owners have Kathmandu‘s citizenship and remaining 178 landowners are out of the valley. It means that alternate option of the residence of people effects land fragmentation.

5.4 Land Use Patterns

By using the cadastral map, field book and field verification, land use map were made. The land use map of 1965, and 2015 were given the map **(**Figure 9 and 10**)** and the areas occupied of each land use type were calculated and percentages were also calculated shown in tabular form **(**Table11),and easy to understanding the land use patterns through themaps.

Table 11. Land use patterns of 1965 and 2015

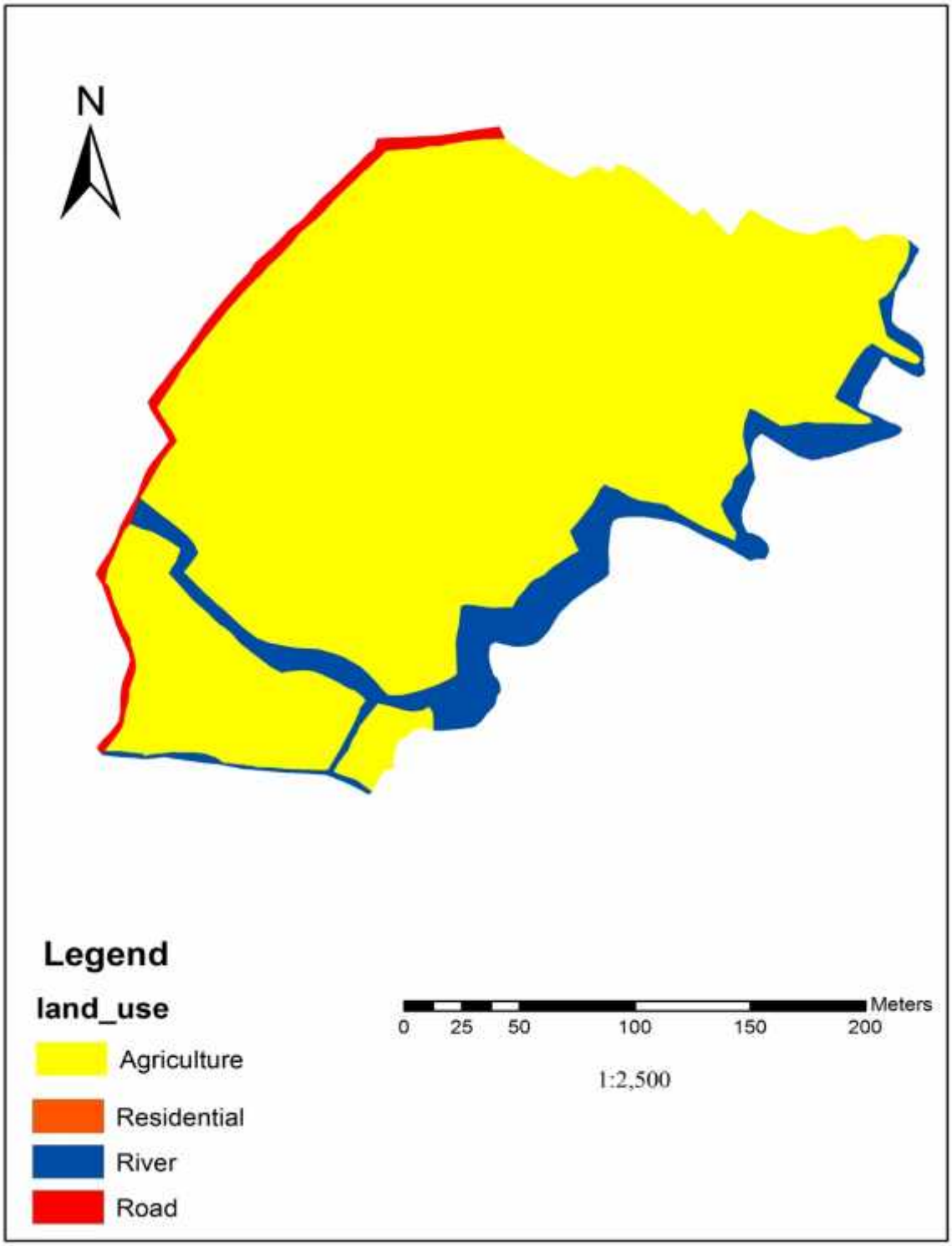
S. N.	Year	Road	%	River	%	Agriculture	%	Residential	%
1	Land use 1965	1401	2.17	6283	9.73	56880	88.10	0	0%
2	Land use 2015	3852	5.97	6283	9.73	36786	56.98	17643	27.33

Source: Land use Maps of 1965 and 2015

5.4.1 Land use of 1965

Table 8 shows that out of total 64564 m^2 of land under the study area 88.1% is under agriculture land use in 1965. It shows that high agriculture pressure on land. There was no residential area in 1965. Road was access to the land and irrigation system was held in agriculture land. The table 8 shows that road was 1401 m^2 and river was 6283 m^2 in 1965.

Figure 9. Land use map of Machchhegaun- 6,Taukhel, Nayabasti,Kathmandu, 1965

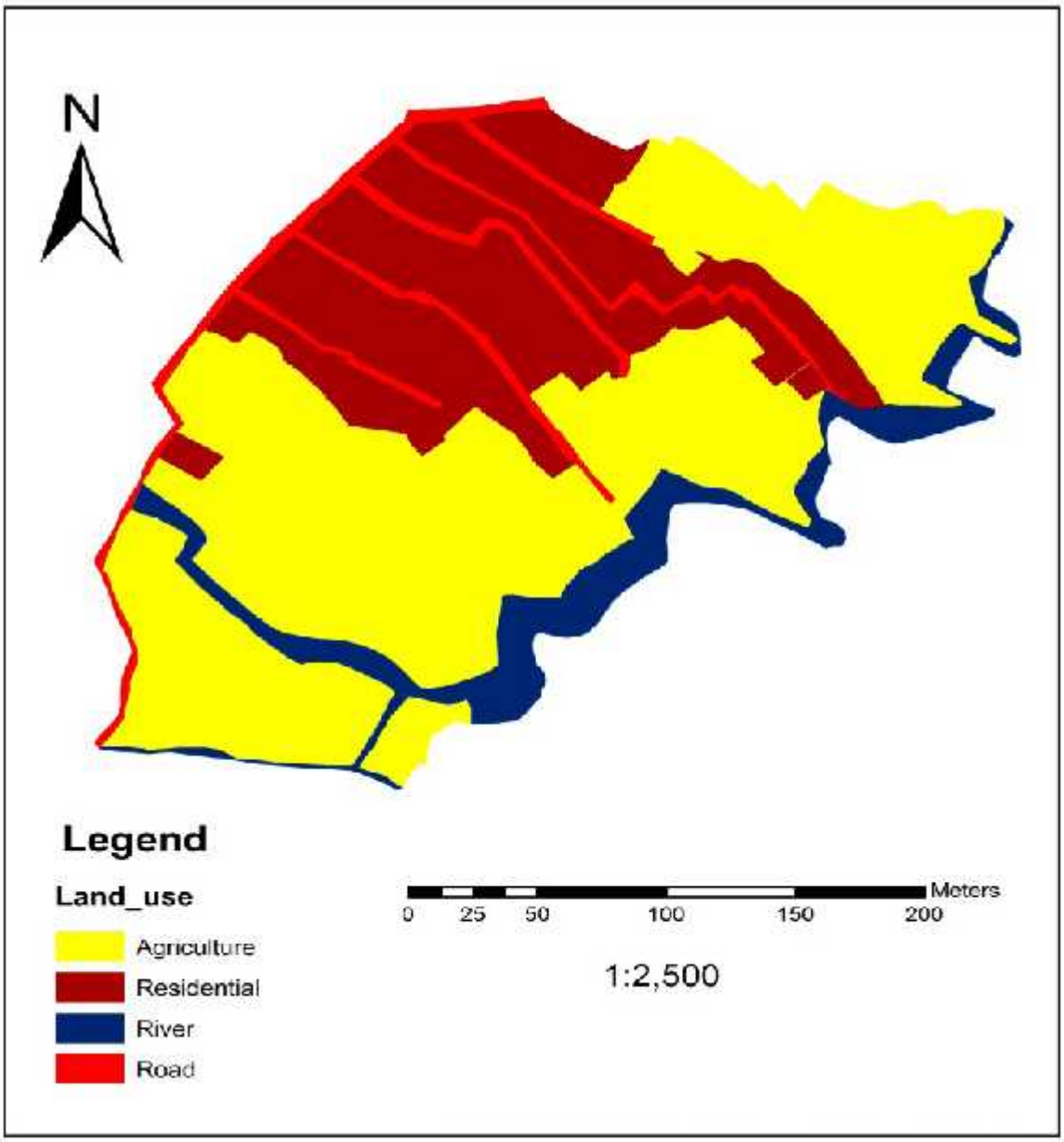


Source: Derived from field book and cadastral map of Machchhegaun- 8 chha

5.4.2 Land use of 2015

In 2015,agriculture, road, river and residential land use patterns existed. Agriculture 56.98 %, residential 27.33%, road 5.97 % and river 9.73% have been shows in the table11 in 2015. It shows that agriculture land was fragmented and changed into the residential and road.

Figure 10. Land use of Machchhegaun- 6, Taukhel, Nayabasti, Kathmandu, 2015



Source: -Cadastral map of Machchhegaun – 8 Chha and field verification 2015

5.5 Land use Change Between 1965 and 2015

Table 12 shows the land use changed in the study area during 1965 to 2015 that had been analyzed from cadastral map. The road has increased by 174.95% in 2015. The cause of increase road was the fragmentation of the parcel to own residential purpose. The cultivation land has decreased by 35.33% wherethe river area has remained same because of its public tenure. The main cause of decrease of agriculture land is growth in population and poor government management. The consequence of decrease in agriculture land impliesin the number of non-farm agriculture occupations. It shows people are rapidly settling in town area. There was no residential area in 1965. Most of all the land of the study area was agriculture area but after some years it has changed into the urban.

Table 12. Land use change between 1965 and 2015 (Area in square meter.)

S.N.	Type	1965	2015	Change %
1	Agriculture	56880	36786	-35.33
2	Road	1401	3852	174.95
3	River	6283	6283	0.00
4	Residential	0	17643	
5	Total	64564	64564	

Source: Land use map of 1965 and 2015

5.6Factors Involved in Change of Land use Patterns

The land-use and land-cover changes through physical, natural, human activities .These changes in turn affect climate at local, regional, and global scales. Many socioeconomic and political factors involved in change in land use patterns which make land use unsustainable. The two major factors namely – human factors and physical factors are directly responsible for bring change in land use patterns(Sah, 1997). There are several causes for land use change. Table 10 shows that factors to attract settle about the study area which is described below.

Table 13. Factors to Attract Settle about Study Area

S.N.	Factors	No of Land owners	Selected land owners	Liked %
1	Cheaper land value	22	30	73
2	Physical characterizes	24	30	80
3	Site Accessibility	16	30	53
4	Private Land owners	13	30	43

Source: Field Survey 2015

1. Land value and land use pattern

Socio-economic institutes determine land use patterns. Machchegaun is peri urban area of Kathmandu metropolitan area and hasquick and easy reach to the city market. Table 13 shows that 22 land owners out of 30 owners found and liked relatively cheap land here than the other area, which held 73 % of the total. According to the field survey, land value of this area is 6 to 9 lakhs per ana (31.79 m^2) which was remained 3 to 5 lakhs before 5 years ago. So, land value is a pull factors to attract the people to migrate in this from remote area.

2. Demographic Factors

There is a causal linkage between the population growth and land use changes. Increased population on the land brings about the change on the pattern of land use resources. Density of the population, occupation of the people and technological development determine extent to which physical capacity of the land is utilized (Sah,1997). Number of population is increased due to migration of people from remote area.It results into increase in Built-up area. The increase in Built-up area demands the construction of roads which decreases the cultivation area.

3. Development interventions

Machchhegaun is open and greenery area of country side. Roads are access to the all village. So, west of Kathmandu valley people are attractive to live in this area. Agriculture farm house generate employment opportunity in farms. Those pull factors attracts the people to migrate in this area from remote area. The increase in Built-up area demands the construction of roads which decreases the cultivation area. According to the field survey,2015, 100 percent land owners realized necessary to implement land use

policy. Mostly,lands owners agree that road accessibility, open area and peaceful environment are most important factors for increasing the land value and build up area in this site. Table 13 shows that 53 % land ownersagreed with site easily accessibility to change the land use patterns.

4. Physiography

Topography, soil and climate set the broad limit upon the capability of land area. It is the pull factor to migrate people into suitable topography and climate. Table 13show that 24 land owners are attract to settle in this study area due to suitable physical characteristics which is 80 % of the sampled land owners.

CHAPTER 6

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

The study analyzed spatial and non-spatial changes in land parcel and its use covering an area of 6.46 ha in Machchhegaun – 8chha by comparing parcel count and cadastral map from 1965 and 2015 complied by GIS analyses and also investigated changes in the shape of land use patches over the period. It has come under intense pressure to respond land use change, due to the high urban growth concern of their activities. Due to the population pressure, most of the agriculture land changed into urban places.

73 parcels had fragmented into 269 numbers of parcels as well as land owner increased up to the 170and average parcel holding size reduced to the 380 m^2due to the land fragmentation.People adopted new technology in farming system and crop patterns. Small parcels remained barrens and a few farmers worked in farm. So, products of the farm reduced day by day.

The change of land use is appeared in almost all part of the study area during the study interval of 1965 to 2015. The major change is focused in agriculture land. The urban (built up) land is increasing day to day. Agricultural land is decreased by urban's growth.Figure shows that, agriculture area is decreased by 35% between 1965 and 2015. There is establishment of more houses and road, which also affected the change in land use / land cover. The study shows that, the fragmentation of the parcel has increased day by day up to the minimum size where government abused sub division of it and remains constant long time. The speed of the fragmentation is highly in peri urban land for residential use. The road area is also changedduring the period of study. Land use map of 2015 shows that, the area of road is seen to be increased by nearly175 percent than that of 1965. Parcels counts also increased. The study shows that, there is major development in residential area due to the plain topographical surface and easily access to the market and national highway.There was no residential area in 1965 but after 50 years 17643 m^2 area covered by residential area in 2015.It has shown that Machchhegaun is rapidly urbanizing. It shows that the urban development is the major factor for decreasing cultivated landand population growth is the major factor for land use change.

The study shows that, the affecting factors of land fragmentation are Ansha banda, decision of court, government land policy and Bank loan policy, purpose of use and development works. Similarly, cause of land use change are economic, demographic and development factors. In other hand open and big trace topography pull people from remote area and dense urban center. But the urbanizing pattern of the study area is increasingly unplanned. There is lack of effective land use policy in this area.

6.2 Conclusion

The study has concluded that there is maximum land fragmentation between 2005 and 2011.The focus of study is change in agriculture area in to the residential and its infrastructure like as roads, open space area and so on. The residential area is increasing rapidly. It means there is need of planned settlement like as land pooling. The government should strictly implementland use policy because degradation of agriculture land is harmful for productivity and sustainable development. The agricultural area is decreasing and converting in to residential area is not so good. Therefore the land fragmentation and land use patterns are precisely related to each other's.

6.3 Recommendation

Following recommendations are derived on the basis of findings;

- The parcels size is too much small for residential purpose like this area. So rules of urban development committee should be reconstructed to meet sustainable development.
- The breadth of road in study area is narrow. So, it must be preferable to 6 m.
- Fragmentation of land is not suitable for agriculture productivity. So land consolidation has been an approach for solving the land fragmentationproblem.
- Future research need to be done in land fragmentation and land use patterns analysis for good land governance.
- Gently sloping ground, far from the river and hill, is most suitable for residential area.
- Regionalrelationship of people may be a point ofattractionto settle down a side of the city which impacts above the land fragmentation and land use patterns. So, it may be a cause to research in this topic for further researchers.

This study may be useful for making policyon suitable size of land parcel and its usein Machchegaun VDC and elsewhere other VDCs in country. Due to the limitation and characteristics of cadastral map, over the VDC should not be study, so grid sheet cadastral maps are best solution for map compilation. The major function of VDCis to control small size of parcel and suitable land use planning policy. The effective size of parcel and its use are known through trend of fragmentation and change in use. The land fragmentation trend and change in land use should be properly studied and compared in different intervals.This is very useful in forecasting suitable parcel size and land use planning policy. Although this study is well exercised, if other more physical parameters can included with it then the additional research would give the more important and precise result about the study area.

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APPENDICES

Appendix I. Questionnaire

Study on Land Fragmentation and Land use Patterns

HOUSEHOLD QUESTIONNAIRE

1. Background of Respondent

Name of the Respondent: Date:

Municipality/ VDC Name: Place:

Ward No….. Age:

Ethnicity/Caste: Male [ ]

Occupation: Female [ ]

2. House type and ownership

No. of House	Place	Storey	Ownership	Remarks

2.1 How many parcels and their size of parcels belong to you?

……..

2.2 Causes of land fragmentation?

…….

2.3 What is distance between the parcels?

a) Maximum.....b) Minimum……..

3. History of migration

Native/ in- migrant

If in-migrant® place of origin……

Year of in-migration …….

Reasons of migration (for previous place/ for current place)……

4. Land use by Parcel

Parcel No.	Type of Land	Area	Land tenure	How did you gain?	Current use

4.1 What made you like to settle in this area?

1. Physical characteristics
2. Cheaper Land Value
3. Site Accessibility
4. Private land development
5. Other (specify)

4.2 What was the condition of this land before you used?

……..

4.3 What factors have affected to change into built up area in this site?

Trends	Decrease	Increase	No change
Factors (one or more)			

5. Market access

SN	Name of market	distance	Means of access	remarks

5.1 What is the current land value of this area?

……

5.2 What was land value of this area 5 years ago?

……

5.3 Whatmade land value increase of your area?

……..

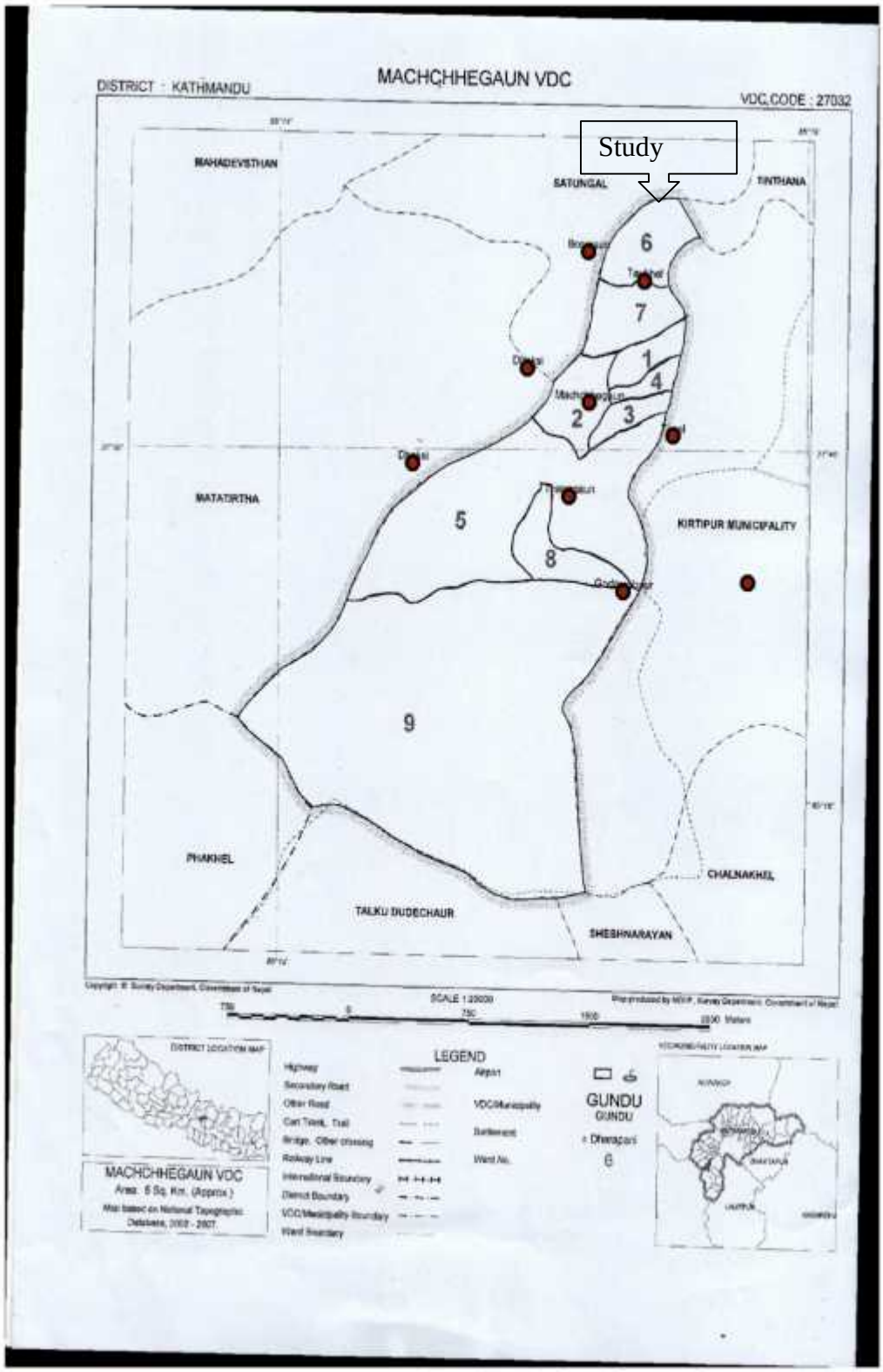
6. Do you have any idea to move out of this area and why?

……..

7. What do you think about the need of land use planning in this area?

Thank you

Appendix II. VDC map of Machchhegaun



Appendix III. Study map overlay on Google map


Image © 2016 CNES / Astrium
Google earth
Imagery Date: 5/14/2015 27°40'41.04" N 85°15'33.80" E elev 1341 m eye alt 1.83 km

Appendix IV. Some Memories of Field

Data collection in Kalanki Survey Office

Data collection on the Field

Data collection on Field

Construction Tunnel for Vegetable

People Working on Farm

Irrigation System for Vegetation cultivation

Tomato farming under Tunnel

Wheat on Farm

New built Buildings and narrow roads on the study area.

Appendix V. Landowner of Machchhegaun - 8 Chha, Nayabasti, Taukhel, Kathmandu

का स=	नाम	जिल्ला	कि.नं.	क्षेत्रफल	लिखतको प्रकार	स्वमित्व
१	सन्दिप ढकाल	चितवन	६+१२+१३+१४+१६+१७+१८+१९+२०	१३९८।९	राजिनामा	संयूक्त
२	ज्ञानेश्वर महर्जन	काठमाण्डौं	२८	७६३।१	नामसारी	संयूक्त
३	सूरेश महर्जन	काठमाण्डौं	५८+६६	११९२	बकस पत्र	संयूक्त
४	अष्ट बहादूर महर्जन	काठमाण्डौं	६२+७०	४८२।८	नामसारी	संयूक्त
५	सिता पराजूली	गूल्मी	३७२+३७४	१५९	राजिनामा	संयूक्त
६	धर्म भक्त महर्जन	काठमाण्डौं	६५+६७	२४३२	नामसारी	साझा
७	हरि राज पौडेल	लमजूङ	१०५+११०	१८४।८	राजिनामा	साझा
८	मान बहादूर माली	काठमाण्डौं	१०६+१११	४५३।१	राजिनामा	साझा
९	निर्मला श्रेष्ठ (मल्ल)	पाल्पा	१३९	२५४।४	राजिनामा	साझा
१०	कविराज खनाल	काठमाण्डौं	२५७+२६१	१९२।८	राजिनामा	साझा
११	श्री ५ को सरकार	काठमाण्डौं	१५	३८३१	छूट जग्गा दर्ता	.
१२	धनिश्वर कडेल	वागलूङ	१४१++१४९	१५१	राजिनामा	.
१३	धनिश्वर कडेल	वागलूङ	१४९+१६१	४०५।४	राजिनामा	.
१४	कमल प्रशाद नवपानिया	पाल्पा	१८०	१०७।३	राजिनामा	.
१५	नेपाल सरकार	काठमाण्डौं	३०८+३११+१३+१५+३२१+३२४	१२१।२२	राजिनामा	बाटो
१६	भिम भक्तेश्वर गुठी	काठमाण्डौं	१	३१८	निर्णय पर्चा	पूरा
१७	शम्भू प्रसाद आचार्य	काठमाण्डौं	२	९५३।९	राजिनामा	पूरा
१८	उमाकूमारी ढकाल्नी	नवलपरासी	५+१०	५३२।६	राजिनामा	पूरा
१९	इन्द्र नाथ भट्टराइ		७	१०३।३	बकस पत्र	पूरा
२०	सन्तू महर्जन	काठमाण्डौं	३०	६६७।७	पुरानो नापी	पूरा
२१	एक राज सिलवाल	धादिङ	३८	१८७६	राजिनामा	पूरा
२२	विष्ण माया मर्हजन	काठमाण्डौं	३९	८०२।९	गूठिरैतानी	पूरा

का स=	नाम	जिल्ला	कि.नं.	क्षेत्रफल	लिखतको प्रकार	स्वमित्व
					नम्बरी	
२३	केदार बहादूर बोहरा	तनहूँ	४४	७१।५४	राजिनामा	पूरा
२४	चेत नाथ उपाध्याय	काठमाण्डौं	५१+५२	२५४।६	पुरानो नापी	पूरा
२५	बूद्ध विर महर्जन	काठमाण्डौं	५५	३०९२	छूट जग्गा दर्ता	पूरा
२६	धनमाया डंगोल	काठमाण्डौं	५७	७६३।१	अंशवण्डा	पूरा
२७	अष्टमान महर्जन	काठमाण्डौं	५९	१७८१	राजिनामा	पूरा
२८	तूल्सी बहादूर महर्जन	काठमाण्डौं	६०	१८४४	हकसफी	पूरा
२९	जित बहादूर श्रेष्ठ	काठमाण्डौं	६१	९५।३९	पुरानो नापी	पूरा
३०	ज.ध.नखूलेको ।	काठमाण्डौं	६८	१३३५	पुरानो नापी	पूरा
३१	त्रिपूरेश्वर महादेव गूठी	काठमाण्डौं	७३+७४	१९०।८	निर्णय पर्चा	पूरा
३२	मन्दा जोशी	काठमाण्डौं	७५	३१८	राजिनामा	पूरा
३३	भेषराज जोशी	डोटी	७८	३६५।७	राजिनामा	पूरा
३४	नम्रता पाठक(शर्मा)	काठमाण्डौं	७९	१९०।८	बकस पत्र	पूरा
३५	भगवती थापा बानिया	काठमाण्डौं	८३	४७६।९	बकस पत्र	पूरा
३६	अनूज राज जोशी	डोटी	८४	२८६।२	राजिनामा	पूरा
३७	नारायण देवी महर्जन	काठमाण्डौं	८९	३१८	बकस पत्र	पूरा
३८	हर्ष बहादूर माली	काठमाण्डौं	९१	४७६।९	राजिनामा	पूरा
३९	बबिता गौतम के. सी.	काठमाण्डौं	९९	२४६।४	राजिनामा	पूरा
४०	मधू कोईराला (नेपाल)	स्याङजा	१००+१०१	३४५।८	राजिनामा	पूरा
४१	सिर्जना पंण्डित	प्युठान	१०२+१०८	२५४।४	राजिनामा	पूरा
४२	सिता मिश्र	धादिङ	११३	१२७२	राजिनामा	पूरा
४३	बिन्दा कोईराला	धादिङ	११७+१२०	२१४।८	राजिनामा	पूरा
४४	प्रेम नाथ तिवारी	धादिङ	११८	११९।२	बकस पत्र	पूरा

का स=	नाम	जिल्ला	कि.नं.	क्षेत्रफल	लिखतको प्रकार	स्वमित्व
४५	राम लामिछाने	धादिङ	११९	११९।२	राजिनामा	पूरा
४६	सपना कूमारी सूबेदी (पौडेल)	सप्तरी	१२१+१२८	३८९।५	राजिनामा	पूरा
४७	सरोज नेपाल	काठमाण्डौं	१२४+१३१	२०६।७	राजिनामा	पूरा
४८	निर्मला श्रेष्ठ (मल्ल)	प्युठान	१२५+१३२	२४६।३९	राजिनामा	पूरा
४९	सिर्जना घिमिरे (नेपाल)	काठमाण्डौं	१२६+१३३	३१२	राजिनामा	पूरा
५०	वीरेन्द्र राज पराजूली	लमजूङ	१३४	११९।२	राजिनामा	पूरा
५१	गणेश बहादूर वोहरा	रुपन्देही	१३७	१६६।९	राजिनामा	पूरा
५२	निर्मला सूवेदी (सापकोटा)	काठमाण्डौं	१४०+१४२	१५९	राजिनामा	पूरा
५३	मनोजकूमार शाह	सिरहा	१४७+ १५१	१२७।२	राजिनामा	पूरा
५४	धनिश्वर कडेल	वागलूङ	१४८+१५२ १६८+१८२+९५ +९८	१२९७।६	राजिनामा	पूरा
५५	कल्पना श्रेष्ठ	धादिङ	१५४+ १७२	९५।३९	राजिनामा	पूरा
५६	ऋषेश्वर अर्याल	कंचनपूर	१५६	९५।३९	राजिनामा	पूरा
५७	कृष्ण प्रशाद भट्ट	काठमाण्डौं	१५८+१६५	९५।४	राजिनामा	पूरा
५८	वीरेन्द्र डंगोल	काठमाण्डौं	१६०	२३।८५	बकस पत्र	पूरा
५९	विश्व विजय आचार्य	धादिङ	१६६+ १५९+१७०	१२७।२	राजिनामा	पूरा
६०	कृष्ण प्रशाद भट्ट	काठमाण्डौं	१६९	३१।८	राजिनामा	पूरा
६१	विना रेग्मी अधिकारी	काठमाण्डौं	१७४	२०४।७	राजिनामा	पूरा
६२	धनिश्वर कडेल	वागलूङ	१७५+१८६	२१८।६	राजिनामा	पूरा
६३	रीता नेपाल(घिमिरे)	काठमाण्डौं	१७८	३०२।१	राजिनामा	पूरा
६४	देबेन्द्र गौतम	चितवन	१७९+	११९।२	राजिनामा	पूरा
६५	मिना चोखल क्षेत्री	नवलपरासी	१८१+१८३ +१८५	९५।३५	राजिनामा	पूरा
६६	धनिश्वर कडेल	काठमाण्डौं	१८४	५६०।४	राजिनामा	पूरा
६७	मनू कूमारी गाहा	पाल्पा	१९२	१८६।८	राजिनामा	पूरा

का स=	नाम	जिल्ला	कि.नं.	क्षेत्रफल	लिखतको प्रकार	स्वमित्व
६८	डिल्लीराम थारु	नवलपरासी	१९३+१९६	१०७।३	राजिनामा	पूरा
६९	करुणा निधि कोइराला	गोरखा	२००	३१८	राजिनामा	पूरा
७०	सरोज खनाल	काठमाण्डौं	२०२+२०४	१९०।८	राजिनामा	पूरा
७१	कविराज अर्याल	गूल्मी	२०७+२०९	१११।३	राजिनामा	पूरा
७२	प्रकाश अधिकारी	धादिङ	२११+२१३+२०३	१२७।१५	राजिनामा	पूरा
७३	नवराज श्रेष्ठ	नवलपरासी	२१६+२१८	३३९।८	राजिनामा	पूरा
७४	सूलोचना बनिया महर्जन	सँखूवासभा	२१९+२२३	११३।३	राजिनामा	पूरा
७५	चूडामणि नेपाल	नूवाकोट	२२१+२२४	१२९।२	राजिनामा	पूरा
७६	गीता पौडेल अधिकारी	काठमाण्डौं	२२५	३९।७५	राजिनामा	पूरा
७७	जनार्दन अधिकारी	पाल्पा	२३२	१७४।९	राजिनामा	पूरा
७८	बद्री सिग्देल	वर्दिया	२३४	२२२।६	राजिनामा	पूरा
७९	विष्णू कूमारी राना	स्याङजा	२३७	१५९	राजिनामा	पूरा
८०	लिला बराल	चितवन	२३८	११७।३	राजिनामा	पूरा
८१	कमला पोखेल	दाङ	२४०	४७।६९	राजिनामा	पूरा
८२	जानूका शर्मा	धादिङ	२४१	१२७।२	राजिनामा	पूरा
८३	देवी प्रसाद शर्मा गौतम	पांचथर	२४२+ २५६	१२६।९	राजिनामा	पूरा
८४	गोमा खनाल	गोरखा	२४८	११७।३	राजिनामा	पूरा
८५	शान्ती खत्री	अर्घाखांची	२५०	१४३।१	राजिनामा	पूरा
८६	पूरषोत्तम तिमल्सीना	धादिङ	२५३	११९।२	राजिनामा	पूरा
८७	गोपीनाथ अधिकारी	काठमाण्डौं	२५५	१४३।१	राजिनामा	पूरा
८८	सरला थापा के.सी.	गोरखा	२५९ +२६२	१२७।२	राजिनामा	पूरा
८९	चन्द्रकला पाण्डे	रुपन्देही	२६०	१५।९	राजिनामा	पूरा
९०	शम्भू प्रसाद लोहनी	धादिङ	२६४	९५।३९	राजिनामा	पूरा
९१	अन्जू गूरुङ्ग	कास्की	२६७	१५९	राजिनामा	पूरा
९२	सीमा गौतम	वर्दिया	२७०	१११।३	राजिनामा	पूरा
९३	विष्णूभक्त डंगोल	काठमाण्डौं	२७५+२८१	१६७	अंशवण्डा	पूरा
९४	राजकाजी डंगोल	काठमाण्डौं	२८३+२८४	२७८।२	बकस पत्र	पूरा
९५	रामभक्त डंगोल	काठमाण्डौं	२८५+३८५	१८६।८	अंशवण्डा	पूरा

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९६	वीरेन्द्र डंगोल	काठमाण्डौं	२८६	१५७	बकस पत्र	पूरा
९७	धर्मभक्त डंगोल	काठमाण्डौं	२८७	१४९	अंशवण्डा	पूरा
९८	विष्णूभक्त डंगोल	काठमाण्डौं	२८९	३१८	अंशवण्डा	पूरा
९९	कृष्ण बहादूर श्रेष्ठ	धादिङ	३०६	१५१	राजिनामा	पूरा
१००	मन नारायण श्रेष्ठ	धादिङ	३०७	१५१	राजिनामा	पूरा
१०१	श्यामपूली महर्जन	काठमाण्डौं	३४९	११९।२	अंशवण्डा	पूरा
१०२	चन्द्र वहादूर महर्जन	काठमाण्डौं	३५०	११९।२	अंशवण्डा	पूरा
१०३	जगत वहादूर महर्जन	काठमाण्डौं	३५१	११९।२	अंशवण्डा	पूरा
१०४	धर्म देवी महर्जन	काठमाण्डौं	३५२	११९।२	नामसारी	पूरा
१०५	यसोदा खनाल	काठमाण्डौं	३६५	९५।३९	राजिनामा	पूरा
१०६	चन्द्रकला पाण्डे	रुपन्देही	३६६	१८२।८	राजिनामा	पूरा
१०७	सत्यवती पाठक	चितवन	३७१+३७३	१५९	राजिनामा	पूरा
१०८	राजकाजी डंगोल	काठमाण्डौं	३८३	२३।८५	बकस पत्र	पूरा
१०९	विष्णूभक्त डंगोल	काठमाण्डौं	३८४	८७।४४	बकस पत्र	पूरा
११०	रामभक्त डंगोल	काठमाण्डौं	३८६+३८८	१४३	बकस पत्र	पूरा
१११	विष्णूभक्त डंगोल	काठमाण्डौं	३८७+३८९	३३।८	बकस पत्र	पूरा
११२	रामभक्त डंगोल	काठमाण्डौं	३९०+३९१	११३+२८	बकस पत्र	पूरा
११३	धर्मभक्त डंगोल	काठमाण्डौं	३९२+३९६	१५७	बकस पत्र	पूरा
११४	धर्मभक्त डंगोल	काठमाण्डौं	३९४+३९६	८७।४४	बकस पत्र	पूरा
११५	रामभक्त डंगोल	काठमाण्डौं	३९५+ १५३	८७।४४	बकस पत्र	पूरा
११६	देबी माया पाठक	चितवन	५२२	११९।२	राजिनामा	पूरा
११७	नाती मर्हजन	काठमाण्डौं	६३८	६८३।६	राजिनामा	पूरा
११८	त्रिपूरेश्वर महादेव गूठी	काठमाण्डौं	७७४+७७५	१५९	निर्णय पर्चा	पूरा
११९	सकू राम महर्जन	काठमाण्डौं	४+८	२९४।१	नामसारी	एकलौटी
१२०	हेरा वहादूर महर्जन	काठमाण्डौं	८+२१+२३ +२५+ २६	२१०७	नामसारी	एकलौटी
१२१	बूद्धि वहादूर महर्जन	काठमाण्डौं	६३+६९	३८१।६	राजिनामा	एकलौटी
१२२	धर्म भत्त डंगोल	काठमाण्डौं	८६	२८६।२	छोड पत्र	एकलौटी
१२३	मान बहादूर माली	काठमाण्डौं	११४	१०१।४	अंशवण्डा	एकलौटी
१२४	राजेश पन्थी	कपिलवस्तू	१३८+ १४३	१५८।५	राजिनामा	एकलौटी

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१२५	मनीषा अर्याल	काठमाण्डौं	१५७+ १६४	९५।३८	राजिनामा	एकलौटी
१२६	विनोद पूरी	काठमाण्डौं	१७६	२७६।२	बकस पत्र	एकलौटी
१२७	अशोक खनाल	तनहूँ	२१५+ 217	१७४।८	बकस पत्र	एकलौटी
१२८	गीता पौडेल अधिकारी	काठमाण्डौं	२२२	११९।२	राजिनामा	एकलौटी
१२९	खगेश्वर पाठक	पाल्पा	२२८	५२२।७	राजिनामा	एकलौटी
१३०	कञ्चन कूमारी दहाल	सिन्धूली	२३१	१५७	राजिनामा	एकलौटी
१३१	कमला पोखेल	दाङ	२४४	९५।३९	राजिनामा	एकलौटी
१३२	चोला राज पाण्डे	गोरखा	२५२	१५१	बकस पत्र	एकलौटी
१३३	धर्मभक्त डंगोल	काठमाण्डौं	२७२+२७६+ ३१४+५७६	८८४।३४	छोड पत्र	एकलौटी
१३४	राम भक्त डंगोल	काठमाण्डौं	२९३+ ३१२	४०३।४	छोड पत्र	एकलौटी
१३५	नवराज अर्याल	धादिङ	२९६	१२७।२	राजिनामा	एकलौटी
१३६	सिता मिश्र	धादिङ	३०९	१९०।८	राजिनामा	एकलौटी
१३७	विष्णू भक्त डंगोल	काठमाण्डौं	३१६+३१८	३०२	संसोधन	एकलौटी
१३८	राजेन्द्र डंगोल	काठमाण्डौं	३२२	२९६।१	संसोधन	एकलौटी
१३९	नविना पौडेल	सिन्धूली	३२३	१०३।३	राजिनामा	एकलौटी
१४०	गूण्डा महर्जन	काठमाण्डौं	३२५+३२९+ ३३४	९३०	दा.खा.	एकलौटी
१४१	योगेस डंगोल	काठमाण्डौं	३२६+३३३	७९५	बकस पत्र	एकलौटी
१४२	शेर बहादूर महर्जन	काठमाण्डौं	३२७+३३१+ ३३५	८३४।७	दा.खा.	एकलौटी
१४३	हरि कृष्ण महर्जन	काठमाण्डौं	३२८+३३६+ ३४०	७४७।२	दा.खा.	एकलौटी
१४४	योगेस डंगोल	काठमाण्डौं	३३०+३३७+ ३४१	४६१	बकस पत्र	एकलौटी
१४५	हरि कृष्ण महर्जन	काठमाण्डौं	३३२+३४४	५०८।७	दा.खा.	एकलौटी
१४६	गूण्डा महर्जन	काठमाण्डौं	३३८+३४२	३२५।९	दा.खा.	एकलौटी
१४७	शेर बहादूर महर्जन	काठमाण्डौं	३३९+३४३	४२१।३	दा.खा.	एकलौटी
१४८	सावित्रा मरासीनी	गूल्मी	३४५+३४७	१५८।८	राजिनामा	एकलौटी
१४९	संझना ज्ञवाली पन्थी	रुपन्देही	३४६	१५९	।	एकलौटी

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१५०	श्यामपूली महर्जन	काठमाण्डौं	३५३	१५९	अंशवण्डा	एकलौटी
१५१	चन्द्र वहादूर महर्जन	काठमाण्डौं	३५४	१५९	अंशवण्डा	एकलौटी
१५२	जगत वहादूर महर्जन	काठमाण्डौं	३५५	१५९	अंशवण्डा	एकलौटी
१५३	धर्म देवी महर्जन	काठमाण्डौं	३५६	२५४।४	नामसारी	एकलौटी
१५४	बसलाल श्रेष्ठ	काभ्रेपलान्चोक	३५७	९५।३९	राजिनामा	एकलौटी
१५५	संगिता भण्डारी	पर्सा	३५८	९५।३९	राजिनामा	एकलौटी
१५६	रामू आचार्य	पर्वत	३५९	९५।३९	राजिनामा	एकलौटी
१५७	लक्ष्मण महर्जन	काठमाण्डौं	३६०	१३५।१	अंशवण्डा	एकलौटी
१५८	रामचन्द्र महर्जन	काठमाण्डौं	३६१	१७०।९	अंशवण्डा	एकलौटी
१५९	बाबूकाजी महर्जन	काठमाण्डौं	३६२	३६१।७	अंशवण्डा	एकलौटी
१६०	उमा भेटूवाल	नूवाकोट	३६४	२२२।६	राजिनामा	एकलौटी
१६१	मान बहादूर माली	काठमाण्डौं	३६७+३६९	४८६।९	अंशवण्डा	एकलौटी
१६२	राम प्रसाद खनाल	अर्घाखांची	३६८	९५।३९	राजिनामा	एकलौटी
१६३	पान वहादूर माली	काठमाण्डौं	३७०	४८६।९	राजिनामा	एकलौटी
१६४	रमी पन्त (बोगटी)	लमजूङ	३९७	९५।३९	राजिनामा	एकलौटी
१६५	कोपिला पन्त	लमजूङ	३९८	९५।३९	राजिनामा	एकलौटी
१६६	रामभक्त डंगोल	काठमाण्डौं	५७५+५८१	४१९।३	अंशवण्डा	एकलौटी
१६७	राजकाजी डंगोल	काठमाण्डौं	५७७+५७९	४०५।४	अंशवण्डा	एकलौटी
१६८	विष्णूभक्त डंगोल	काठमाण्डौं	५७८+५८०	४१३।९	अंशवण्डा	एकलौटी