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**URBAN EXPANSION IN GREEN ZONES OF URBAN EDGES: A CASE OF
GIRI BANDU TEA ESTATE, BIRTAMODE JHAPA**

By:

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DECLARATION

I hereby declare that the thesis entitled "**Urban Expansion in Green Zones of Urban Edges: A Case of Giri-Bandu Tea Estate**", submitted to the Department of Architecture in partial fulfillment of the requirement for the degree of Master of Science in Urban Planning, is a record of an original work done under the guidance of Dr. Sudha Shrestha, Institute of Engineering, Pulchowk Campus. Except for the material consulted, which has been properly referenced and acknowledged, all of the work in this thesis was done by me.



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ABSTRACT

Urban expansion at the peripheries of growing municipalities often leads to significant transformations in land use and socio-economic structures. This study explores the impact of urban expansion on green landscapes, focusing on the Giri Bandhu Tea Estate at the edges of Birtamode Municipality, Nepal. Historically, this area was entirely covered with tea plantations, but since 2061 B.S., it has witnessed increasing settlement development, driven primarily by urban growth pressures. This research examines the factors contributing to the decline of estate land and evaluates the responses of key stakeholders, including estate owners, local residents, urban planners, and policymakers.

The study employs a mixed-methods approach, combining spatial analysis, site observations, stakeholder interviews, and policy reviews to assess land-use changes and the socio-economic implications of urban expansion. Findings indicate that major drivers of this expansion include population growth, rising land prices, real estate speculation, and infrastructure development, particularly road networks facilitating access to urban centers. The study also highlights how unplanned urbanization threatens agricultural productivity, ecological balance, and the socio-economic stability of tea estate workers.

The research concludes that urban expansion into green zones at municipal edges is not merely a densification process but an outward growth pattern requiring strategic land-use planning. It underscores the need for sustainable urban development policies that balance economic growth with environmental conservation. Recommendations include improved land-use regulations, stakeholder-inclusive urban planning, and the promotion of alternative economic activities that preserve ecological assets while accommodating urban expansion. This study contributes to the broader discourse on peri-urban development and offers valuable insights for policymakers and urban planners in similar contexts.

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1 CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Urban growth leads to urban expansion since urban areas require more land. Both increasing population density and urban sprawl can support this growth. As the population of cities increases, they extend outward, increasing their size and transforming additional land for urban purposes. Research covering 30 cities from every continent revealed that their land areas grew by 16 times or more from 1800 to 2014 (Angel, 2023). Urban areas handle population increases by either intensifying their current boundaries or spreading into surrounding rural areas. In recent years, the majority of population growth has been addressed through the outward expansion of cities. In the Global South, where the bulk of urban population growth currently occurs, this expansion tends to be chaotic and unplanned, leading to cities that are less efficient, less inclusive, less resilient, and less sustainable.

The process of urbanization, along with the accompanying increase in urban populations and the spread of urban areas, began to rapidly increase at the end of the 18th century and has continued largely unabated throughout the 19th and 20th centuries. In Nepal, prompt urbanization took place in the last two decades due to population enlargement. The dynamics of land use change systems of Nepalese cities and village is driven by complex political, social and economic systems (Rimal, 2013). Jhapa district has been experiencing continuous population growth and socioeconomic changes. The impacts of land use changes resulting from swift population growth and urban development are evident in both urban centers and surrounding areas. A variety of immediate and fundamental factors contribute to the changes in land use and land cover in the urban, peri-urban, and rural areas of the Jhapa district. Key influences include the development of physical infrastructure, population increase, socio-cultural factors, access to public services, economic prospects, migration patterns, the land market, the effects of globalization, the political environment, government plans and policies, and tourism activities, all of which have significantly driven people away from their original rural

communities in neighboring districts and attracted them to the eastern region of Jhapa.. It has greatly impacted how land and natural resources are used in this region, leading to changes in land use and cover (Bakrania, 2015). The primary demographic factors impacting land use and the consumption of natural resources in this area are population growth, migration, and rising population density, leading to changes in land use and cover. The surge in population density over the years is attributable to both natural growth and immigration.

The main objective of this study was to investigate the factors driving urban growth that are contributing to the decline of green zone (Estate Land) at the edge of Birtamod municipality and to analyze how different stakeholders (estate owner, local residents, planners and authorities) perceive and respond to these urban- driven changes.

1.2 STUDY AREA: GIRI BANDU TEA ESTATE BIRTAMODE, JHAPA

The present urbanization trend in eastern part of terai region has pressurized on the development of the fringe areas in haphazard manner. Recently the fringe area are developing in a fast pace without any defined pattern. The result of this type of unplanned conversion of fringe land has far reaching consequences on the urban environment as well. According to the Agriculture Development Office, Jhapa, located in the eastern Terai region of Nepal, has seen a loss of 1,500 hectares of productive agricultural land due to development, and the pace of land plotting has increased threefold in recent years (Republica, 2017). Once known for its abundant paddy production and exports to India, the region now faces a significant decline in cultivable land and rice output. Four decades ago, the paddy harvest exceeded national requirements, with the surplus exported to India. However, rapid land plotting has drastically reduced arable land, leaving rice production insufficient to meet even six months of local demand. According to official estimates, 1,000 hectares of land are now unsuitable for cultivation, although the true number might be significantly greater.

Of the 99,716 hectares of arable land in the region, more than 1,500 hectares have been lost to plotting. Housing developments on one bigha of land negatively impact 15-20

bighas surrounding (Timsina, August 2020). Cities such as Birtamod, Damak, Mechinagar, Bhadrapur, Surunga, Budhabare, and Charali have experienced the fastest growth in real estate development, while rural areas such as Sani-Arjun, Bhahun Dangi, and Jyamir Gadhi are also experiencing increased land plotting. Highways are a prime target for land brokers, who often exploit fake development plans, such as a fabricated five-star hotel project in Birtamod, to drive demand for plots.

Despite government warnings and land utilization policies, most land plotting is conducted without permits or adherence to guidelines. According to Santosh Ghimire, executive officer at Bhadrapur Municipality, municipalities rarely receive applications for plotting permissions, leading to rampant unauthorized land trading.

Birtamod Municipality is situated in the Terai region of Nepal, at an altitude of roughly 163 meters above sea level. The majority of the town is located on flat land. This municipality resides in Jhapa district, part of Province 1. It was formed in 2073 BS through the amalgamation of Garamani VDC and the former Birtamod Municipality. Birtamod is bordered by Mechi Municipality to the east, Kankai Municipality to the west, Arjundhara Municipality to the north, and Haldibari and Barhadshi Rural Municipality to the south.

History

Originally governed by the Anarmani Village Development Committee, the town transitioned into a municipality in May 2014. In 2017, it combined with Charpane VDC and later merged with Garamani VDC. Birtamod was initially part of a vast forest area. Due to the prevalence of mosquitoes and the risk of malaria, it was sparsely populated. Eventually, the forests were cleared to use the rich lands for agriculture. Gradually, individuals from the hills began to relocate to Birtamod, alongside Nepalese who returned from the Indian states of Assam and West Bengal. The local ethnic communities, including Rajbanshi and Dhimal, are the original inhabitants of Birtamod and Jhapa as a whole. The opening of the East West Highway significantly contributed to Birtamod's development, positioning it as a central hub for commercial activities within the district. Birtamod experienced further growth during the Maoist insurgency when trade and banking

activities for the entire Jhapa district were centralized there. Several prominent tea estates and processing facilities are situated just east of Birtamod, which will be the focus of my case study. Notable establishments include Giri Bandhu Tea Estate (गिरी बन्धु चिया बगान), New Giri Bandhu and Sons Tea Estate, and Buttabari Tea Processing. In addition to agriculture, industrial activities are on the rise, with several cement factories operating to meet local cement demands at a small-scale production level.

1.3 PROBLEM STATEMENT

As per the 2021 National Population and Housing Census (NPHC) of Nepal, the distribution of the population by region is detailed as follows:

- Terai: 53.66% of the population
- Hilly areas: 40.25% of the population
- Mountainous regions: 6.09% of the population

Firstly, the population density in the Terai is 460 people per square kilometer, highlighting it as the most densely populated region in Nepal. If the same ratio of urbanization keeps on going, the Terai area which carries more than half of the total population will be declared dense urban in the near future. Several places have been declaring urban on the basis of Local Self-government Act 1999 which in itself is unscientific since it hasn't been able to modify itself regarding the norms and standards.

Secondly, the distribution of cultivated and arable land in Nepal varies with the Terai region having the largest share of cultivable land:

- Terai: 34% of Nepal's cultivable land is in the Terai region
- Mountain and hill region: 48% of Nepal's cultivable land is in the mountain and hill region

So from above, the key problem identified in this research is the challenge of accommodating the high population density (53.66%) in the Terai region, which already serves as a key zone for arable cultivation land, accounting for 34% of Nepal's total cultivable land (CBS). This pressure has contributed to an unchecked rise in urban land

prices in recent years, with no specific measures in place to stabilize these prices. Also, between 2011 and 2021, both cultivated land and forest cover decreased significantly. Cultivated land dropped from 403.31 sq. km (67.55%) to 355.60 sq. km (59.56%), while forest area declined from 95.69 sq. km (16.03%) to 84.21 sq. km (14.11%). Water bodies saw a slight decrease from 22.77 sq. km (3.81%) to 22.38 sq. km, and sandy areas reduced dramatically from 20.41 sq. km (3.42%) to 3.01 sq. km (R. H. Timilsina, 2019).

Additionally, the loss of green landscape at urban edges due to plotting is a significant concern, as it replaces vital ecosystems and cultivable areas with fragmented urban settlements. This trend not only reduces agricultural productivity and disrupts ecological balance but also accelerates unplanned urban sprawl. As green spaces are converted into plots for housing and commercial development, the environmental, social, and economic benefits they provide—such as climate regulation, biodiversity, and food security—are increasingly compromised, highlighting the need for sustainable urban planning and land-use policies.

1.4 RESEARCH GAP

A significant amount of research has been carried out on the impacts of urbanization on agricultural land and forest areas, with government acts, policies, and regulations guiding these aspects. However, limited attention has been given to the loss of green landscapes at urban edges, such as tea estates, which hold both ecological and economic importance. Tea estates, like the Giri-Bandu Tea Estate, not only provide livelihoods but also contribute to biodiversity, carbon sequestration, and microclimate regulation. Despite these critical roles, the effects of urban expansion on such landscapes remain significantly understudied.

This lack of research hinders the understanding of how urbanization-driven changes—such as plotting, settlement growth, and infrastructure development—affect the sustainability of tea estates and other green spaces at urban edges. Moreover, this gap limits the development of effective policies and strategies to balance urban growth with the conservation of these vital landscapes.

Recognizing this gap, my research aims to bridge it by providing insights into the dynamics of urban expansion in fringe areas and also by analyzing urbanization-driven changes in the Giri Bandhu Tea Estate, providing a comprehensive understanding of how urban sprawl affects green spaces in the urban edges. The study will also explore stakeholder responses and propose strategies to mitigate adverse effects, ensuring a balanced approach to urban development and green space preservation.

1.5 RESEARCH QUESTION

“WHAT ARE THE CONTRIBUTING FACTORS (DRIVERS) OF URBAN EXPANSION IN STUDY AREA & HOW DO STAKEHOLDERS OF ESTATE AREA RESPOND TO THESE URBAN-DRIVEN CHANGES.”

The research questions are addressed by taking the case of Giri Bandu tea estate, a green zone located at the edge of Birtamod municipality of jhapa district.

1.6 RESEARCH OBJECTIVES

1. To explore drivers of urban expansion that are contributing to the decline of green zone (Estate Land) at the edge of Birtamod municipality.
2. To analyze how different stakeholders (estate owner, local residents, planners and authorities) perceive and respond to these urban- driven changes.

1.7 RATIONAL OF RESEARCH

The present urbanization trend in terai region has pressurized on the development of the fringe areas in haphazard manner. Recently the fringe areas are developing in a fast pace without any defined pattern. The result of this type of unplanned conversion of fringe land has far reaching consequences on the urban environment as well. Hence, if not properly planned then all the fringe areas will develop in the disorganized way which in the later time will be converted into unhealthy city. To develop the city and to stop the

possible hazards in the later time, the urban fringe areas have to be managed in a proper way to make a planned city for future.

Even there are different plans and policies for the development of municipality, there had not been serious study on Fringe area management. The fringe area has grown in an uncoordinated and unguided process leading to unplanned urban sprawl causing adverse effect on the whole environment. So, this research will be helpful in reviewing the policies and efficient measures required for making the planned city. It will give the clear picture of physical development trend of urban fringe in terms of change in land use and expansion of built up areas. It will also indicate the significant factors influencing these changes. Thus this research is expected to add more understanding on the physical aspects of urban fringe development and institutional role of the government in proper management of fringe.

1.7.1 Need

Urban expansion into green zones at urban edges has become a pressing issue due to rapid urbanization and population growth. Lack of effective policies and poor monitoring mechanisms has allowed uncontrolled development to destroy these areas. Research is essential to understand the causes, patterns, and scale of this issue of such encroachments, helping stakeholders to address this challenge effectively.

Furthermore, Green zones, often treated as expendable resources, are converted into residential, industrial, or commercial spaces, ignoring their long-term ecological and social significance. Thus, there is a critical need for research to assess the environmental, social, and economic impacts of this expansion, offering a foundation for informed decision-making. To provide guidance for the creation of policies, and assist Birtamod municipality in achieving a healthy balance between environmental preservation and urban development by protecting green zones on government-owned properties, like Giri Bandu Tea Estate land.

1.7.2 Importance

Studying how green zones like Giri Bandu Tea Estate at urban edges are declining is important for sustainable urban development and protecting the environment. Research helps find ways to guide policymakers in formulating effective zoning regulations, creating urban growth boundaries, and protecting these vital national assets. The loss of key green areas, which are national assets, can lead to multiple negative impacts. To address this, we should encourage positive change through practical measures, aligned policies, and comprehensive urban planning that values national assets, including environmental protection, community health, tourism, and economic growth.

1.8 SCOPE AND LIMITATIONS

Firstly, this study focuses on green landscapes found only in urban edges, specially the tea plantation area situated at the edge of Birtamod municipality, jhapa. Other type of green landscape available in urban edges, such as forest areas, agricultural lands, parks and open spaces, grasslands, Wetlands and marshes, green belts etc. are not considered in this research. Additionally, the geographical scope is limited to a specific urban edge area (e.g., Giri-Bandhu Tea Estate) of Birtamod municipality, which may not fully represent urbanization and urban expansion trends in other regions, reducing the generalizability of the results.

Secondly, this study focuses on the sold 71 bighas (out of 344 bighas) of Giri-Bandu Tea Estate land, where urban expansion and settlement had already began in 2061 B.S (2004 A.D). But it strongly excludes the current political controversy and Giri Bandus proposal to the government, which involves plotting the remaining 200 biga of Giri Bandu land in exchange with same amount of land in different place.

The research will capture a snapshot of the current situation, and long-term impacts or future trends of urbanization and urban expansion will not be fully considered. The complexity of interconnecting social, economic, and environmental factors may limit the study's ability to fully explore all dimensions of urbanization, and the subjective nature of stakeholder responses could affect the objectivity of the findings.

The study will focus on green space utilization, other significant aspects of urbanization, such as infrastructure or economic growth, may not be explored in detail. These limitations will suggest the need for further research to address the gaps in understanding.

Furthermore, Research might have several other minor limitations that may affect its findings. Also the study relies on the views of key individuals. Since the collected data is qualitative and subjective, it could be prone to significant bias, potentially skewing the research outcomes. Data availability and data access could introduce biases, as responses from local residents and stakeholders may not always be complete or accurate.

1.9 RESEARCH ETHICS

"Ethics will refer to the moral principles that govern a person's behavior or the conducting of an activity. Research ethics will primarily deal with the interaction between researchers and the people they study. Parveen and Showkat (2017) will refer to research ethics as doing what is morally and legally right in research. These are norms for conduct that distinguish between right and wrong, and acceptable and unacceptable behavior. The principal concern in research will be respect for the participants' dignity, rights, safety, and well-being (Parveen & Showkat, 2017). Since ethics will be a fundamental requisite of the research process, this research will maintain ethical considerations as far as possible.

In this research, during the preparation of questions for the questionnaire survey, discriminatory and ambiguous questions will be avoided, and questions will be made as objective as possible. During the operationalization of the questionnaire survey in the field, respondents will be chosen based on voluntary participation, with no forced participation. There will be no discriminatory behavior based on gender, ethnicity, economic background, etc., toward the respondents."

2 CHAPTER TWO: CONCEPTUAL FRAMEWORK AND METHODOLOGY

2.1 RESEARCH PARADIGM

Ontological position (Nature of reality/what is happening)

With positivist /constructivist paradigm:

The study recognizes urban expansion and changes in green landscapes as dual realities— one physical and measurable (population growth, land use changes and urban sprawl) and the other socially constructed (human behaviors, decisions, and interactions influencing these changes). This reflects a mixed ontology, combining elements of positivism (objective, measurable phenomena like land conversion) and constructivism (subjective interpretations of social behaviors and stakeholder actions).

The study views urban expansion and urban edge development as physical and measurable phenomena that can be systematically studied (positivism). At the same time, it recognizes that social behaviors and their impacts are constructed through interactions and context, requiring a constructivist approach.

Epistemology position (How Knowledge is gathered/ how we know it)

With positivist/constructivist paradigm:

The study takes a constructivist approach to gather knowledge by analyzing stakeholder behaviors, opinions and responses inductively, creating context-specific insights. It also incorporates positivist methodologies, such as data collection on urban land use patterns, population changes, and land price changes, to build a grounded understanding of the interplay between urban growth and reduction in green zone of urban peripheries.

The study seeks to understand causing factors of urban expansion in study area and urban edge development in green zone through observed data. It helped to increase general understanding of real situation of urbanization and its effects on green peripheries of cities.

2.2 LOGIC SYSTEM

The research has deductive Logic System. As it starts with a general statement and applies it to specific cases (Top-down reasoning). It starts with a general theory, the established urban growth models as suggested by famous theorists that suggest cities expand outward from the core to the periphery. On this basic it applies this theory to a specific case, the Hypothesis of the research is that new settlement in Giri Bandu Tea Estate Land is an outgrowth of Birtamode City core. Research collects various data, observation and test the hypothesis whether urban expansion into green zones of city periphery aligns with this established theory or not to reach the conclusion.

2.3 METHODOLOGICAL APPROACH

The research followed mixed method, quantitative approach for numerical measurement and qualitative approach for in-depth contextual exploration incorporating stakeholders' perspective as well. Hence, it would be more accurate to say that the research was conducted under mix methodological approaches.

2.3.1 Methods of data collection

a. Literature Review-Existing data

Initially, relevant articles and papers were gathered from online sources and relevant organizations to build background knowledge. Data that already existed were obtained via various documented sources. After collection, documents were reviewed and analyzed. Document analysis, a qualitative research method, was used to interpret documents and provide insights into the assessment topic (Bowen, 2009). The municipal profile provided general data regarding the study area. Data from National Census and Urban Base Map were also obtained. Similarly, certain data like migration number and trend, municipal building permit, taxation were extracted from the records of the Municipality Office.

b. Site Observation –transit walk

Initially, maps, satellite images, Shape files for GIS etc. of the study area were collected from municipality office and department of survey. And to verify in the field observation by the researcher was done in the areas that are rapidly urbanizing since past few decades. Physical changes were observed identified and noted. Photographs of new settlement in estate land at the edge of Birtamode municipality were taken. These all helped me to understand the changing land use pattern in the market centers and city edge of study area. Lifestyle of stakeholder (worker, local residents), housing typology, settlement patterns were observed and collected in the form of photographs and notes. Researcher's observation in the site helped in contextualizing the urban expansion towards city edge scenario of the study areas.

c. Questionnaire Survey

I surveyed Two different types of survey were done for the research. A questionnaire survey was done on the basis of random sampling to get data on mobility. To avoid duplication of data with Household Survey, only data that could not be obtained from existing data were structured. The questionnaire survey consisted of total 13 questions out of which 3 were open-ended and other remaining 10 closed questions with multiple choices given. It was conducted in dual medium i.e., via mail/online and in person as well. The data were collected in the first week of March 2020.

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

d. Key Informant Interview

The study used both qualitative and quantitative approaches, drawing on data from interviews with key informants and a survey questionnaire. Key informants included Tea Estate owner and Worker and management team, Leader of Giri Bandu land management (real estate developer), Residents of city area nearby Estate land and Residents on the converted land of tea estate. The interview was 15 to 30 minutes long with semi-structured questions. The major objective of the interview was:

- For qualitative data analysis to gather in-depth information from tea estate stakeholders, focusing on how they respond to urban growth encroaching on estate land.
- For collecting stakeholders opinions and to understand the context, experience, and perspectives of key stakeholders.
- For identifying trends, problems and potential solutions after urban expansion towards green zones (Land of Giri Bandu Tea Estate) of urban edge of Birtamod municipality.

e. Focused Group Discussion (FDG)

I conducted focus group discussions with a group of tea estate worker or tea picker, a group of tea estate visitors and group of tea factor workers / tea processing workers to get a valuable insight into stakeholders' opinion and the effects of urban expansion on tea estates. Tea pickers and tea factory workers gave idea on how urban growth to their estate land has reduced the tea plantation area, affecting the production of green tea leaves and ultimately affecting their livelihood, while estate visitors provide insights into tourism potential, sustainability perceptions, and market influences. Collectively, these discussions help analyze the estate-to-urban transition, balancing sustainability, economic opportunities, and policy implications for urban expansion while preserving livelihoods and tea plantation land.

2.4 RESEARCH METHOD

Table 2-1 Overall Research Method of research

| S.N | OBJECTIVE | DATA COLLECTION METHOD | SOURCE | ANALYSIS |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 1. | To explore key factor contributing to the decline of green zone (Estate Land) on the outskirts of Birtamod municipality | The study used secondary data from online and offline published literature or documents, as well as primary data collected through field surveys, transect walks, key informant interviews (KII), and focus group discussions (FGD). | Data was sourced from Google Earth, GIS, the survey department, district and municipality office Local community and Guthi | Helped in finding Major drivers of urban expansion towards edge area as mention in literature |
| 2. | To analyze how different stakeholders (estate owner, local residents, planners and authorities) perceive and respond to these urban-driven changes. | Primary data was gathered through field surveys to measure physically encroached areas, key informant interviews (KII), and focus group discussions (FGD) with estate land users and neighbors. Secondary data came from published documents and literature. Additional insights were collected via transect walks and discussions with the local community. | Municipality staffs, Tea Estate owner and Worker and management team, Real Estate developer, Residents of city area nearby Estate land, Residents on the converted land of tea estate: | Helped in finding opinion and reactions of stakeholder towards effect of urban expansion in available green zones of city edges |

3 CHAPTER THREE: LITERATURE REVIEW

This chapter gives a review of the existing literature, including definitions, concepts, theories, necessary policies and regulations of Nepal related to the objective of the study. It also examines previous studies on the factors influencing urban expansion towards green zones of urban edges, both in national and international context.

3.1 URBAN EXPANSION

3.1.1 Concept Definition

Urban expansion refers to the physical growth of a city's boundaries into the adjacent rural areas (Angel, 2023). Urban areas commonly experience land use changes driven by the higher economic returns of construction compared to agriculture. The non-market value of land, which is hard to quantify in financial terms, is often overlooked during these conversions (Jumei Cheng 1, 8 August 2023). Over time, excessive land use changes create negative effects that impact daily life, such as uncertain livelihoods for displaced farmers and growing tensions over land resources. Finding the right balance for urban expansion remains a complex challenge for researchers.



Figure 3-1 Definition and major types of Urban expansion (Zhijian Chang, September 2022)

3.1.2 Types of urban Expansion

Urban land use expansion can occur in five main categories:

- i. **Infilling:** New constructions are established in previously unused or refurbished regions for different purposes. Redevelopment of brownfield sites, such as former industrial areas, deserted terminals (like waterfronts or rail yards), and shopping malls, exemplifies urban expansion opportunities on locations that have lost their economic relevance.
- ii. **Extension:** This is a common form of expansion where development occurs directly next to current land uses. New infrastructure, including streets and utilities, is extended from the existing network.
- iii. **Linear development:** Similar to extension, but here, the growth is influenced by a pre-existing transportation corridor like a highway or transit line (subway, light rail), capitalizing on the access provided by the transport infrastructure.
- iv. **Sprawl:** A typical form of suburban development that utilizes dispersed lots. Each developer takes advantage of an available plot of land without considering the existing urban layout.
- v. **Large-scale projects:** The establishment of significant infrastructure projects, such as a new port, airport, industrial zone, logistics center, or intermodal rail terminal, requires a substantial amount of land. The operational rationale for these projects often differs greatly from the surrounding landscape, leading to limited integration with existing land uses. These initiatives frequently stimulate new developments in the surrounding area.

3.2 DRIVERS OF URBAN EXPANSION

Nepal's rapid urban expansion stems from a mix of socio-political, economic, and developmental factors. According to MoUD (2017, 3), urbanization in Nepal results from three interconnected transitions: i) a demographic shift where more individuals join the workforce than exit it, ii) a spatial shift driven by increased rural-to-urban migration, and

iii) an economic shift marked by the decline of traditional subsistence economies, a reduced agricultural share in GDP, and the pursuit of new livelihood opportunities. Choe and Pradhan (2010) highlight that expanding municipal boundaries and designating new urban areas also significantly contribute to urban growth.

The influx of people from rural areas seeking economic prospects, coupled with the political instability and conflict from 1996 to 2006 and subsequent political unrest, has directly or indirectly shaped the socio-economic and developmental patterns of Nepal's urban centers (Devkota, 2018). This population surge has led to unplanned and chaotic urbanization, largely due to ineffective planning and poor implementation.

The factors driving urban growth are complex and interlinked. For example, economic opportunities attract migrants, which in turn spurs population growth, leading to increased construction of buildings and infrastructure. Notably, road development often triggers higher built-up density along these corridors.

3.2.1 Population growth

Population growth significantly contributes to the expansion of urban areas, creating a heightened demand for both residential and commercial properties, which in turn propels urban growth. Cities respond to population increases by either densifying their existing regions or extending into surrounding areas. Over the past few decades, the majority of population growth has been managed through urban sprawl. In many parts of the Global South, where urban population growth is now concentrated, this expansion often occurs in a chaotic and unplanned fashion, resulting in cities that are less efficient, inclusive, resilient, and sustainable (Angel, 2023). Population growth reflects economic opportunities, political issues, and security concerns, driving migration from rural hilly areas to the Terai region. Limited job prospects, poor living conditions, and lack of basic services in rural areas push people toward urban centers. Rural residents move to the capital seeking jobs, education, safety, housing, and better economic prospects. In Jhapa's municipalities, rural-to-urban migration is the main driver of population growth.

For example, in the 1990s, up to 40% of population growth in these areas was due to urban in-migration (Devkota, 2018).

3.2.2 Land price, Land speculation and real Estate Development

Lower land costs and more available space on city fringes make peripheral areas attractive for development, encouraging urban sprawl and expansion. Land availability on the fringes of cities at affordable price compared to city centers, is a major factor behind urban expansion. It happens frequently as construction land brings higher benefits than agricultural land, leading to land use changes. Because the non-market value of land is difficult to quantify financially, it is frequently ignored. Over time, excessive land conversion causes problems, such as displaced farmers struggling to make a living and increasing conflicts over land use. Finding the right balance in urban expansion remains a major challenge for researchers.

Land use changes in urban areas are closely tied to the value of land. Typically, as land value rises, so does the density of development, with land often converted to more profitable uses. Jhapa district, a peri-urban area, faces intense pressure from urbanization. As mentioned earlier, the Terai region's lands are strained by rapid urban growth, driven by migrants drawn to the city's economic opportunities. Commercial pressures also stem from remittance inflows, capital leaving rural areas, and a significant increase in credit from financial institutions. Together, these factors have caused a sharp rise in land values, fueled land speculation, and led to uncontrolled urban expansion.

Price reflects the value of an object or property, with money being the standard way to compare values in a market. However, land prices are influenced by uncertainties like net rent, interest rates, and inflation, meaning land value also depends on how rents evolve. There's a key distinction between price and value: market price is what a property might sell for at a given time, while value reflects its true worth compared to similar properties (Ewert, 1979, cited in Ranjitkar, 2017). This difference arises because establishing a price involves varying levels of knowledge, intelligence, and willingness, unlike determining value (Ranjitkar, 2017).

Land speculation and real estate development drive urban expansion by turning land into profitable ventures, often causing rapid, unplanned outward growth. From an urban planning perspective, land speculation—defined by Adedamola (2018) as buying land for future sale at a higher price without immediate use—harms the built environment. Its disorganized nature distorts cities and regions physically, economically, and socially, reducing their smartness, resilience, and sustainability. Physically, land speculation disrupts the pace and pattern of city growth. Cities should grow with accessible, compatible, and well-connected land uses supported by efficient roads. However, speculation often leaves areas inaccessible or undeveloped due to ownership issues. Built environments should include efficient facilities and services for the local population, but speculation undermines this goal.

3.2.3 Road Networks, Infrastructure development, and Services

The degree of urbanization and development is closely linked to access to infrastructure and services like clean water, electricity, education, healthcare, and sanitation. In Jhapa district's municipalities, educational and healthcare facilities are key drivers of urban growth (Bakrania, 2015). Urban expansion in Nepal typically occurs along major highways, ring roads, feeder roads, corridors, and key junctions, as these improve accessibility. Transportation infrastructure tends to expand in peripheral areas, offering benefits like better access, economic opportunities, and social services. The growing road networks and improved connectivity have supported the establishment of industries, schools, and hospitals in these outer areas, extending services, businesses, and markets beyond the district's core.

3.2.4 Economic Opportunities

Economic opportunities encompass a range of activities, including jobs, businesses, industries, and rising land values (Thapa and Murayama, 2010). Cities concentrate commercial and financial activities, creating employment in both formal and informal sectors for many people. Urban centers provide the infrastructure needed for trade and business. These attractive factors cause urban development to focus around the city core

and spread outward. According to a Nepal Rastra Bank (2012) survey, Jhapa district's economic activities contribute about 3.2% to Nepal's GDP, making it one of the country's more economically important districts. Agriculture is a cornerstone of Jhapa's economy, accounting for roughly 4% of Nepal's total agricultural production, highlighting its critical role in the national agricultural sector.

3.2.5 Political Factors

Between 1996 and 2006, political conflict in Nepal was a major factor in rural-to-urban migration, as it displaced many people from rural areas (KVDA, 2016). Displaced individuals chose destinations based on various factors: some moved to nearby cities, while others migrated to Kathmandu Valley. The combination of limited economic opportunities and an unstable political climate triggered a large-scale exodus of Nepal's productive workforce from rural areas to Kathmandu Valley. During the conflict, internal migration to Kathmandu Valley surged because it was seen as a relatively safe place to live, leading to a rise in rental and housing units. This period saw significant urban growth in the city, often at the cost of valuable agricultural land around the ring road.

3.3 GREEN ZONES OF URBAN EDGES

3.3.1 Concept Definition

Natural or semi-natural areas located at the boundary between urbanized zones and undeveloped land. Parks, forests, tea plantation area, agricultural land etc. that act as a transition between the built environment and nature (Varkey, 12 June 2021).

3.3.2 Encroachment in green Zones of urban Edges

Encroachment describes the spread of human-built structures, utilities, pathways, roads, and other infrastructure into natural environments. It refers to the unauthorized or unregulated occupation and modification of green spaces, such as forest, agricultural lands, wetlands, and open spaces, located on the urban periphery. These green landscapes play a vital role in maintaining ecological balance. However, the growing pressure of urban expansion has turned these landscapes into contested zones.

3.4 CONCEPT AND CHARACTERISTICS OF CITY EDGE/PERI-URBANIZATION

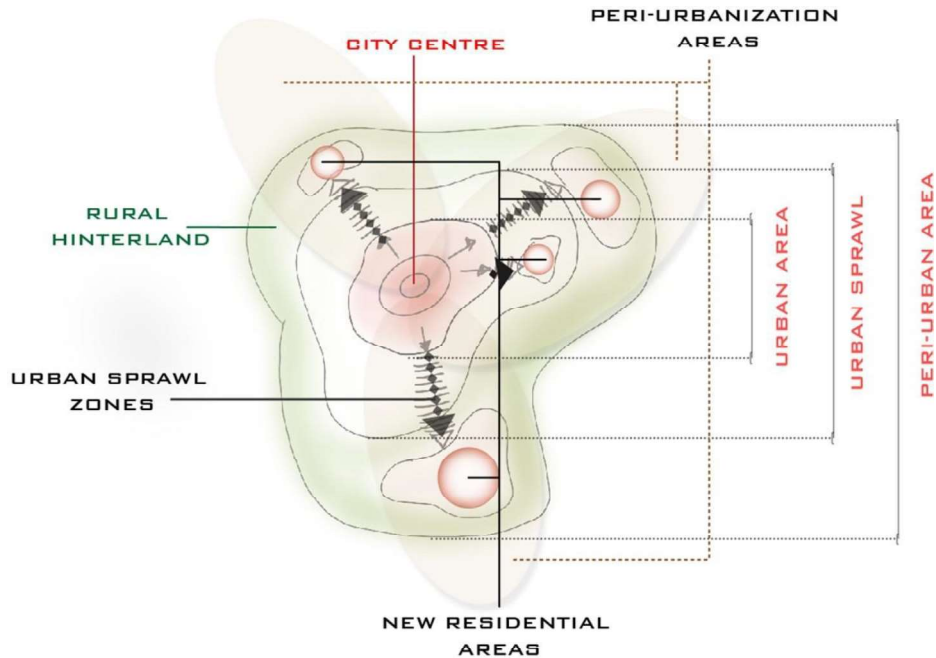


Figure 3-2 Illustration of the peri-urbanization process, with arrows indicating the areas into which new settlements are expanding (Izgi, 14 July 2024)

Morphological characteristics are fundamental to understanding the peri-urbanization process. The development of settlements is shaped not only by their physical layout but also by socio-economic dynamics. Urbanization encompasses more than just visible changes in land use and built form—it also involves less obvious transformations in function and lifestyle. These socio-economic developments play a crucial role in altering population traits, including income distribution, educational attainment, employment prospects, and preferences for land use in fringe areas.

Settlement morphology, along with the activities of its inhabitants, serves as a defining element of a region. According to Bryant and colleagues, less urbanized fringe zones can be identified and examined based on their distance from and access to urban cores, demonstrating the spatial zones influenced by cities. Antrop emphasized how urbanization has historically evolved and expanded, particularly noting its effects on accessibility, landscape dynamics, and the urban–rural interface.

Rather than being a fixed condition, peri-urbanization is best understood as a continuous and evolving process. Capturing its complexity requires a flexible framework that accounts for its self-reinforcing characteristics. Elements such as the relocation of services and industries, part-time agricultural activity, development of secondary residences, and migration of retirees are recognized as significant forces contributing to urban expansion beyond core urban areas. Allen conceptualizes peri-urban zones as interaction spaces where urban, agricultural, and natural systems converge, engaging in complex socio-economic and environmental exchanges. Madsen investigated peri-urban development through 22 dynamic themes and their subcategories, identifying key urbanization drivers across dimensions like social structure, labor markets, and agricultural organization.

While definitions of peri-urbanization may appear similar, the processes involved can vary greatly depending on the settlement pattern. Understanding these differences necessitates a contextual examination of settlement morphology and its transformation over time. A localized and subjective approach to assessing settlement structure can help trace the evolving identity of peri-urban areas. This involves analyzing patterns of change and identifying how elements such as historical continuity, building forms, and urban layout develop over time, using two main methodological perspectives.

Examining urban form through morphological analysis offers a key method for investigating how settlements evolve. Various interdisciplinary studies have addressed this topic, revealing that the nature of urban form dynamics differs according to both the researcher's focus and the specific study area. These dynamics are typically grouped into physical and non-physical components, encompassing social, cultural, and economic influences alongside land use, street networks, architectural forms, and infrastructure. Levy stresses the significance of investigating these shifts, particularly the transition from compact urban forms to more fragmented and open peri-urban landscapes, and underscores the need for updated analytical frameworks to interpret emerging patterns of urban form. Al-Saaidy contributed to this field by comparing the perspectives of the British, Italian, and French schools of urban morphology, identifying key points of

divergence and overlap. Both qualitative and quantitative techniques are useful in exploring the forces driving changes in settlement structure, and these methods support the development of context-appropriate strategies for guiding future growth. The interpretation of morphological transformation is inherently case-specific. For example, Wang and Yuan applied tools such as statistical methods, spatial analysis, and data visualization to assess the spatial patterns of morphological evolution in less urbanized edge areas.

3.5 PERI-URBANIZATION PROCESS: DYNAMICS AND IMPACT

Peri-urbanization is the process where areas on the outskirts of cities gradually develop urban characteristics in terms of infrastructure, economy, and society, often in an uneven and disjoint way. Beginning in the mid-20th century, this idea has been applied in Western Europe and North America to study how cities expand and how small agricultural communities are forced to quickly adapt to urban life (Dzifa Adimle Puplampu, 2021).

As cities grow, peri-urban areas experience major changes, such as the breakup of agricultural land and increasing separation between farms and human activities. Shifts in employment and transportation patterns in modern societies have reshaped cities, influencing roads, parks, and public spaces. This transformation, called peri-urbanization, is a key part of urban expansion. It extends beyond city centers into urban edge areas, forming new urban regions and merging these areas with city functions. Peri-urbanization plays an important role in regional planning and economic policies. In Germany, for example, it has helped shape new regional identities.

In developing countries, peri-urban areas act as transition zones where traditional farming meets rapid urban growth. These areas often lack proper planning, leading to informal settlements and mixed land use. Conversely, peri-urban regions in developed nations often encompass suburbs, industrial areas, and green belts designed to control urban expansion. In Europe, for instance, peri-urban areas often feature low-density housing, commercial spaces, and protected green areas to control city growth. These

hybrid zones, which combine urban edge and urban characteristics, are essential for urban planning and policy-making.

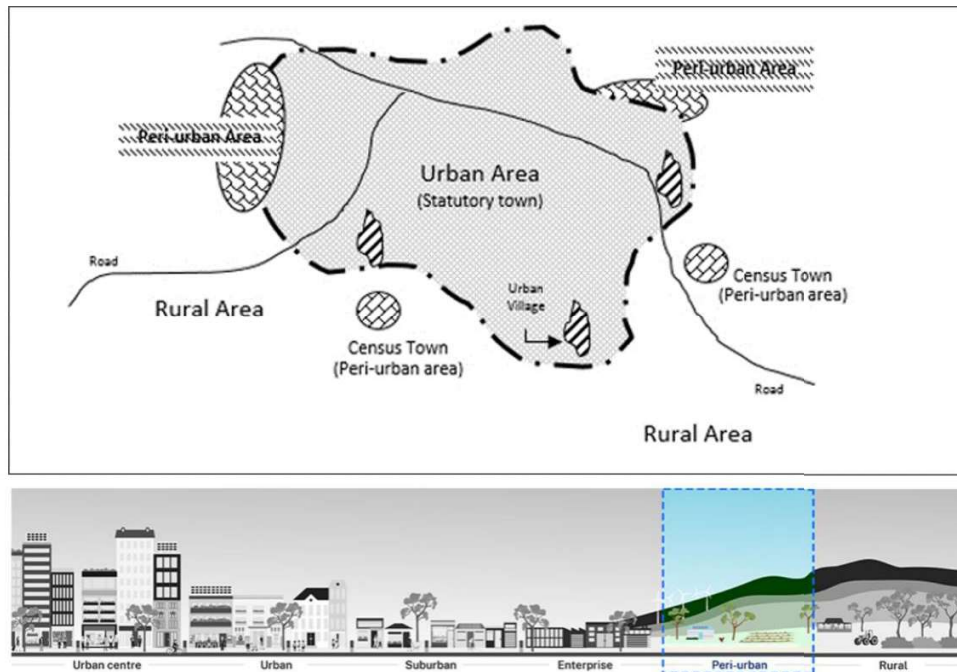


Figure 3-3 Illustration between development process of urban and peri-urban areas (Varkey, 12 June 2021)

The spread of cities into peri-urban areas creates challenges such as scattered settlements, high dependence on transportation, and weak land management. These regions often serve multiple functions, reflecting social and economic changes at the urban edge. Examples of peri-urban areas include Hangzhou (China), which experiences rapid urbanization; Koper (Slovenia), which focuses on social cohesion; Montpellier (France), which prioritizes green space conservation; Warsaw (Poland), which struggles with uncontrolled urban growth; and Leipzig-Halle (Germany), which emphasizes ecosystem services.

Understanding the interaction between urban centers and urban edge areas is crucial for studying peri-urbanization. Researchers have analyzed transportation, economic shifts, demographics, and social aspects to better define this evolving urban boundary. The expansion of urban infrastructure, housing, and industries into urban edge areas often leads to informal settlements. Some experts argue that peri-urbanization requires new

planning and governance approaches to manage the diverse mix of people, spaces, and institutions in these areas. Others have studied different migration patterns within peri-urban zones, such as those seeking self-sufficient lifestyles, better living conditions, or a more comfortable retirement.

3.6 THE FRINGE AREA, THE CITY AND URBANIZATION

The fringe area has historically maintained a unique connection with urban regions. In the Canadian Prairies, agricultural expansion led to the establishment of several small service centers designed primarily to cater to the needs of a scattered agricultural community. In medieval Europe, within the context of the feudal system, the fringe area occupied a more subordinate position relative to towns and cities. The dynamics and functions of the fringe and urban centers in relation to each other have shifted across different times and locations.

Despite these varying interactions, it is evident that both the city and the fringe are essential components of the same social and economic framework. Consequently, transformations in both urban and rural areas are mutually dependent. Following World War II, the rate of change in fringe areas within Western society increased dramatically. The agricultural sector underwent significant transformations due to advancements in technology and new economic production methods. While farming continues to occupy a significant portion of land near most urban areas, the effects of these changes on the landscape have been profound. Given that the fringe area is tied to economic development, growth has emerged as a significant factor driving notable changes in these regions, particularly due to rapid urbanization. It is arguably no longer sufficient to assess urbanization merely by the percentage of the population residing in urban locales. According to Lewis and Maund, multiple factors have facilitated the migration of predominantly urban populations into the urban fringe. An appropriate indicator of urbanization might be the proportion of the population living in these peripheral urban areas, specifically the urban fringe. It should be noted that urbanization represents the infiltration of non-agricultural elements into the countryside and encompasses more than

just the demand for additional land designated for urban purposes. Therefore, urbanization can be perceived as generating a variety of pressures that can induce change in rural areas.

3.1 URBAN EDGE DEVELOPMENT AND URBAN GROWTH THEORIES

Fringe development refers to the expansion of urban areas into surrounding rural or peri-urban zones, leading to the transformation of land use, social structure, and infrastructure in these areas. Several theories explain the processes, dynamics, and impacts of fringe development. Below are the key fringe development theories:

3.1.1 Concentric Circular Model

The Concentric Circular Model (also known as the CCD model) is considered one of the earliest theories explaining urban growth patterns. It was introduced in 1925 by sociologist Ernest Burgess, drawing on observations from the development of Chicago (Goodwill, 2018). According to this model, urban expansion begins with the Central Business District (CBD) located at the core of the city, serving as the main economic center. This central zone has the highest land and rental values, which gradually decrease as one moves outward from the center. However, while the cost of living becomes lower further from the core, transportation time and expenses increase.

Although modern automobile-friendly cities have enabled economic development beyond the city center, the model remains relevant for early cities and still accurately reflects urban structures in many areas today. It is also important to recognize that geographical features can limit the outward expansion of cities. This type of urban development was most common until around 1930. During that period, railways were the primary mode of transportation, so factories were typically built near downtown railway stations. Due to the high cost of living near the urban core, factory workers often settled in less densely populated areas farther from the center.

3.1.2 Growth Pole Theory

Growth Pole Theory was proposed by François Perroux in 1955. The central idea of this theory is that development originates from a dominant hub, known as a growth pole, and expands outward. These growth poles are typically economic or industrial centers that stimulate development in surrounding areas.

In the context of fringe development, growth poles play a crucial role in shaping the expansion of urban areas. Fringe zones often develop around major industrial estates, commercial centers, or large infrastructure projects. This theory helps explain the uneven distribution of development, as economic activities tend to cluster around these key hubs, leaving some areas more developed than others. The spatial clustering of industries and services around growth poles creates patterns of growth that influence land use and urban expansion.

3.1.3 Sector Growth Model

In the 1930s, Homer Hoyt introduced the Sector Growth Model as a refinement of the earlier concentric circle model. This model acknowledged that urban growth typically extends outward from the city center, mainly along transportation routes, and that certain types of development often group together in distinct patterns (Goodwill, 2018). This form of urban expansion is especially evident in many European cities, notably in the United Kingdom.

Unlike the concentric model, where development occurs in uniform rings, the sector model proposes that residential areas grow in wedge-shaped sectors radiating out from the Central Business District (CBD). In this model, low-income populations tend to settle along major transportation routes to reduce the effort and cost of commuting to workplaces. Adjacent to these areas are the neighborhoods of middle-income residents, which are less densely populated. These individuals can afford the daily transportation required to travel between home and work.

A small segment of the population, typically the wealthiest, chooses to live much farther from the CBD. These elite residential zones are often isolated and represent the

outermost wedges. Overall, the sector growth model describes urban development as occurring in clustered sectors rather than in concentric zones. It can be understood as a modified form of concentric model with difference that sector model allows outward

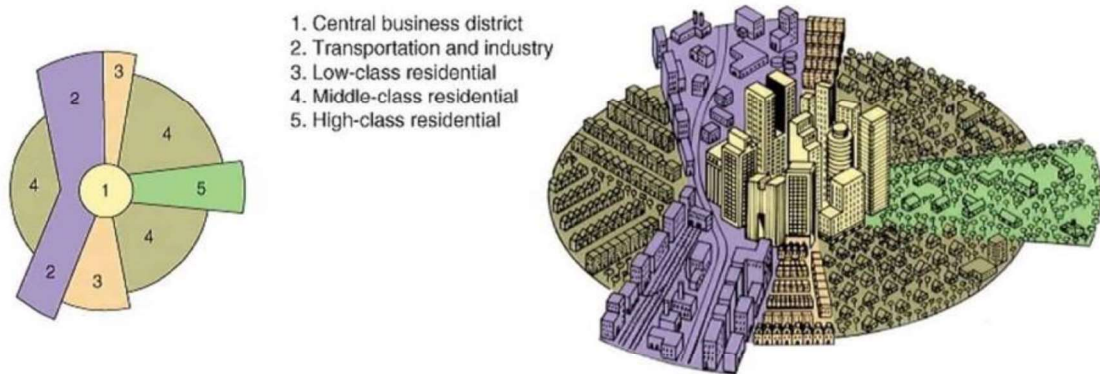


Figure 3-4 3.1.3 Sector Growth Model (Google)

progression of growth. This model is seen to be followed by British cities like New Castle and London. Calgary city of Canada and modern Chicago city of United States have also followed this model for growth and development.

3.1.4 Land Rent Theory (Bid-Rent Theory)

Land Rent Theory, also known as Bid-Rent Theory, was introduced by William Alonso in 1960. This theory explains how different land uses compete for space based on their proximity to the city center. The fundamental principle is that land closer to the city center is more expensive due to higher demand from commercial and business activities, while land values decrease as the distance from the center increases.

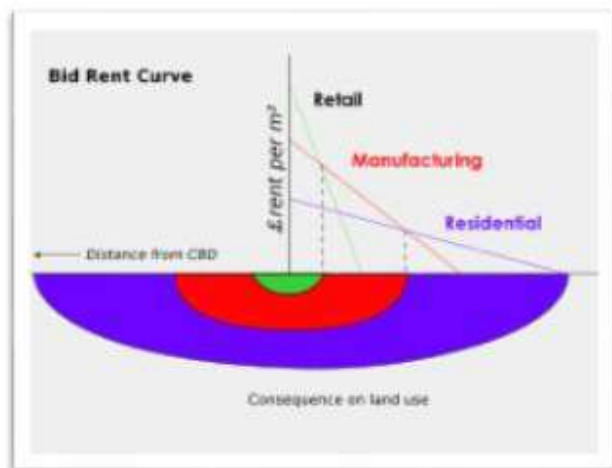


Figure 3-5 Bid Rent Theory (google)

In terms of fringe development, this theory highlights why certain types of land use dominate different urban zones. Fringe areas, being farther from the city

center, offer larger and more affordable land parcels, making them attractive for residential expansion, industrial activities, and logistics hubs. Meanwhile, high-value land uses such as commercial businesses concentrate in central areas, pushing other activities toward the urban fringe. This process helps shape urban growth patterns and explains the gradual expansion of cities into less developed edge areas.

3.1.5 Axial Growth Model

It is very clear from the study of history of cities growth that transportation is a key to urban growth. The Axial Growth Model emerged around the same time as the Sector Growth Model and proposes that urban development expands along transportation routes extending from the city center (Goodwill, 2018). The regions closest to these transportation corridors experience the most intense development, while areas situated farther away tend to be less developed. This results in a linear or belt-shaped pattern of growth. The axial growth model is commonly observed in many developing countries. In Nepal too, the areas along the major highways like East-West highway, Araniko Highway are growing organically only because of their location along the major transportation lines. The places like Muglin, Khurkot are the examples of emerging urban areas developed in this model of urban growth.

3.1.6 Urban Sprawl Theory

Urban Sprawl Theory explains how urban areas expand outward in a low-density, often unplanned manner. This expansion typically occurs as cities grow beyond their core areas, spreading into surrounding regions with dispersed residential, commercial, and industrial developments. Unlike compact urban growth, urban sprawl is characterized by extensive land consumption, increased dependency on private vehicles, and fragmented land use patterns.

Fringe zones are particularly susceptible to urban sprawl due to their relatively cheaper land prices and fewer regulatory restrictions compared to city centers. These areas become attractive for housing developments, commercial establishments, and infrastructure projects seeking more space at lower costs. However, urban sprawl brings

several environmental and social challenges, including habitat destruction, increased traffic congestion, and socio-economic inequality due to uneven access to urban services.

Despite its role in accommodating urban expansion, urban sprawl is often criticized for being inefficient and unsustainable. The spread of low-density developments increases infrastructure costs, strains public services, and contributes to environmental degradation. As a result, many urban planners advocate for more compact, mixed-use development strategies to balance growth with sustainability.

3.1.7 Multiple Nuclei Model of Growth

The growth of cities aided by population growth, economic and technological advancements caused changes in the forms of urban growth. Cities became more complex and new areas of economic generation were created. Harris and Edward Ullman developed a model that aimed to clarify the intricate patterns of urban expansion. Unlike earlier models that focused on rail transport, the multiple nuclei growth model took into account the transformative technology of automobile transportation. The multiple nuclei model identifies the growth of cities in cluster forms and there are more than one modes of economy. It suggests that new clusters grow for variety of reasons. Some may be

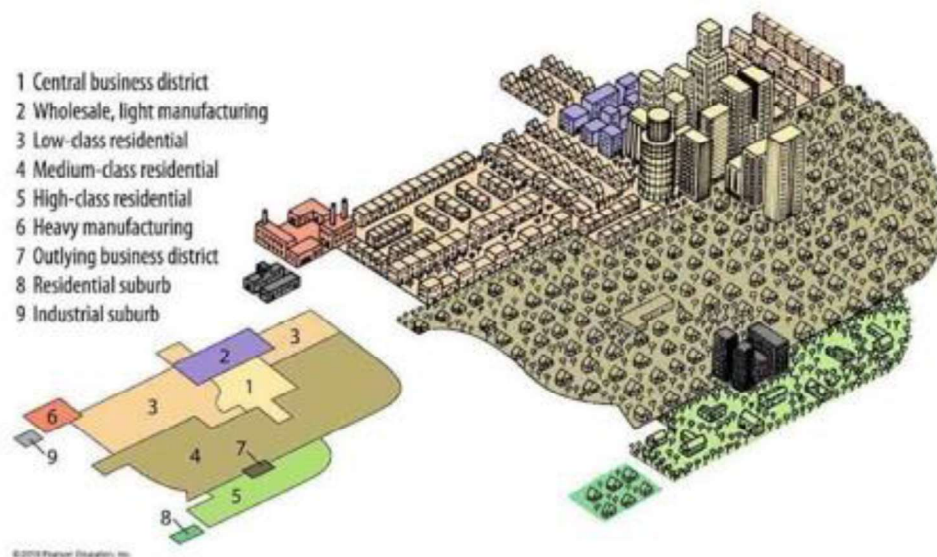


Figure 3-6 Multiple Nuclei Model of Growth (google)

specialized in the functions they bear for the city. However, the city still grows around the central business district. In this model, new suburbs are created outside the city core.

The growth pattern of any city is influenced by social, economic, and technological factors. In the past, affluent individuals preferred to reside in spacious homes located away from the crowded city center. Owning a private vehicle was essential for this lifestyle, and they had the means to afford it. However, in the present context, where resource scarcity has raised concerns about sustainability, this trend is being questioned. In fact, the opposite trend is now observed in many large cities, as living farther from the city center requires more time and effort for daily commuting. As a result, urban planners and designers are increasingly focused on creating more efficient and sustainable models for guiding urban development.

3.1 LAND RELATED POLICIES AND REGULATIONS OF NEPAL

3.1.1 National Urban Policy, 2007

The policy framework outlines strategies aimed at creating a system for providing affordable land and housing that is accessible to various income groups, including economically disadvantaged populations. It includes provisions for implementing land development programs through a range of planned development options for settlements. The policy empowers local governments to execute these programs by strengthening legal frameworks, enhancing institutional capacity, and establishing a land development fund to support local initiatives.

It also introduces legal measures to promote private sector participation in land development through Public-Private Partnership (PPP) models. Furthermore, the policy ensures legal provisions for allocating a certain number of residential plots and housing units specifically for low-income groups during land development initiatives. It facilitates access to housing loans either through government channels or alternative financial institutions to support these groups.

To guide urban development and ensure a timely land supply, the policy adopts innovative tools such as land banking and land exchanges. It also emphasizes the creation and enforcement of effective policies to maintain a steady supply of land in urban areas and to maintain an inventory of vacant land that could be utilized for future town expansion.

Additionally, the policy supports the development of an information system that monitors land availability, identifies individuals and organizations involved in land transactions, tracks potential buyers, and provides data on land pricing. It also proposes the establishment of mechanisms and institutions to disseminate land-related information to the public. Lastly, the policy aims to regulate the land and housing rental markets through appropriate legislation and to encourage private sector investment in this area.

3.1.2 National Urban Development Strategy, 2017

The national urban development strategy is designed with a 15-year timeframe. Approaches have been developed to achieve favorable conditions in key areas such as infrastructure, environment, economy, and finance. In the urban sector, the national goal is to enhance both the national and sub-national urban systems. For the infrastructure domain, strategies focus on increasing national funding for urban infrastructure projects; encouraging private sector investment in essential services and advanced infrastructure; guiding strategic investments in shared infrastructure across urban regions through a cluster city model; and enhancing the capacities of national and local institutions for infrastructure development and service provision. The strategies concerning the urban economy aim to boost the contribution of urban areas to the GDP and fortify the economic foundations of these areas, addressing components of economic development, investment, and finance. The aim of strategies related to urban finance is to foster self-sustaining and financially stable urban areas.

3.1.3 Land Use Policy, 2015

This policy recognizes land as a limited and valuable resource, emphasizing its optimal use and safeguarding it from unregulated fragmentation. Its goal is to promote a clean,

organized, well-equipped, and secure living environment to support planned and sustainable urban growth.

3.1.4 Town Development Act, 1988

Enacted in 1989, the Town Development Act (TDA) serves as a comprehensive legal framework for the planned growth of urban areas. It is regarded as the most significant legislation for urban land management. The act focuses on physical development, upgrading and reconstructing existing towns, setting up new towns, preparing land use and development plans, and enforcing planning standards.

Section 12 authorizes Town Development Committees (TDCs) to initiate and execute urban housing and development projects through Guided Land Development (GLD), site and services schemes, and land readjustment (LR). Section 16 permits the use of existing land acquisition laws for acquiring public land. Additionally, the act outlines the involvement of multiple stakeholders in the urban land development process.

3.1.5 The Land Act, 1964

This Act has undergone several revisions. The Fifth Amendment set landholding limits: 10 bighas (6.77 hectares) in the Terai and Inner Terai, 70 ropanis (3.56 hectares) in the Hills and Mountains, and 20 ropanis (1.01 hectares) in Kathmandu. For residential purposes, individuals are allowed to own up to 5 ropanis (0.25 hectares) in Kathmandu and hilly areas, and 1 bigha (0.67 hectares) in the Terai. The act includes provisions for land acquisition if these ceilings are exceeded. However, exemptions apply for land owned by the government, municipalities, trusts, diplomatic agencies, agro-industries, and educational or health institutions designated by the government.

It also addresses tenant rights and rental regulations, promotes land use programs, prohibits using land for purposes other than designated, and includes provisions to prevent fragmentation and boost productivity. The government holds the authority to

declare any area insecure or unplanned, restrict settlement, and organize planned resettlements.

The original goal of the land reform initiative was to shift idle capital from land to productive sectors to stimulate industrialization (Khanal, 2010, cited in Ranjitkar, 2017). Land ceiling provisions were expected to release land for redistribution to marginalized groups, such as landless laborers, Dalits, and indigenous communities. However, despite reductions in land ceilings, surplus land remained unavailable. As a result, land reform has largely been limited to administrative processes. In light of rapid urban growth, managing and regulating land fragmentation has become more urgent than merely restricting it. Since relocating residents to new planned areas is often impractical, the focus should be on better regulation and planning of emerging settlements.

3.1.6 The Land Acquisition Act, 1977

Due to the limited availability of public land in Nepal—most being either privately owned or forested—land acquisition is a necessary component of urban development. Initially enacted in 1961 and revised in 1977, this act provides the legal framework for acquiring private land for public projects. It grants the government authority to acquire land with compensation and ensures tenants receive 25% of the compensation. The Chief District Officer (CDO) and a designated compensation committee handle land acquisition and negotiate with landowners.

Provisions include annual reviews of land values, determining the minimum registration rate at the beginning of each fiscal year based on transaction records, and considerations for improvements in infrastructure and services.

Nevertheless, several challenges persist, such as the absence of clear guidelines for compensation, the lack of requirement to align land acquisition with a development plan, and delays in compensation payments. A significant issue is public resistance stemming from the disparity between government-assessed and market land values. As a result, the

government struggles to acquire land in urban areas for development and lacks adequate involvement in urban land markets.

3.1.7 Land Revenue Act, 1978

This Act authorizes the government to collect land taxes from all land within Nepal and provides for the establishment of Land Revenue Offices. These offices are responsible for registering land within each district as per the law. It also allows for land transfers upon verification of prior ownership records. Annual land tax rates are set by the government, and everyone is legally obligated to pay them. The act prohibits converting public or government-owned land into private property and includes penalties for violations.

It forms the foundation of Nepal's land information system. A reliable and updated land registration system is essential for efficient land markets, as it legally certifies land ownership. According to Ranjitkar (2017), systematic land registration offers multiple advantages, including ownership security, streamlined transfers, improved access to credit, better government oversight, enhanced land use and management, fair taxation, and access to dependable land data.

3.2 STAKEHOLDER MAPPING

The Power vs. Interest Grid is a widely used framework for stakeholder analysis. It classifies stakeholders into four groups according to their level of power and interest, or their influence and relevance to the issue at hand.

3.2.1 Stakeholders identification

The initial phase of Stakeholder Analysis involves recognizing all pertinent stakeholders. This task requires evaluating individuals and groups impacted by the project, those who possess influence or authority over it, and those who care about its success or failure. Stakeholders may consist of both organizations and individuals, and communication must

ultimately take place at the personal level with people. It is necessary to pinpoint the appropriate individual stakeholders within a stakeholder organization.

| | | | | |
|-----------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| P O W E R | High | <p><u>Keep Satisfied</u></p> <ol style="list-style-type: none"> 1. Google Play Store 2. App Store | <p><u>Manage Closely</u></p> <ol style="list-style-type: none"> 1. Project Manager 2. Project Team Members 3. Project Sponsor 4. Steering Committee 5. IT Department 6. Representative of internal customers | |
| | Low | <p><u>Monitor with Minimum Effort</u></p> <ol style="list-style-type: none"> 1. Government agencies 2. Not-for-profit organizations 3. Occasional individual customers 4. Suppliers | <p><u>Keep Informed</u></p> <ol style="list-style-type: none"> 1. Sales Department 2. Marketing Department 3. Maintenance Department 4. Internal customers 5. Frequent individual customers 6. Organizational customers 7. Insurance companies 8. Travel agencies 9. Vehicle manufacturers | |
| | | Low | INTEREST | High |

Figure 3-7 Stakeholder Analysis and Mapping (google)

The figure above illustrates the various approaches for categorizing prioritized stakeholders according to their levels of power and interest.

Stakeholders with high power and high interest are the key decision-makers who have the greatest influence on the project's success, so their expectations need to be managed carefully.

Those with high power but low interest should be kept informed; even though they may not take an active interest in the project, their power must be appeased. These stakeholders require careful management, as they could potentially use their influence adversely if they feel dissatisfied.

Individuals with low power but high interest should be kept well-informed and engaged in discussions to prevent any significant issues from developing. They can often provide valuable input regarding the project's specifics.

Finally, stakeholders with low power and low interest should be monitored, but it's important not to overwhelm them with too much communication.

3.2.2 Stakeholder Analysis

Effectively managing stakeholders is a crucial practice that successful individuals utilize to gain the backing of others. This approach ensures that their initiatives thrive in situations where others may struggle. Stakeholder Analysis is the method employed to pinpoint the essential individuals whose support needs to be secured. Following this, Stakeholder Planning is used to foster the necessary support that will contribute to your success.

Stakeholder Management is a critical discipline employed by successful professionals to gain support from relevant individuals or groups. This practice ensures project success where others may fail. Stakeholder Analysis serves as a technique for identifying key stakeholders who require strategic engagement. Following the identification process, Stakeholder Planning is implemented to build the necessary support to enhance the likelihood of project success.

3.2.3 The benefits of using a stakeholder-based approach

Adopting a stakeholder-based approach offers several advantages:

- a. Involving the perspectives of key stakeholders during the initial phases of a project can greatly enhance its overall quality.
- b. Securing backing from influential stakeholders can help secure additional resources, thereby boosting the likelihood of project success.
- c. By engaging with stakeholders early and consistently, you can ensure they comprehensively grasp the project's goals and potential advantages. This understanding allows stakeholders to lend their support when needed.

4 CHAPTER FOUR: OVERVIEW OF CASE STUDY AREA

4.1 MUNICIPALITY BACKGROUND

Birtamod Municipality Located in Jhapa district of Province No. 1, it is a major commercial hub and a rapidly urbanizing area, often referred to as the eastern gateway of Nepal. Birtamod Municipality is located in the Terai region of Nepal. It sits at an elevation of around 163 meters above sea level. The majority of the town is situated on flat land. It was first declared a municipality on 25th Baisakh 2071 B.S. by merging the former Anarmani and Charpane Village Development Committees (VDCs). Later, in line with the provisions of Part 5 of the Constitution of Nepal, the government restructured it, including the former Garamani VDC, and re-declared it as Birtamod Municipality on 27th Falgun 2073 B.S.

Birtamode was once part of a vast forested region. The area remained sparsely populated for a long time due to the prevalence of mosquitoes and the associated risk of malaria. Over time, the forest was cleared to make way for agriculture, taking advantage of the fertile soil. Gradually, people from the hill regions began settling in Birtamode. The town began to develop significantly after the East-West Highway was constructed through it. Positioned at the geographic center of the district, it evolved into a hub for commercial activities. Birtamode experienced even greater growth during the Maoist insurgency, as trade and banking operations across the Jhapa district became increasingly centralized.

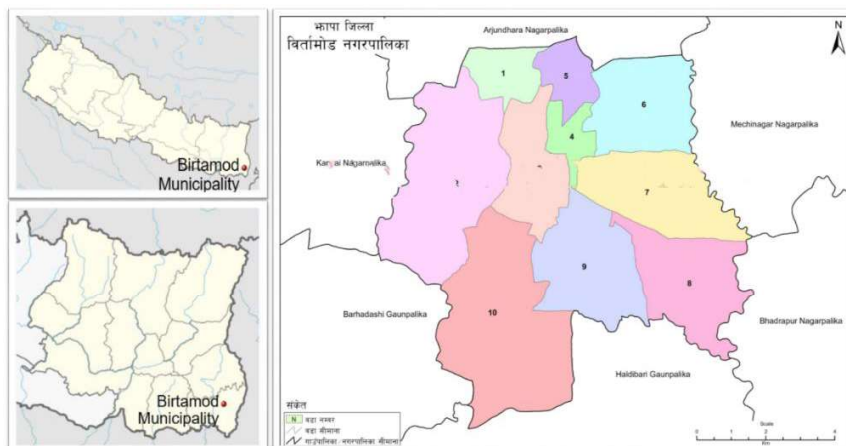


Figure 4-1 Map of Birtamode Municipality

Numerous significant tea plantations and processing plants can be found to the east of Birtamod. The primary ones include Giri Bandhu Tea Estate, New Giri Bandhu and Sons Tea Estate, and Buttabari Tea Processing. In addition to agriculture, industrial activity is on the rise. Several cement factories operate locally to meet the demand for cement with a small-scale production capacity.

4.2 INTRODUCTION

The Giri Bandhu Tea Estate is located in Birtamod municipality of Jhapa district. Located on both sides of the Mahendra Highway, to the eastern part of Birtamod Municipality, the area is part of a growing urban center. The estate can be seen from the highway

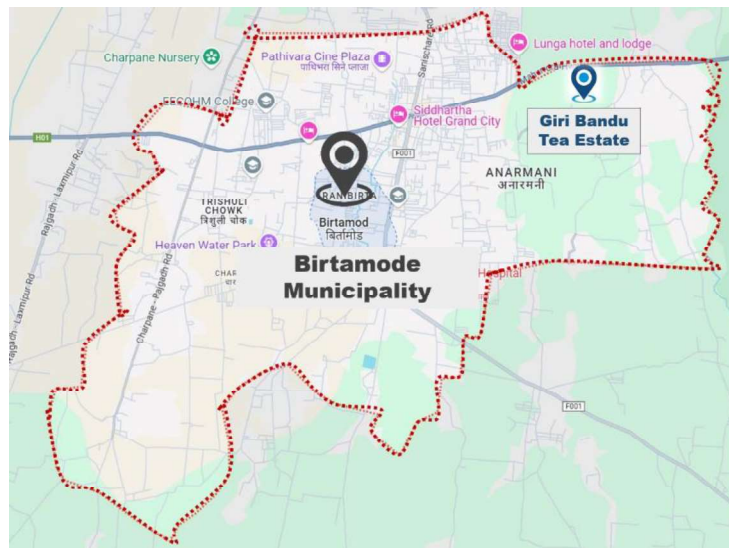


Figure 4-2 Location of Giri Bandhu Tea Estate in Birtamode municipality

and often serves as a stopping point for travelers. However, most of the estate's land extends for several kilometers on either side of the road and is not visible from the highway.

Giri Bandhu Tea is a family-owned ancestral property managed by the Giri brothers for over 50 years. The estate includes its own tea processing factory, situated just off the main road and surrounded by tea plantations. It is one of the tea producers in Nepal, operating two estates along with a large, advanced processing facility. The tea estate was established in the 1950s by Shamsheer Giri, Tek Bahadur Giri, Padam Bahadur Giri, and Bhagawan Giri, and has remained a family-run enterprise ever since. What began as a small-scale operation producing limited amounts of processed tea has grown into one of Nepal's leading tea estates.



Figure 4-3 Giri Bandu Tea Estate Land Area

4.3 HISTORY: ABOUT LAND OF GIRI BANDU TEA ESTATE

History of land distribution in Terai

During the rule of the Rana dynasty, around 1977 B.S they made a decision “तराईमा रहेको जङ्गल, जसले जति काट्न सक्दछ, त्यति नै जग्गा ल्यो व्यक्तिको”- that means Giving lands to anybody as per who would cut more trees. Primary goal of this decision was to bring back Nepali who had left the country for earning, to encourage those who had settled in the hilly region to settle in terai, to minimize population density in hilly region and to improve settlement in terai region. As terai’s lands were arable and had the potential for agricultural development which might result to make Nepal self-dependent or self-sufficient for earnings.

Implementation of Land Reform Act

Later, as the rana regime came to an end, king Mahendra’s reign aimed to address this issue through land reform measures (Bhumi sudhar ain). According to this new laws, no one could own more than 28 bighas of land in their name in the terai region, in case of

hill areas, no one could have more than 75 ropanis and within the Kathmandu valley, not more than 30 ropanis. If someone had land exceeding these limits, the government had the authority to either take over the land or provide compensation and benefits to the landowner in certain cases. However, there was an exception to these limitations, if the land was being used for agricultural purposes or for specific industries, it could be exempted from these limitations. But under no circumstances could such land be sold and if a company dissolved, the land would revert to the ownership of the state (Government's land).

Now then the giri family own around 500 bighas of land in close proximity. According to the Bhumi sudhar ain as it was in terai region, the government was going to take over remaining land except the 28 bigha. Before this law was enacted, Giri found out about this and had already distributed the ownership of their 500 bighas of land among their close relatives. Even when they distributed lands in 11-biggas part, they still had 342 bigha land. Then after they have been gradually converting these lands for tea cultivation. Going from Birtamod to kakarvitta the first tea garden is this particular tea garden. Within this estate, 25%- 25% of the shares each were owned by the four sons of Shamsheer Giri from two wives. The statute legalized by Mahendra wasn't going to affect them. In reality, the land registered under the name of Giri Bandu Tea Estate was not of Giri family but should owned by the government. In future if tea plantation is not done in that area, the land was going back to government. In this way, Giribandu tea estate has 342 bighas of land within a company named Giri Bandu Tea Estate pvt.ltd.

If we look in given figure above, the green part is all giri bandu tea estate, which neither can be sold nor can it be used for other purpose. The Giri Bandu Tea Estate currently owns only 280 bighas of land under its name. Currently, there are settlements established within this particular area and some of the remaining land is intended for sale. How can homes be built on this government land, what are the procedures involved in doing so and who are behind this? Initially, the land didn't hold much value. But over time due to rapid urbanization, the expansion of settlements in Birtamode municipality increased, the

construction of the East-West highway also happened within the area between Giri Bandu Tea Estate causing its land price cost very high. Due to these factors, the land that had very low monetary value began to be seen as an investment opportunity in the real estate market. Real estate mafias became active in this area, actively engaging in activities related to the sale of government land under private names or the development of housing colonies.

Illegal privatization of Land due to high land value

(Story behind conversion of 70 Bigas former Estate land to urban settlement)

In 2061 BS (2004 AD), the area around the Tek Bahadur Giri Bus Park, aka Birtamode Bus Park were sold through shady ways. When we examine the below provided satellite image of today, we'll see that the area belong to Tea estate but now if you see satellite images, we can see there's buspark and there are private residences. People were praising Giris as they gave "their" land to build buspark, they were made god /great social worker in the public eyes, even the buspark was named Tek Bahadur Giri and in the name of creating buspark, 51Bigahas of tea estate was sold. Giris were not happy from selling only this portion of land, they intended to sell all the land, but for this again the same bus park narrative was not going to work at that time so they planned to sell this expensive land and buy cheaper land in a remote area for government in a name of their company. Present vanlue of land is evaluated at 33 arba 60 crore. The Giri family had been trying to obtain permission for the sale of land from government for nearly 20 years. They had made several attempts during the direct rule of king Gyanendra. Due to legal constraints, Raja Gyanendra did not allow this to happen.

Giri Bandu Tea Estate further Proposal for government

(For remaining 280 Bighas land of Estate land)

"Give us that 280 Bighas prime location land in return we will give government the same area land in somewhere remote area". It can be clearly figure out that their focus was on land rather than tea cultivation, so they stopped taking care of that tea farm. The

expansion of settlement is causing damage to tea cultivation in that area, and this is clearly visible in site area and satellite image. If the Giris have stopped taking care of the tea farm, then according to the law, the land should be required to return to the government but in this case.

4.4 CURRENT SITUATION:

In Jhapa, near Birtamode Chowk, the road leading to the Giri Bandhu Tea Estate is marked by statues of Giri Bandhu ancestors, heirs, and family members, adorning the intersections. The nearby Ilam Bus Stand and Birtamode Bus Park also prominently showcase the legacy (विरासत) of Giri Bandhu.



Figure 4-4 Current situation of Giri-Bandu Tea Estate Land

In the present day, through field observation we can observe that the past estate land is divided into two parts:

- 1. Tea plantation Area covering 280 Bigas**
- 2. Well-Established settlement covering 70 Bigas (Former Estate land)**

The figure illustrates the reduction of tea estate areas due to urban expansion. 70 bighas of land owned by Giri Bandhu Tea Estate has been sold and had already started to develop

settlements in it. It can be clearly figure out that their focus was on land rather than tea cultivation, so they stopped taking care of that tea farm. Present value of land is evaluated at 33 arba 60 crore. The Giri family had been trying to obtain permission for the sale of land from government for nearly 20 years. The area, currently situated within Birtamod Municipality-5 and Arjundhara-11 in Jhapa, has experienced considerable transformations, with a significant portion remaining adorned by tea estates and woodlands.

4.4.1 Tea plantation Area covering 280 Bighas

Giri Bandhu Tea Estate land, currently occupying 280 Bighas, is located within Birtamod Municipality-5 and Arjundhara-11 in Jhapa, covered by tea plantations and forests. Now the tea plants are 50+ years old and soil quality has depleted, they have no option but to move the plantation in next place other than currently present. The land is targeted for a land swap. Real estate businessman Deepak Malhotra is allegedly involved, investing billions to facilitate the exchange of the valuable Birtamod land with less valuable plots in Kachanakbal and Jhapa Rural Municipalities.



Figure 4-5 current situation of tea plantation area covering 280 Bigas under Giri Bandu Tea Estate Pvt Limited

4.4.2 New settlement covering 70 Bighas (In Former Estate land)

The area today consists of a sizable residential settlement, a bus park, a major hotel, and offices of various organizations. Around 400 families currently live on this land, which has been divided into 1,153 individual plots. Out of the total 51 bighas located in Birtamod-5 and Arjundhara-11, 38 bighas have been subdivided into plots, while the rest remains undeveloped. Several commercial establishments operate within the plotted area, including Tek Bahadur Giri Bus Park, Pathibhara Engineering College, and Kantipur Driving Center. In addition, the area contains residential homes and over two dozen hotels.

The story of this 70 bighas of land is links back to Sudarshan Giri, an heir of the Giri Bandhu group, who transferred his 51 bighas of land to the sister organization "Naz" as a share investment 30 years ago. This transfer process, initiated by a ministerial decision on May 15, 1995, during a nine-month UML government, concluded in 2003 with arrangements for sale and distribution. Figure below clearly illustrate figure Birtamode city is expanding towards land of Giri Bandu tea estate.



Figure 4-6 Current situation of new settlement covering 70 Bighas (In Former Estate land)

4.5 NEW SETTLEMENT COVERING 70 BIGHAS: CHARACTERISTICS

(Estate -to- urban transformed green edge Area of municipality)

The land that was once part of a tea estate was developed into an urban area (started in 2061 B.S) due to Birtamod city expansion and development. The urban edge is a zone where urbanization occurs most intensively, and where some of the most visible environmental consequences of urban growth are concentrated. This study has identified the following features within the settlement in former estate land which is an edge areas of Birtamode municipality.

Table 4-1 Summary of field observed characteristics

| S.N | Parameters | Indicators | Applied method |
|-----|---------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| 1. | Change in Land Use | Changing Agricultural land, forest land, settlement area, and barren land | Site observation, photos, discussion with communities |
| 2. | Noise and Dust Pollution | Total Suspended Solid, Particulates, Noise level | Visual inspection and comparison |
| 3. | Road Safety Measures | Speed controls, traffic signboards, ROW encroachment, pedestrian/cyclist and cattle passageways, and speed bumps | Observations, photos, spot checks, interviews with local people |
| 4. | Road Accidents | Type and number of accidents occurred, adequacy of occupational safety measures provided | Records, observation, interview with local people |

| | | | |
|----|------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|
| 5. | Cultural, Religious, and Historical Sites | Cultural and religious infrastructure, people perception, and practices | Observation, records |
| 6. | Possible Township/Ribbon Development Along the Road | Congestion to road users, number of accidents, ROW encroachment | Records, observations |

4.5.1 Level of urbanization

Urbanization is shaped by national laws, plans, and policies, as well as by power dynamics, political influences, and weak governance in many less-developed nations. Higher level of urbanization is characterized in these area, expansion of settlement area and market place is likely to be developed. An increased opportunity for trade and commerce is likely through the establishment of shops, restaurants, stalls and hotels as well as the market of local products to nearby market centers. The expansion of new settlement areas and development of market centers may trigger the practice of encroaching Right of Way (RoW).

4.5.2 Settlement Pattern

In the past, settlements were primarily concentrated along the main road and in areas closer to Birtamode city. However, more recently, there has been a noticeable expansion of settlements toward the eastern and northern parts of the estate land as well. The settlement pattern in the Terai region of Nepal varies based on geographical and socio-economic factors. Linear settlements are commonly found along roads, rivers, and canals, following transportation routes and water sources. Clustered or nucleated settlements consist of closely packed houses forming villages, which are often located in areas with fertile agricultural land and irrigation facilities. In contrast, scattered or dispersed settlements are spread out, mainly in rural farming areas, often emerging in newly cultivated or forest-cleared lands. Additionally, grid pattern settlements are observed in planned urban and suburban areas, characterized by well-structured roads and

systematically arranged land plots. These different settlement patterns reflect the diverse land use and development trends in the Terai region.

4.5.3 Impact of Road on Estate Land's New Settlement

The distribution of new settlements is predominantly concentrated along road networks. Areas with road access tend to have more settlements, while those lacking roads have significantly fewer. This pattern suggests that urban growth is more likely to occur near roads, and the likelihood decreases as the distance from these networks increases. These results align with Timothy's (1995) findings on the expansion of peri-urban areas in Dar es Salaam. According to Timothy, transport infrastructure plays a vital role in settlement development, particularly in low-income areas. Public transport systems utilize road networks to serve such communities, thereby influencing settlers' locational choices. However, the influence of public transport is not the only factor; the goal of minimizing travel costs also significantly shapes settlement patterns. Households prefer locations that reduce travel time, leading to a higher concentration of housing along roads. Nonetheless, when land near roads becomes scarce due to rising demand, new settlements may also begin to appear in areas without direct road access.

4.5.4 Impact of Distance from Birtamode Market Center

The market area of Birtamode functions as a hub for business, commerce, education, and health services, making it a major point of attraction. As a result, built-up areas are more densely clustered near the city center compared to the outskirts. This pattern shows that settlement density decreases as one moves farther from the city boundary. The findings of this study reveal that land occupied by settlements is more extensive near the urban core, while the extent of built-up land declines with increasing distance from the city center. One of the most important factors in urban growth was "distance from built-up areas." This aspect assumes particular significance due to urban planning principles, security goals, and the availability of infrastructure (such as schools, hospitals, and supermarkets). As a measure of accessibility, "distance from main roads" is the next important element in urban development.

Table 4-2 standardization for urban areas.

| SN. | FACTORS | CONTROL POINTS |
|-----|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Distance from Main Roads | Areas located within 0–500 meters from main roads are considered to have the highest suitability. Suitability gradually declines for areas between 500 and 5000 meters. Beyond 5000 meters, areas are regarded as unsuitable. |
| 2. | Distance from Built-up Areas | Locations within 0–100 meters of existing built-up areas are identified as having the highest suitability. Suitability decreases for areas situated between 100 and 5000 meters. Areas beyond 5000 meters are deemed unsuitable. |

5 CHAPTER FIVE: DATA ANALYSIS AND FINDINGS

The flowchart illustrates the overall data analysis and findings of research from the case study area, focusing on the decline of estate land and the responses from various stakeholders. The analysis is structured around two main objectives: identifying the driving factors behind estate land decline (Objective I) and gathering stakeholder responses regarding these changes (Objective II).

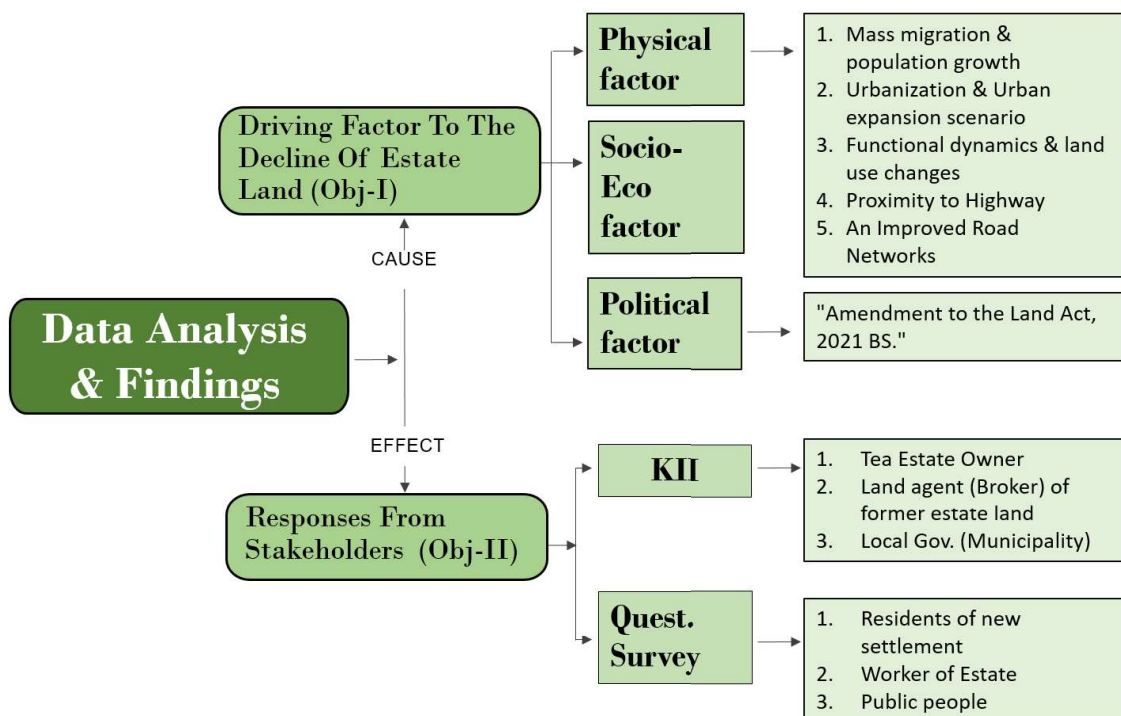


Figure 5-1 Flow chart for Data Analysis and findings from case study Area

The driving factors contributing to the decline of estate land are categorized into physical, socio-economic, and political factors. Physical factors include mass migration and population growth, urbanization, land use changes, proximity to highways, and improved road networks, all of which facilitate urban expansion into estate areas. The political aspect, particularly the Amendment to the Land Act, 2021 BS, has played a key role in reshaping land ownership and conversion policies, accelerating estate-to-urban transitions.

To understand the effects of these changes, stakeholder perspectives are gathered using Key Informant Interviews (KII) and Questionnaire Surveys. KII is conducted with local government (municipality member), tea estate owners and land agents (brokers) who have been directly involved in estate land transactions. Meanwhile, the questionnaire survey captures insights from residents of new settlements, estate workers, and the general public, providing a broader view of the socio-economic impact of estate land transformation.

Overall, the study follows a cause-effect framework, where urban expansion and policy shifts (causes) lead to the transformation of estate land and subsequent stakeholder responses (effects). The research methodology integrates both qualitative methods, such as Key Informant Interviews (KII), and quantitative techniques, including surveys, to provide a comprehensive understanding of the estate-to-urban transition process.

5.1 FACTOR CONTRIBUTING TO THE DECLINE OF TEA ESTATE LAND (OBJ-I)

(Key actions or processes driving urban expansion in the study area resulting the reduction of green zones)

PHYSICAL FACTORS

The Giri Bandu Tea Estate has undergone significant physical transformations due to urban expansion. One of the most notable changes is the conversion of tea cultivation land and vacant areas into new settlements. This shift in land use has led to a decline in green spaces and increased urbanization, particularly along road networks. The presence of noise and dust pollution has intensified due to ongoing construction activities and rising vehicular movement, which contributes to worsening air quality.

Infrastructure development has also influenced settlement patterns, with rapid expansion occurring along major roads. However, unauthorized encroachments into the Right of Way (RoW) have created issues related to road safety, pedestrian movement, and traffic congestion. The township's development follows a ribbon-like pattern, where settlements have formed along major transportation corridors, leading to increased

density in some areas while leaving others relatively underdeveloped. Additionally, proximity to the Birtamode market center plays a crucial role in determining urban growth intensity, with more dense settlements closer to the commercial hub and gradual thinning of settlements as the distance increases.

5.1.1 Mass migration & population growth

Mass migration

A notable surge in mass migration took place, mainly from mid-hill districts like Taplejung, Ilam, Panchthar, Terhathum, and Dhankuta, driven largely by political unrest between 1996 and 2006 {Maoist Insurgency (1996-2006)}. After 2006, as the political insurgency settled, infrastructure development, including road networks, hospitals, bus parks, and academic institutions, accelerated (Devkota, 2018). CBS, 2021 report states that Jhapa, located in the Tarai region, saw over 25% of its population involved in inter-district migration, with a high immigration rate of 24.5% and a lower emigration rate of 9.2%. Migration in Nepal was shaped by immediate and underlying factors, such as economic prospects, population growth, globalization, political conditions, government policies, access to public services, and diverse social, cultural, and rural-urban ties. (Ranjitkar, 2017). The CBS study from 2014 states that while service-oriented migration was more common in urban regions (17%), agricultural migration accounted for 21% of all economic movement in rural areas.

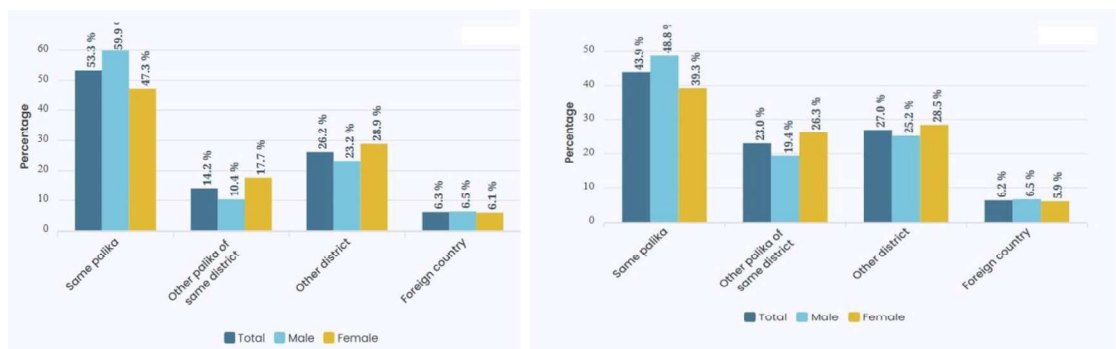


Figure 5-2 District and Municipal Population by former place of residence (Source: CBS)

"Population by former place of residence" refers to the number of people living in a particular area who previously resided somewhere else. It helps analyze migration patterns by showing how many residents have moved from rural areas, other cities, or even other countries. This data is useful for understanding urban growth, migration trends, and settlement patterns.

5.1.1.1 Population growth

Jhapa district has been experiencing continuous population growth and socioeconomic changes. The dramatic effects of land use change due to rapid population growth and urbanization is prominently visible in both urban and peri-urban areas. Various immediate and underlying factors have contributed to changes in land use and land cover across cities, peri-urban zones, and rural areas of Jhapa district. Key driving forces include the development of physical infrastructure, population growth, socio-cultural changes, access to public services, economic opportunities, migration, the land market, globalization, political conditions, government plans and policies, and tourism-related activities. These factors have collectively pushed people out of their original rural settlements in nearby districts and drawn them into the eastern region of Jhapa. This shift has had a notable impact on the use of land and natural resources, leading to significant land use and land cover changes. Among the demographic factors, population growth, migration, and increasing population density have played a major role. The rise in population—driven by both natural growth and immigration—has led to a substantial increase in population density over time.

Jhapa Population Size

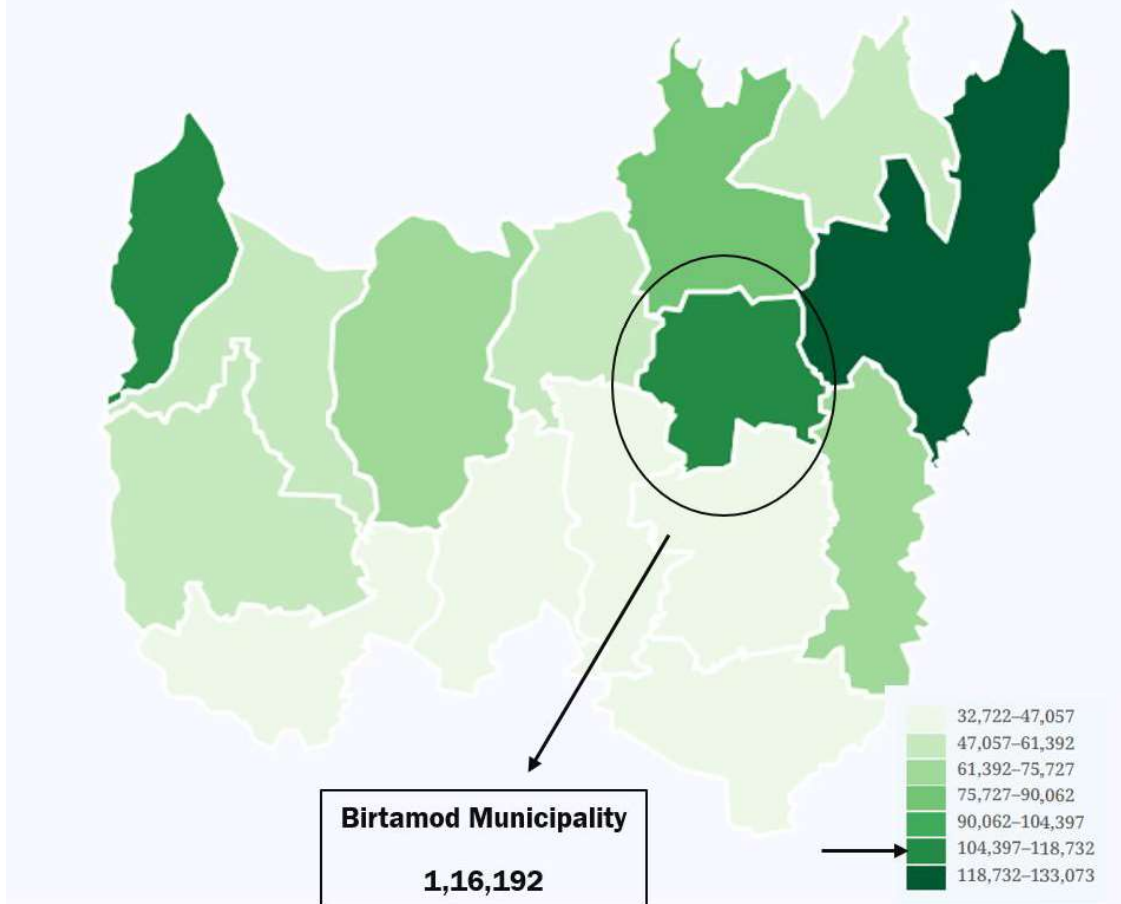


Figure 5-3 District and municipality level population distribution data of study area (Source: CBS)

From population distribution perspective, Birtamode is second rapidly urbanizing Municipality of Jhapa district with population size above 1 lakh. When we analyze the population data from the population data from the Census 2078 (2021) provides a comprehensive overview of the demographic distribution across the ten wards. The total population within these wards is 116,192, with 56,105 males (48.3%) and 60,087 females (51.7%), indicating a slightly higher female population. The municipality covers an area of 78.24 square kilometers, resulting in a population density of approximately 1,485 people per square kilometer.

PRESENT SCENARIO OF POPULATION DISTRIBUTION

The Birtamode Municipality had a total population of 116,192 in the 2021 National Population and Housing Census. Among the wards, Ward 5 has the highest population, with 22,484 residents across 6,156 households. It also has the largest number of both male (10,718) and female (11,766) residents. In contrast, Ward 9 has the smallest population, with only 5,546 residents and 1,345 households. Ward 10, despite being the largest in terms of area (16.35 sq. km), has a moderate population of 8,169, indicating lower density.

Table 5-1 Ward level population, HH and population density data (Source: CBS)

| Ward | Area (sq. km) | Households | Total Population | Male | Female | Population Density |
|------|---------------|------------|------------------|--------|--------|--------------------|
| 1 | 2.95 | 3,735 | 13,707 | 6,670 | 7,037 | 46.5 |
| 2 | 14.45 | 3,339 | 13,415 | 6,500 | 6,915 | 9.3 |
| 3 | 5.97 | 4,384 | 13,283 | 6,401 | 6,882 | 22.2 |
| 4 | 2.03 | 3,371 | 16,668 | 8,121 | 8,547 | 82.1 |
| 5 | 2.65 | 6,156 | 22,484 | 10,718 | 11,766 | 84.8 |
| 6 | 7.73 | 2,182 | 8,710 | 4,232 | 4,478 | 11.3 |
| 7 | 8.43 | 1,935 | 8,273 | 4,006 | 4,267 | 9.8 |
| 8 | 8.47 | 1,410 | 5,937 | 2,839 | 3,098 | 7.0 |
| 9 | 8.91 | 1,345 | 5,546 | 2,682 | 2,864 | 6.2 |
| 10 | 16.35 | 1,995 | 8,169 | 3,936 | 4,233 | 5.0 |

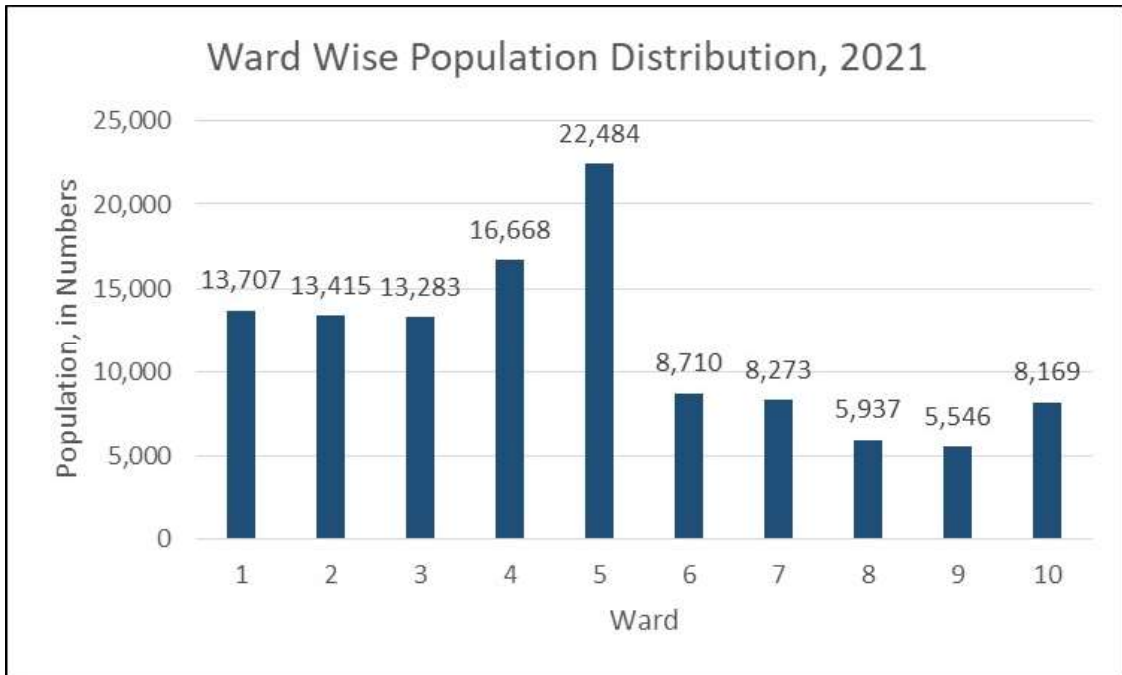


Figure 5-5 Ward Level Population data of Birtamode municipality (Source: CBS)

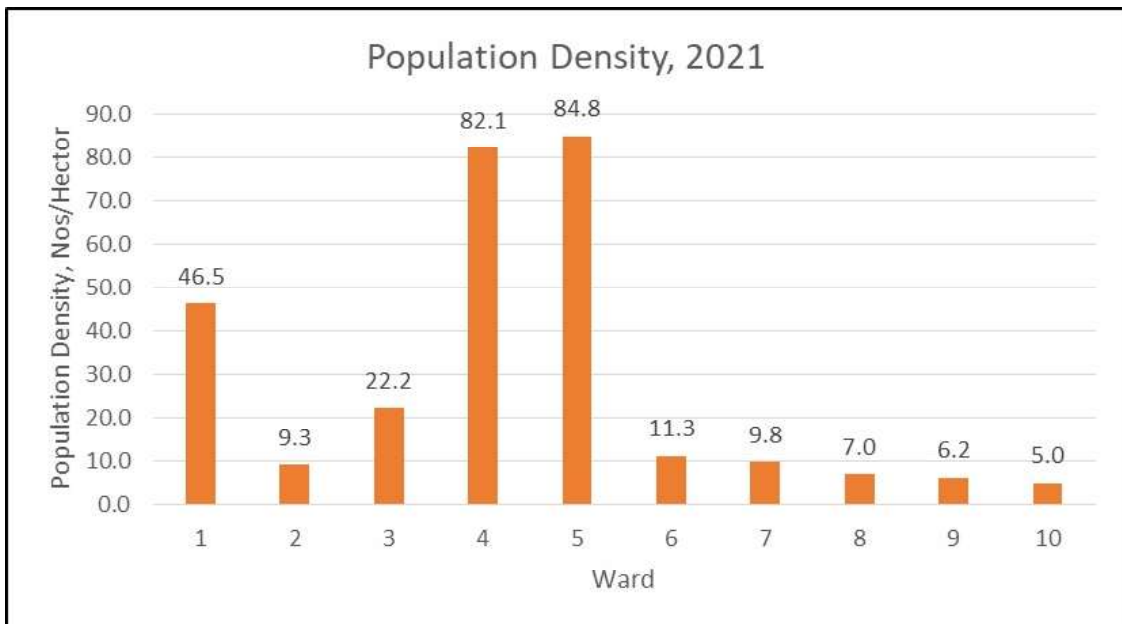


Figure 5-4 Ward Level Population density of Birtamode municipality (Source: CBS)

The distribution of households shows variations across the wards, with Ward 5 having the most households, while Ward 9 has the least. The wards with smaller areas, such as Wards

1 and 4, exhibit relatively high population densities, while larger wards, like Wards 6, 7, 8, 9, and 10, have lower densities, suggesting a more dispersed settlement pattern.



Figure 5-6 Ward level HH data of Birtamode municipality (Source: CBS)

The present demographic trends indicate variations in population concentration, household distribution, and density across different wards. These patterns can help in urban planning, resource allocation, and infrastructure development to ensure balanced growth and efficient service delivery across the municipality.

POPULATION GROWTH TREND

The population data from 2001, 2011, and 2021 shows a consistent and significant increase over the two decades [5]. In 2001, the total population was 58,001, which grew to 81,878 in 2011, reflecting a growth of 23,877 people in ten years. This trend continued over the next decade, with the population reaching 116,192 in 2021, marking an increase of 34,314 individuals. The growth rate appears to have accelerated between 2011 and 2021, indicating rapid urbanization and expansion in the area.

Similarly, the population density, measured in people per hectare (PPH), has increased over time. In 2001, the density was 7.4 PPH, which rose to 10.5 PPH in 2011, indicating a growing pressure on land and resources. By 2021, the density had further increased to 14.9 PPH, reflecting the impact of urban expansion and migration into the area. This rising

density suggests a shift towards more concentrated settlements, potentially leading to increased demand for housing, infrastructure, and public services.

Table 5-2 Population growth of Birtamod Municipality over the last three decades (Source: CBS)

| Year | Area(S.km) | Population | Area, in Hector | Population Density |
|------|------------|------------|-----------------|--------------------|
| 2001 | 77.94 | 58001 | 7794 | 7.44 |
| 2011 | 77.94 | 81878 | 7794 | 10.51 |
| 2021 | 77.94 | 116192 | 7794 | 14.91 |

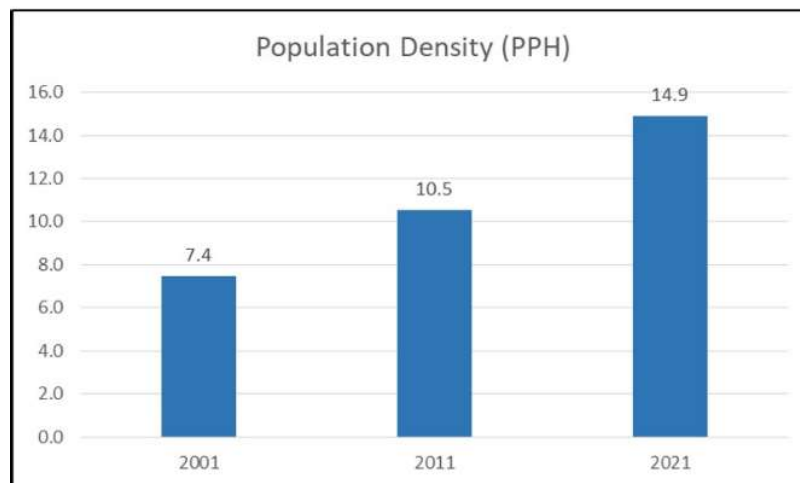
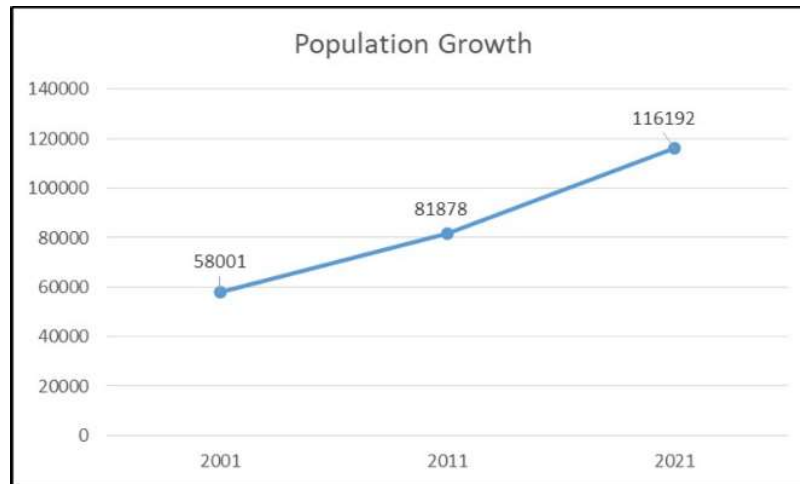


Figure 5-7 Population Growth of Birtamode Municipality (Source: CBS)

The steady rise in both total population and population density highlights the ongoing transformation of the region. Urbanization, economic opportunities, and improved living conditions might be driving this growth. However, the increasing density also underscores the need for effective urban planning, infrastructure development, and sustainable resource management to accommodate the growing population while maintaining livability and environmental balance.

Findings for Objective 1: Mass Migration & Population Growth

Based on the collected data, the findings for **Objective I** of this research confirms that mass migration and population growth in district and municipal level of study area played a major role in driving urban expansion in the study area. Particularly after the end of the Maoist Insurgency (1996–2006). As political stability improved post-2006, infrastructure development, including road networks, hospitals, bus parks, and academic institutions, accelerated, making the region more attractive for settlers and leading to population growth. To accommodate the increasing population, urban extended towards the city edges. Since urban centers were already occupied by business areas, people were drawn to the edge areas due to the availability of land at a more affordable price compared to market centers. The suitability of land in these areas further encouraged settlement, resulting in urban expansion into former estate land. Consequently, this expansion has led to a significant reduction in green landscapes, particularly tea plantation areas, marking a shift from agricultural land to urban settlements.

5.1.2 Urbanization and Urban expansion scenario

Urbanization and Urban expansion in Giri Bandhu Tea Estate started after the the establishment of (such as Tek Bahadur Bus Park) as a central business zone, leading to the growth of settlements around it, aligns with the Central Place Theory and aspects of the Sector Model (Hoyt's Model) as mention in literature review.

Back in 1980 (2037 B.S.), the price of land in this area (Birtamod) was just NPR 5,000 per Bigha Birtamode city was very far from the tea estate land. Many people avoided investing here, calling it a place where only jackals roamed. After 20 years, the price of land in the same area had risen to

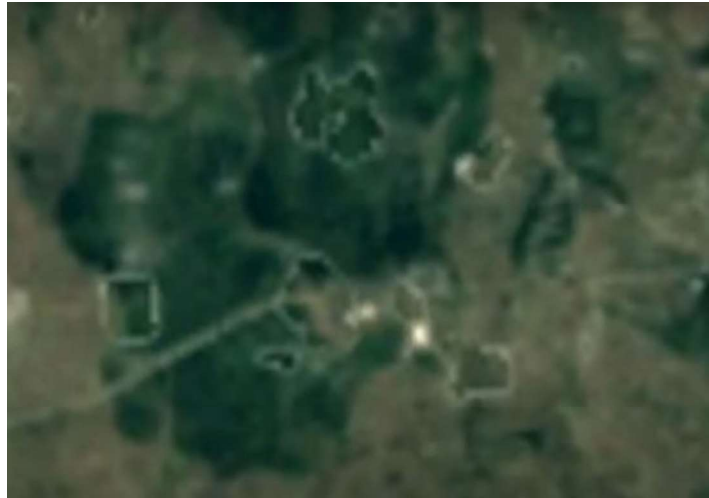


Figure 5-8 Tea Estate Area in 2037 B.S, with no settlement around NPR 500,000 per kattha. Around 2003 (060 B.S.), opportunities for land and business transactions started emerging in this area.



Figure 5-9 Urbanization and Urban expansion scenario Of Giri Bandhu Tea Estate Area

A large number of people migrated, primarily from neighboring mid-hill areas such as Taplejung, Ilam, Panchthar, Terhathum, and Dhankuta, suffered by political instability during the Maoist Insurgency lasted from **2052 to 2063 BS (1996-2006 AD)**. After **2063 BS (2006 AD)**, when the conflict ended, development projects like roads, hospitals, bus parks, and schools grew rapidly. During this period, Birtamode city also began to grow and extend towards the nearby Giri Bandhu Tea Estate.



Figure 5-10 First: View from Bus park (Former Estate land) towards Tea Estate Second: view from Tea Estate towards bus park area (Former Estate land)

With the aim of converting 71 bighas of estate land into an urban settlement, the Giri Bandhu family donated 2 bighas of land to establish a Bus park named Tek Bahadur Bus Park. The goal was to develop a city area within the 51 bighas of Estate land surrounding it. In this way, urban settlement expanded within 51 bighas out of 71 bighas of land.

So in conclusion urbanization in the study area began only after the city expanded toward the estate land. First, Birtamod grew closer to the estate. Then, the estate owner gave some land for a bus park. After that, more people started building houses and settlements grew around that area. The development pattern of Giri Bandhu Tea Estate aligns with Central Place Theory, while growth is also influenced by transport routes. Additionally, the Sector Model plays a significant role in shaping urban expansion.

5.1.3 Urban Expansion Scenario

This research focuses on Jhapa District, located in the southern lowland region of Nepal. Since 1996, area has witnessed rapid urban growth. This urbanization trend is largely shaped by migration and population increase, leading to the conversion of fertile agricultural land into urban settlements.

Urban expansion is driven by underlying factors (Devkota, 2018) that operate across specific temporal and spatial scales. Understanding these drivers requires contextual analysis, as different factors exert varying influences depending on time and location. In the case of Jhapa District, the primary forces behind its accelerated urbanization include economic opportunities, political circumstances, and developmental initiatives during certain periods. These are further supported by the availability of public services, demographic growth, physical geography, governmental plans and policies, (Chatterjee, 2024) and the impacts of globalization. Similar trends are observed in other urban centers

of Nepal. Additionally, urban sprawl is influenced by physical characteristics, access to services, globalization, and planning frameworks.

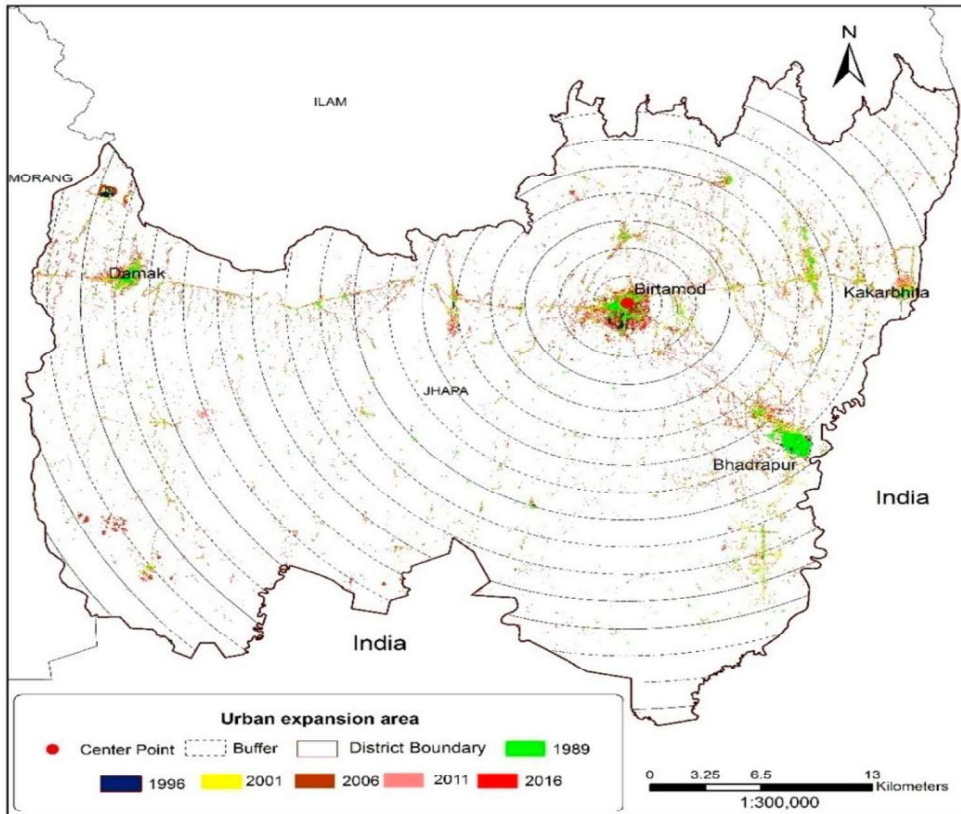


Figure 5-11 Outward Urban Extent from City Center

The urban core, particularly Birtamode Market or Tek Bahadur Bus Park, is referred to as the "center" in this analysis. Areas along the East-West and Mechi highways were more urbanized, whereas the southern and southwestern peripheries had slower growth rates. Within a 2–4 km radius of Birtamod's center, a consistent growth of urban land was seen, with the core itself being within this area. Notably, there has been substantial urban development in the area between 12 and 18 kilometers from Birtamod. Similarly, there is a significant amount of urban coverage in the 28–32 km range.

5.1.4 Functional dynamics and land use changes

At District level of study area:

The research region is in Nepal's Jhapa District, which is the nation's easternmost district. Since 1996, the rate of urban growth in this area has increased. Numerous changes in land use were noted between 1996 and 2021, including a linear rise in the urban area, a steady decrease in the amount of land under cultivation, little change in the forest cover and bushes, and variations in the area used for tea cultivation.

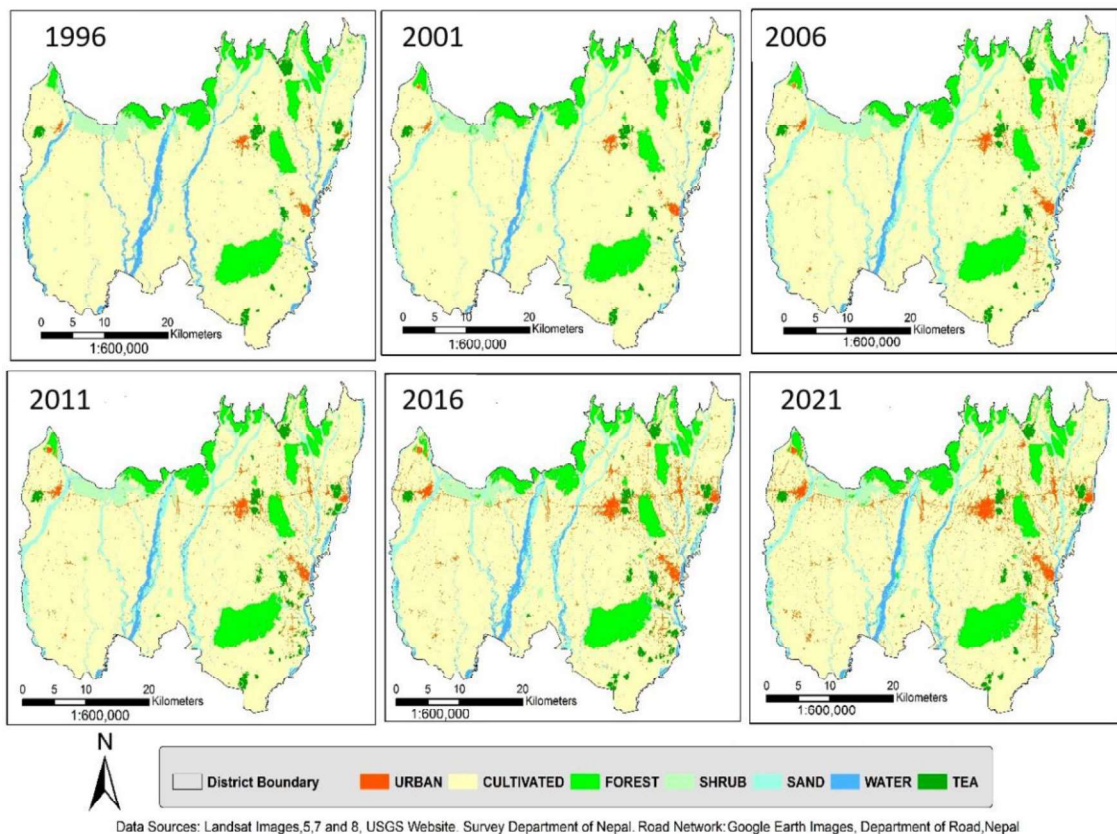


Figure 5-12 maps of Jhapa district for 1996–2021

Human activities, changes in land use, and the goal of a sustainable future environment are strongly interlinked. Rapid and unregulated urbanization often leads to the loss of valuable farmland, which directly impacts long-term food security. Additionally, poorly planned road networks contribute to environmental instability and threaten future

sustainability. The area is highly vulnerable to seasonal floods and waterlogging. Annually, seasonal rainfall gives rise to disasters such as flooding, waterlogging, and riverbank erosion, causing considerable loss of life and damage to property.

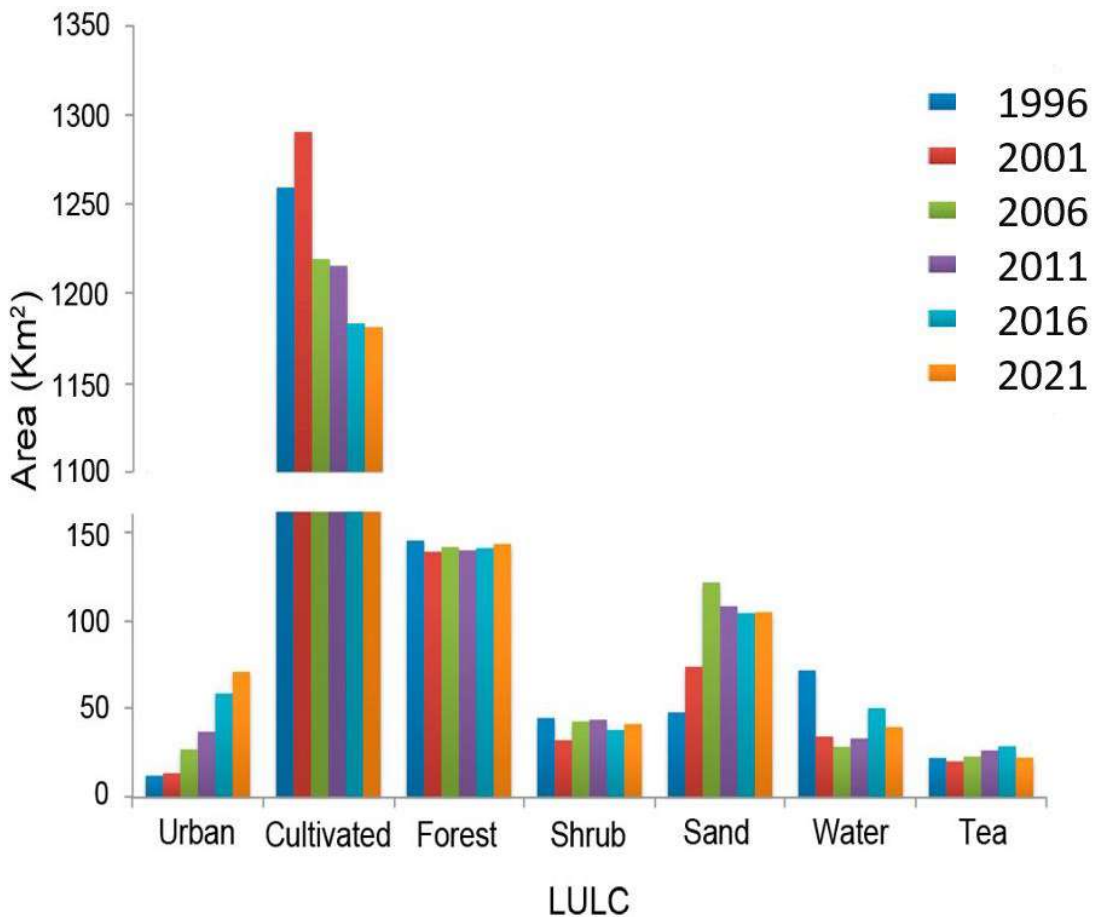


Figure 5-13 Trend of LULC change in study area

As shown in the map, chart, and table, the total urban area of the region was 12.35 km² in 1996, growing at an average rate of 1.56% per year over the next seven years. By 2001, it had increased to 13.38 km². However, by 2006, it had rapidly expanded to 27.12 km², with a sharp annual growth rate of 19.57%. The urban area continued to grow, reaching 37.09 km² by 2011, although the growth rate slowed to 7.35% per year. A major expansion occurred with the area increasing to 58.65 km², averaging 11.63% annual growth, marking

a significant change in the district's urban development. Between 2016 and 2021, urban growth continued, reaching 70.90 km², with a slower average annual rate of 4.18%. (Rimal, 2013) (Hamidreza Keshtkar & Bhagawat Rimal, 2017).

Table 5-3 Land-use distribution from 1996 to 2021 (in km²):

| SN. | LAND USE | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
|-----|----------------|---------|---------|---------|---------|---------|---------|
| 1. | Urban built-up | 12.35 | 13.71 | 27.12 | 37.09 | 58.65 | 70.91 |
| 2. | Tea | 22.26 | 20.38 | 23.1 | 26.58 | 28.96 | 22.52 |
| 3. | Cultivated | 1259.34 | 1290.34 | 1219.27 | 1215.43 | 1183.25 | 1181.27 |
| 4. | Shrub | 44.85 | 32.31 | 42.89 | 43.87 | 37.95 | 41.51 |
| 5. | Sand | 48.01 | 73.77 | 121.26 | 107.88 | 103.82 | 104.5 |
| 6. | Water | 71.72 | 34.4 | 28.61 | 33.33 | 50.26 | 39.77 |
| 7. | Forest | 144.95 | 138.57 | 141.23 | 139.31 | 140.6 | 143.01 |
| 8. | Total | 1603.49 | 1603.49 | 1603.49 | 1603.49 | 1603.49 | 1603.49 |

The urban area expanded from 12.35 km² in 1996 to 70.90 km² in 2021, experiencing different rates of growth over time.

- 1996–2001: Slow growth (1.56% per year), reaching 13.38 km².
- 2001–2006: Rapid expansion to 27.12 km² (19.57% annual growth).
- 2006–2011: Continued rise to 37.09 km², but at a slower 7.35% growth rate.
- 2011–2016: Sharp increase to 58.65 km² (11.63% growth).
- 2016–2021: Growth continued to 70.90 km², at a 4.18% rate. (Hamidreza Keshtkar & Bhagawat Rimal, 2017), (Rimal, 2013)

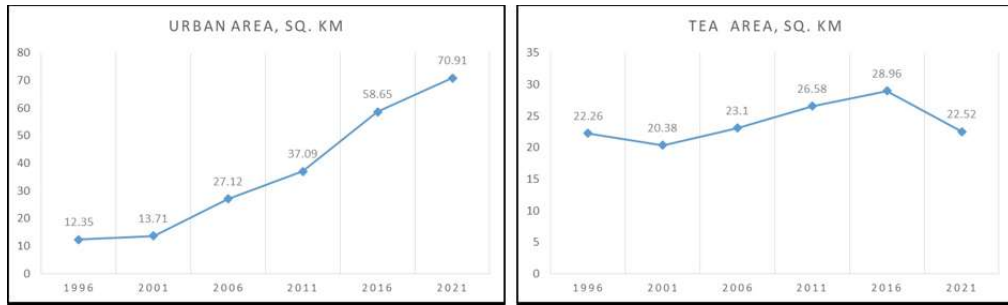


Figure 5-14 Overall change in urban Area and Tea plantation area of Jhapa district from 1996 to 2021

The area used for tea farming was 22.26 km² in 1996 and slightly decreased to 20.38 km² by 2001. It then increased over the years, it increased to 23.10 km² in 2006, 26.58 km² in 2011, and further to 28.96 km² in 2016. However, by 2021, it dropped sharply to 22.52 km². This decline is mainly due to decreasing interest in tea farming and the growing influence of the real estate market, which is turning agricultural land into urban areas.

At Municipal level of study area:

Birtamod Municipality's land use is predominantly characterized by cultivated land (58.581%), followed by built-up areas (13.82%), tea estates (5.06%), orchards (2.18%), and rivers (1.04%) (R. H. Timilsina, 2019). The land in the municipality is primarily used for agriculture, with crops such as rice, wheat, mustard, and tea being cultivated. The built-up areas, which include residential, commercial, and industrial zones, reflect the municipality's development as a growing commercial hub. Located to the east of Birtamod are several large tea estates and processing factories, which play a vital role in the local economy. Orchards, likely dedicated to fruit cultivation, are another significant land use in the area. A small portion of the land is occupied by rivers, while other areas are designated for public use, cultural and archaeological importance, and potentially forest zones.

Between 2011 and 2021, Birtamode Municipality saw significant changes in land use, particularly in the built-up area. The built-up area expanded from 2.515 square kilometers in 2011 to 3.56 square kilometers in 2021, reflecting rapid urbanization and growth in residential, commercial, and industrial zones. This expansion likely corresponds to the municipality's increasing commercial activity and infrastructure development. Alongside this growth, forest cover decreased slightly from 4.336 sq. km to 4.073 sq. km, indicating potential encroachment or land use changes due to urbanization.

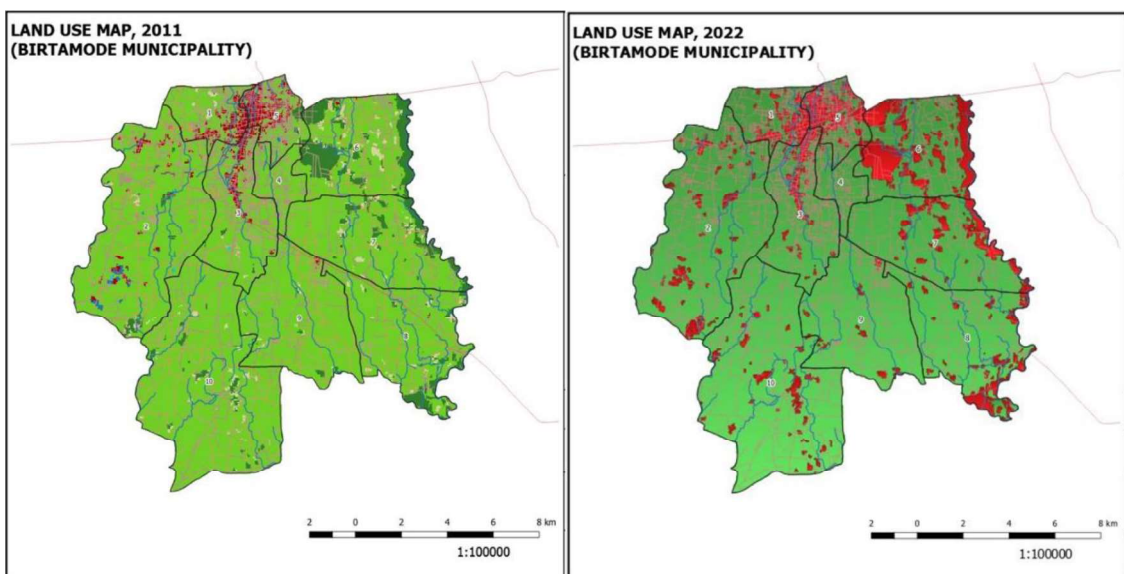


Figure 5-15 LULC maps of Birtamode Municipality for year 2011 & 2022

Cultivated land also saw a marginal decline, from 69.166 sq. km in 2011 to 68.904 sq. km in 2021, suggesting a slight shift away from agricultural land in favor of urban development. Other land use categories, including water bodies, riverbeds, grasslands, and areas marked as "other," remained unchanged over the decade. Overall, the data points to urban expansion as the most prominent trend in Birtamode, with a corresponding reduction in forest and agricultural land.

Table 5-4 Land use, 2011 of Birtamode Municipality

| S.N | Land cover | Area (sq.m) | Area (sq. km) |
|-----|------------------|---------------|---------------|
| 1. | Water body | 30,977.77 | 0.031 |
| 2. | Forest | 4,336,449.39 | 4.336 |
| 3. | Riverbed | 180,305.04 | 0.18 |
| 4. | Built-up | 2,514,665.10 | 2.515 |
| 5. | Cultivation land | 69,165,776.61 | 69.166 |
| 6. | Grassland | 271,634.49 | 0.272 |
| 7. | Other | 1,513,821.09 | 1.514 |

Table 5-5 Land use, 2022 of Birtamode Municipality

| S.N | Land cover | Area (sq.m) | Area (sq.km) |
|-----|------------------|---------------|--------------|
| 1. | Water body | 30,977.77 | 0.031 |
| 2. | Forest | 4,153,135.76 | 4.073 |
| 3. | Riverbed | 180,305.04 | 0.18 |
| 4. | Built-up | 3,560,000.00 | 3.56 |
| 5. | Cultivation land | 69,008,668.34 | 68.904 |
| 6. | Grassland | 271,634.49 | 0.272 |
| 7. | Other | 1,513,821.09 | 1.514 |

5.1.5 Proximity to highways

According to the Axial Growth Model discussed in literature review, urban development tends to occur more along transportation lines, with areas close to the transportation grows more, while areas farther away develop less. Also, in urban studies, areas closer to highways typically experience more development due to better transportation connections.

Former Estate land, where new settlement has emerged, this transition area is located close to East-West Highway (as clearly shown in the figure below). This proximity to the highway is a significant reason for the conversion of estate land into urban settlements as per Axial Growth pole theory and different urban studies. So this is consider another key driving factor of urban expansion towards the study area (estate land), which, in turn, leads to a reduction in green space at the city's edge.

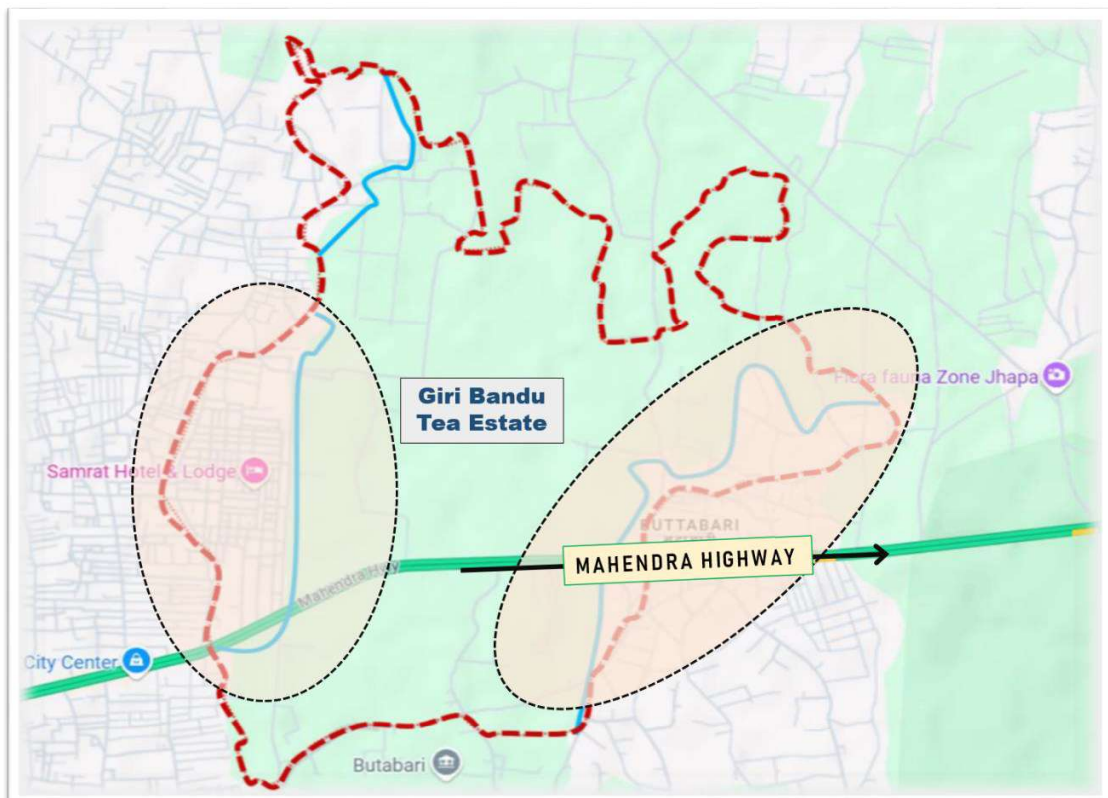


Figure 5-16 Proximity to Highway of study area

5.1.6 Available Road Networks

5.1.6.1 At a District level of study area

Jhapa district, located in the southeastern part of Nepal, has a well-developed road network that plays an important role in connecting major urban centers, rural settlements, and industrial hubs. Being a part of the Terai region, Jhapa enjoys relatively better road infrastructure compared to the hilly and mountainous districts. The district is

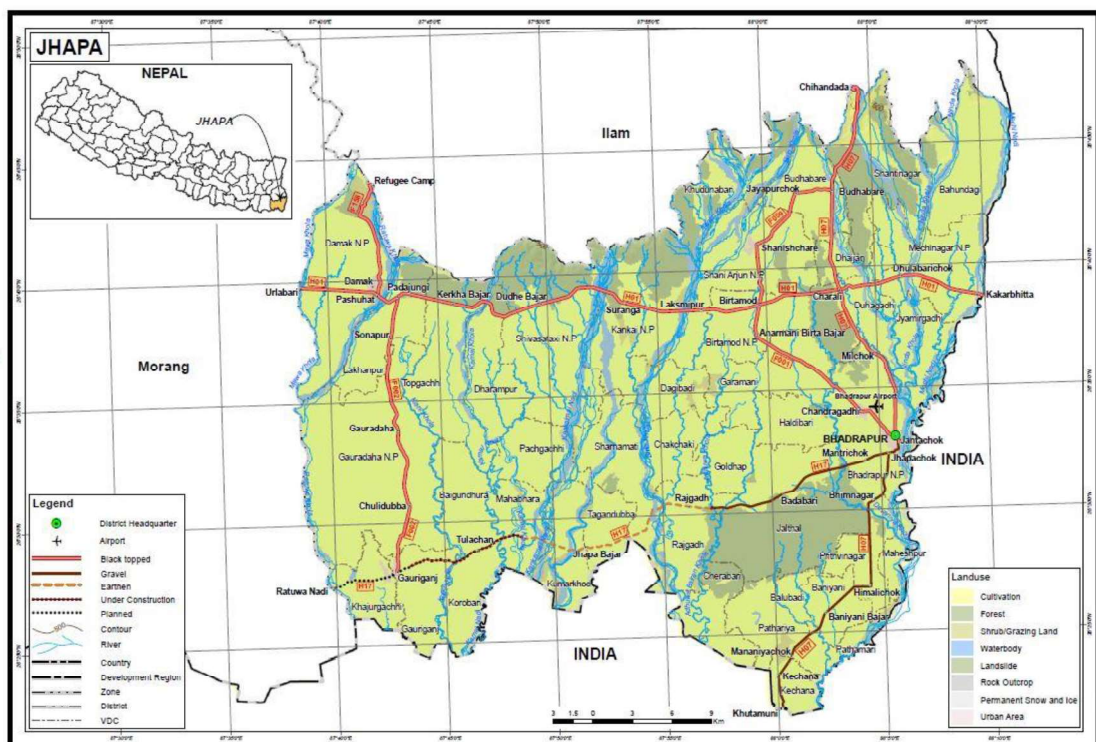


Figure 5-17 Road Networks of jhapa district (Source: GIS Shape files)

strategically positioned along the East-West Highway (Mahendra Highway), Nepal's longest and most significant road corridor, which serves as the backbone of transportation in the region. This highway connects Jhapa with major cities like Biratnagar, Janakpur, and Bhairahawa while also linking to Kakarbhitta, an important border point for trade and travel between Nepal and India. In addition to the East-West Highway, the Mechi Highway extends northward from Charali in Jhapa towards Ilam and beyond, providing vital connectivity between the Terai and the hilly regions. This highway

is crucial for the transportation of agricultural products such as tea, cardamom, and ginger from the hills to the markets in Jhapa and beyond. Furthermore, the Postal Highway (Hulaki Rajmarga) runs parallel to the East-West Highway, improving local access within Jhapa and enhancing border trade with India. Several feeder roads and district roads further link smaller towns and rural villages to the main transportation corridors.

5.1.6.2 At a Municipality level of study area

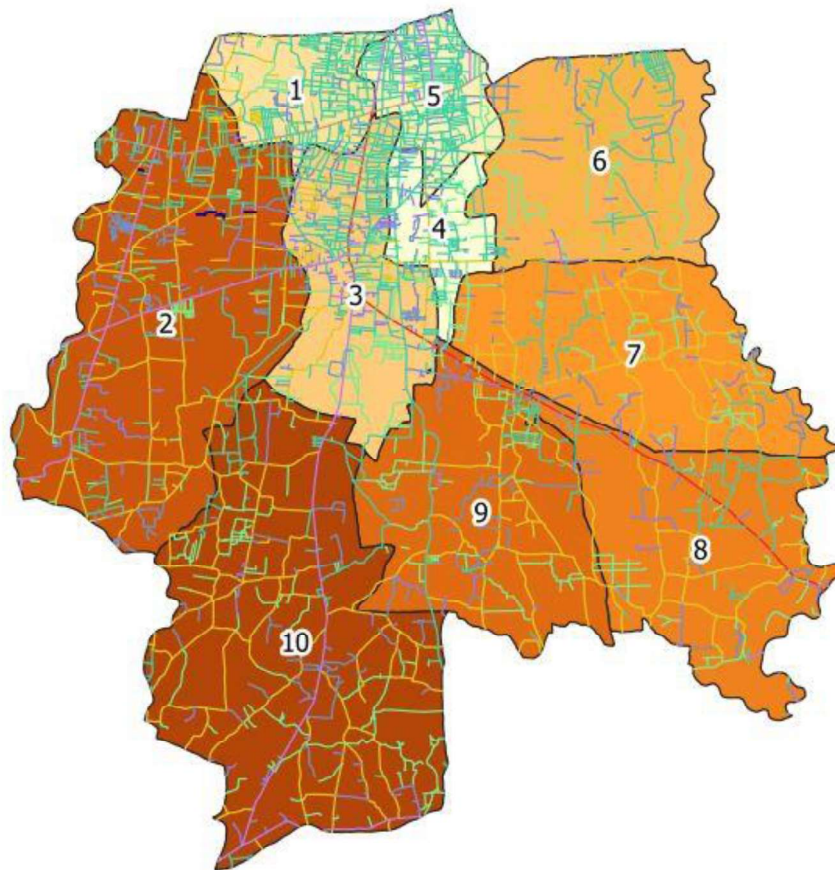


Figure 5-18 Current Road networks available in Birtamode municipality (Source: GIS Shape files)

Birtamode Municipality, the commercial and administrative center of Jhapa, serves as a major transportation hub in eastern Nepal. The town is located at the intersection of the

East-West Highway and Mechi Highway, making it a critical junction for trade and mobility. Birtamode has a well-developed network of urban roads, including paved and well-maintained streets that facilitate smooth intra-city movement. The municipality has expanded its road infrastructure in recent years, improving connectivity within residential, commercial, and industrial areas. The road network in Birtamode also supports public transportation services such as buses, minibuses, and taxis, ensuring efficient mobility for residents and businesses.

Additionally, Birtamode benefits from strong cross-border connectivity due to its proximity to the Kakarbhitta border point, which serves as a key entry for goods and travelers between Nepal and India. This strategic location has encouraged the growth of transport-related businesses, warehouses, and logistics services. However, despite these developments, the municipality faces challenges such as increasing traffic congestion, road maintenance issues, and the need for better drainage infrastructure to prevent waterlogging during the monsoon season.

Overall, Jhapa district and Birtamode Municipality have a robust and expanding road network that supports economic activities, enhances trade, and improves accessibility. Continued investment in road infrastructure, urban planning, and traffic management will be essential to sustain growth and address future transportation needs in the region.

5.1.7 Socio-Economic Factors

The socio-economic landscape of Giri Bandu Tea Estate is rapidly evolving due to the decline in traditional tea-based livelihoods. Many estate workers, who have been engaged in tea production for generations, now face uncertainty as tea cultivation has diminished by approximately 70% due to urban expansion. This decline has directly impacted employment opportunities, forcing some workers to seek alternative livelihoods or migrate to other locations in search of jobs.

The real estate sector has seen a surge in demand, with increasing land values and widespread land speculation. This trend has led to unregulated plotting and informal settlements, creating disparities in access to essential services. While some stakeholders

acknowledge the importance of preserving green spaces, economic incentives continue to drive urban encroachment.

The urban expansion of the estate has also resulted in socio-economic inequalities, with informal settlements lacking basic infrastructure and access to amenities. Additionally, stakeholders such as local residents, planners, and estate owners hold differing perspectives on balancing development and conservation. The lack of proper planning and policy enforcement has made sustainable urban management challenging, putting additional strain on the local economy and infrastructure.

5.1.8 Political Factors:

"Amendment to the Land Act, 2021 BS."

Section 12 of the Land Act, 2021, states that land occupied by industries, agricultural industries, cooperative farming organizations, and educational or health institutions is exempt from land ceiling provisions.

Budhkarán Rajbansí, a landlord from Jhapa with close ties to the royal palace, learned in advance that establishing a tea plantation could prevent his land from being nationalized. Acting on this information, he founded the Budhkarán Tea Estate to avoid land ceiling regulations. Similarly, the Giri brothers—Prem Kumar Giri, Krishna Kumar Giri, and Trilochan Giri—who owned around 500 bighas of land in Birtamod, Jhapa, received the same information. To protect their landholdings, they registered the Giri Bandhu Tea Estate in 2020 BS, prior to the enforcement of the Land Reform Act. Consequently, when the act was implemented, their land was exempt from sealing due to its use as a tea estate.

On December 25, 1964, an official notice in the Nepal Gazette confirmed that the land used by the Giri Bandhu Tea Estate would not be subject to land ceiling. The notice specified that this exemption would remain valid only as long as the land continued to be used for tea production. According to the Gazette, "In accordance with the authority granted under Section 12(E) of the Land Act 2021, about 343 bighas, 19 kathas, and 12

dhurs of land are exempt from sealing, and a total of 500 bighas have been allocated exclusively for the operation of a tea estate.” The Act also restricted the buying, selling, or leasing of this exempted land.

As a result, the Giri Bandhu Tea Estate, initially established during the Panchayat period to avoid land ceiling measures, continued to operate after the introduction of the multi-party democratic system. Amendments made to the law following the democratic transition preserved the limited exemptions granted to agricultural industries. These provisions remained in effect even through the eighth amendment to the Land Related Act, 2076.

In recent years, however, there have been efforts by land mafias to divide and sell the tea estate land. This has exposed violations of the original intent of the Land Act, 2076, particularly through the exchange of valuable land in prime locations with cheaper plots elsewhere. In 2061, 51 bighas of land were sold through such unauthorized exchanges from the total area of 343 bighas, 19 kathas, and 12 dhurs.

Further plans are reportedly underway to sell the remaining land. At present, the Giri Bandhu Tea Estate holds about 280 bighas, with the rest being used by workers. Experts estimate that the current value of land near the Birtamod marketplace in Jhapa ranges from Rs 200,000 to Rs 3 million per square meter. There are ongoing attempts to swap this high-value land with low-value land in Kachanakbal Rural Municipality and Jhapa Rural Municipality under the pretext of relocating the tea estate. The intention is to sell the prime land in Birtamod for real estate development. Real estate developer Deepak Malhotra is reportedly playing a significant role in managing this land deal. (Republica, 2017).

5.2 ANALYZING RESPONSES FROM STAKEHOLDERS OF TEA ESTATE (OBJ-II)

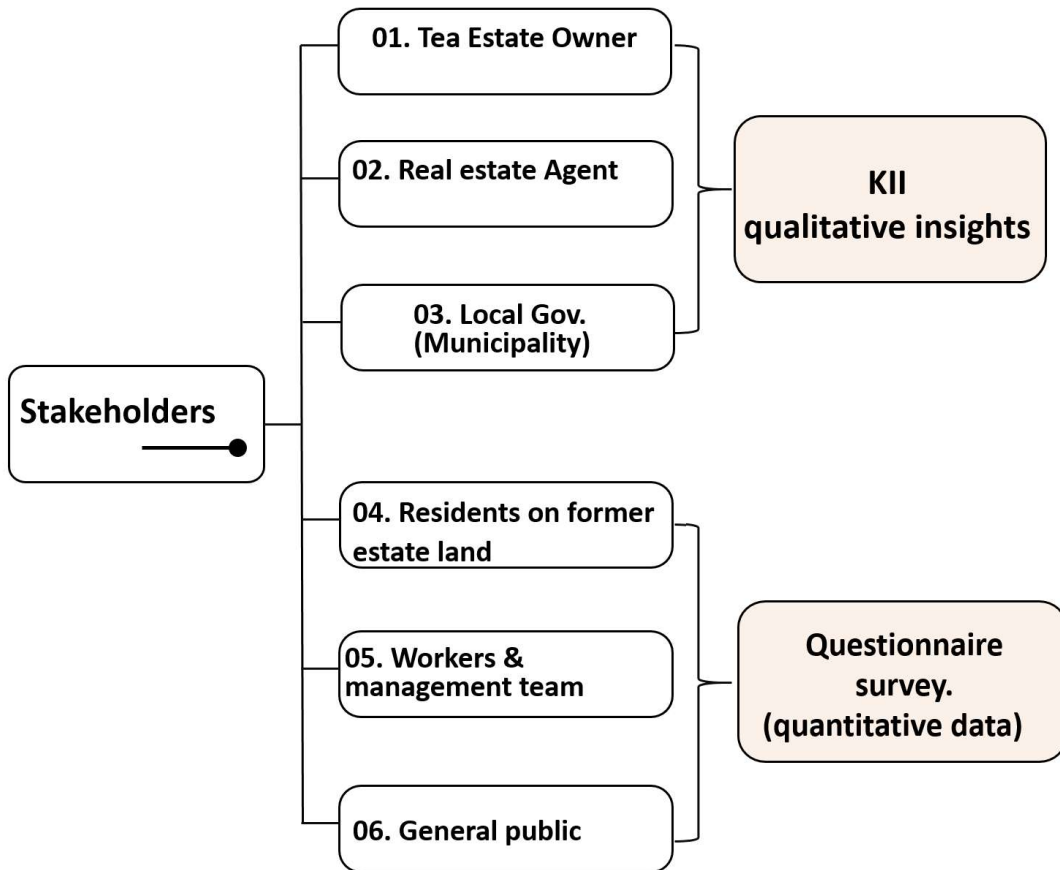


Figure 5-19 List of stakeholders for data collection and analysis

This Section focuses on analyzing responses from various stakeholders of the Giri Bandhu Tea Estate as part of Objective II. To gather opinion and responses from stakeholders, 6 key stakeholders were considered in this study. Among these 6 stakeholders, KII was conducted with 3 stakeholders: the Tea Estate owner, local government and the Real Estate agent. A questionnaire survey was carried out with the remaining 3 stakeholders: Residents on former estate land, workers and management team of the estate and General public (visitors or residents) of Birtamod municipality. A mixed-method approach

was followed for stakeholder analysis to gain both qualitative insights (Via KII) and quantitative data (Via questionnaire surveys).

Among the six key stakeholders (as shown in the figure above), Mr. Chatra Giri serves as the chairperson of Giri Bandhu Tea Estate Pvt. Ltd., overseeing estate operations, making key decisions, and guiding its strategic direction. Second, Mr. Bishnu Kumar Rai is responsible for the plotting of the former estate land, which spans 70 Bighas. Third, municipality staff represent the local government, playing a crucial role in policy formulation and urban planning. Fourth, residents have settled on the former estate land, utilizing 70 Bighas for both residential and commercial purposes. Fifth, the estate's workers and management team are directly affected by urban expansion, as the shrinking tea plantation areas pose a threat to business sustainability. Lastly, the general public, including visitors and residents of Birtamode, also have a vested interest in the ongoing land-use changes.

A. Key Informant Interviews (KII) With:

1. Tea Estate Owner : Mr. Chatra Giri

To understand the impact of urban expansion on tea estate operations, economic viability, and future plans.

2. Real Estate agent (Broker) of former estate land : Mr. Bishnu Kumar Rai

To explore the motivations behind land conversion, land management strategies, and perspectives on urban expansion.

3. Local government

B. Questionnaire Survey With:

1. Residents on Former Estate Land covering 70 Bighas:

To understand reasons for land purchase, changes in land use, and infrastructure development.

2. Workers & Management Team of Estate:

To assess the impact of reduced plantation areas on employment, job security, and estate operations.

3. Visitors or any residents of Birtamod municipality:

To gather insights on their perceptions of urban expansion, benefits, or challenges faced.

5.2.1 Key Informant Interviews (KII)

- For qualitative data analysis to gather in-depth information from key tea estate stakeholders, focusing on how they respond to urban growth encroaching on estate land.
- For collecting stakeholders opinions and to understand the context, experience, and perspectives of key stakeholders.
- For identifying trends, problems and potential solutions after urban expansion towards green zones (Land of Giri Bandu Tea Estate) of urban edge of Birtamod municipality.

5.2.1.1 Chairman of Giri Bandu Tea Estate Pvt.Ltd: Mr. Chatra Giri

Giri Bandu Tea Estate Pvt. Ltd states that it has followed all the rules and utilized all the exemptions (special permission) necessary for tea farming on the family's private land. The company emphasized that Giri Bandhu is their private property and reiterated their compliance with the legal limits for tea farming.

Chairman Mr. Chatra Giri denied the rumors that the government gave them the land for free. Giri stated that the tea estate belongs to him and his family and has been passed down from his ancestors, dispelling rumors that it is state-owned. He emphasized Giribandhu Tea Estate is a family asset acquired by his forefathers and not state property.

Giri further claimed that various rumors had been spread about his private property. He says the tea cultivation in Giri Bandu land was started before the Land Act came into effect in 1964 (2021 BS).

He also mentioned that since the company was established in 1963, the area around tea estate has developed into the Birtamode market, which has reduced the land's fertility. As a result, tea production has fallen by 70%, affecting the livelihoods of tea workers. Due to increasing pressure from locals to remove the tea farm from the area, he explained that they submitted an application to exchange Giri Bandhu's land for other plots within the province. The tea estate planned to exchange(land swap) its Birtamod land, priced at Rs 200 million per bigha, for less costly land in Prithvinagar, Jhapa. After a recent Supreme Court decision, Giri said they are working on a solution that follows the court's ruling.

5.2.1.2 Real Estate agent of former estate land: Mr. Bishnu Kumar Rai

How did you come to manage Giribandhu's land?

I am a British Army veteran, now retired. Previously, I also served as the treasurer of the Ex-British Army Association (when Jalkumar Gurung was the president). Back in 1980 (2037 B.S.), when I left for the army, the price of land in this area (Birtamod) was just NPR 5,000 per bigha. Many people avoided investing here, calling it a place where only jackals roamed. By the time I returned with my pension, the price of land in the same area had risen to NPR 500,000 per kattha. When I arrived here, I teamed up with some friends to initially open a small mart, which later expanded into the Gorkha Department Store. It became very successful. At that time, many people realized the need for cities, facilities, and service providers. Around 2003 (060 B.S.), opportunities for land and business transactions started emerging in this area. I encouraged many of my friends from the army to invest in land, but only a few listened. Those who did became millionaires, while those who didn't are now regretting it. By gaining the trust of Giribandhu (manager Sudarshan Giri), I managed 51 bighas of land at that time.

How did you manage such a vast area of land back then?

Actually, it wasn't 51 bighas entirely. I personally handled 38 bighas. Out of that, 2 bighas were allocated for a bus park, and Sudarshan Giri himself kept about 10 bighas. Back then, I purchased the land at NPR 375,000 per kattha, which was equivalent to NPR 7.5 million per bigha. Currently, I only own about 1 kattha, where my office is located, and perhaps 2 or 3 additional katthas.

After acquiring the land, I developed it into a well-organized town by paving roads, creating plots, and arranging for electricity and water. In the next phase, if the 340 bighas of land exchange proposal gets approved (at the time of this conversation, the Giribandhu Tea Estate case was under consideration by the Constitutional Bench of the Supreme Court), there is already a digital map prepared for systematic urbanization purposes. Plans are underway to make it public, with a vision for a well-organized city featuring hospitals, schools, and other facilities. My dream is to build a beautiful city in Jhapa.

Additionally: Complete context of the Giribandhu case: The decision on the land exchange was deemed 'improper, immature, and based on deferred conditions.'

When we paved 30-foot-wide roads back then, local leaders like Keshav Kumar Budhathoki and Mohan Kumar Gautam criticized it, saying it was unnecessary. Now, even those roads have become too narrow. Urban planning like this needs a vision for at least 100 years. This idea originates from the British—a vision for the future. Whether or not investment yields profit is secondary, but creating a city worth living in is a must, and that has always been my goal.

Even before the legal case is resolved, a digital map for its management has already been prepared. What's the plan for this?

The basic idea is to distribute one share per bigha, under a concept called 'NAMS.' Around NPR 400–500 million might have been raised through agreements for 40–50 shares. Some people contributed NPR 10 million, others contributed NPR 2–3 million, and a few even gave as little as NPR 200,000 under smaller agreements. Most of this money was used to pay off Giribandhu's debts and bank loans.

Currently, due to a lack of funds, even the finalized digital map for this area hasn't been published. So far, housing companies in Birtamod, along with businesses like Mahendra, Bajaj, and petroleum dealers, have shown interest in acquiring land here. Some of the media professionals you may know are also involved, and more details will gradually unfold.

The plan is to have a single company collect the shares and sell them in a way that suits their operations. Out of the approximately 340 bighas, about 100 bighas are under my responsibility, designated for the entire Jhapa region—or, more broadly, for the whole eastern region. Another 100 bighas are to be handled by Kathmandu-based businessman Deepak Malhotra. The remaining 140 bighas are intended to remain under Giribandhu's ownership.

However, the management of this land will only be finalized after the land exchange process is completed. Even for the 100 bighas under Malhotra's responsibility, if he's told, "You're the coordinator, manage it properly," that's perfectly fine. If Mr. Malhotra decides to bring in his own people to oversee it, that's acceptable too.

Giribandhu has already issued a memorandum regarding this matter. The details will only be finalized after the land exchange process is complete. For now, the land required for the exchange is being identified in Jhapa Rural Municipality—although I can't recall the name of the specific location at the moment. The process is lengthy. First, we need to purchase that land, transfer it to Giribandhu, and then Giribandhu needs to transfer it back to us. In my estimation, this entire process might take another three years to complete.

As for the example of share transfers and exchanges, it seems the Naz Tea Estate didn't serve as an ideal precedent. But it's not entirely a failure either. Take Naz, for instance. At the time, the tea workers from the 51 bighas here didn't all move to Naz in Bahundangi. Those who stayed behind were given 10 dhur of land each to settle here. Naz is still being managed by Sudarshan Giri. Even now, many of the 200 workers in Giribandhu tell me,

"Sir, when will this exchange happen? Please give us land here and let us stay. We don't want to go anywhere."

So, what should be considered an example? In the past, Morang's Satighatta tea estate (a 250-bigha plantation) was relocated to Kakarbhitta. Several tea plantations in the southern belt of Jhapa have undergone similar exchanges—there have probably been 10–12 such cases. However, in Giribandhu's case, political issues have been overly intertwined, creating additional challenges.

This kind of work has been described as state exploitation. What's your response?

What's there for me? My children are in London, and I'm a retired British Army veteran with a pension. While I can, I want to contribute something meaningful and leave behind a legacy. How is this state exploitation? If this project succeeds, it could set a precedent for a well-planned city and settlement, with people saying, "Let's go to Jhapa to see an example of organized urbanization."

Moreover, Chhatra Giri, the principal operator of Giribandhu, has connections everywhere. Who isn't on good terms with him? Be it KP Oli or Sher Bahadur Deuba, he calls Sher Bahadur his elder brother and Arzu his sister-in-law. He even sent me a photo of himself with Prachanda via Messenger. All the managerial tasks will be handled by Giri. The transformation of Birtamod is certain.

Also: The Giribandhu Tea Estate case, which 'shook' KP Oli: What happened, and who is involved?

Down in Damak, too, KP Oli's vision has led to the construction of a view tower and an industrial zone with foreign investment. This is how development happens and becomes visible. Damak is developing similarly to Birtamod.

But isn't it true that despite all these agreements, some investors are asking for their money back?

Yes, it's true. Within Giribandhu itself, two brothers (Prem Kumar and Krishna Giri) have taken legal action, claiming ownership of 102 bighas of land as their share. Amid such internal disputes, I've told Chhatra Giri, the principal operator, to return the money I've invested. I've also made it clear that such internal conflicts make progress impossible.

Findings from above interview:

From above interview Perspectives of stakeholder mr. Bishnu kumar rai is as follows:

Mr. Bishnu Kumar Rai views the Giri Bandhu Tea Estate land as a valuable asset with great potential for urban development. He emphasizes his long-term vision for transforming the area into a well-organized city, with facilities such as hospitals and schools, benefiting both the region and its people. He believes the land exchange proposal, once approved, will play a key role in realizing this dream. Despite challenges, including legal disputes and local resistance, Rai is determined to leave a lasting legacy by contributing to organized urbanization in Jhapa. He acknowledges the complex political issues surrounding the project but remains confident in the transformative potential of the land and its future development.

5.2.1.3 Local Government: Municipality

The Supreme Court has mandated the nationalization of land that is not utilized for the production of tea under the name Giri Bandhu Tea Estate (Former Estate Land covering 70 Bigas). The release of the court's full decision has confused the local government. The truth of the matter will become clear over time.

The Giri Bandhu Tea Estate land in Birtamode, Jhapa, is currently under a development ban, preventing any new residential or commercial construction. Due to ongoing legal disputes and controversies surrounding land ownership and exchange, the government has halted further development in the area. As a result, no new building permits are being issued, and authorities have restricted any form of expansion until the matter is resolved.

This land is now considered a restricted zone, meaning that businesses and individuals cannot proceed with new construction. The government has effectively imposed a construction freeze, ensuring that no further urbanization takes place. Additionally, legal actions and disputes over ownership have led to a stay order on development, preventing any structural changes or land transactions. The Estate land is under legal review, creating uncertainty for investors and local residents. Until a final decision is made, no new homes or businesses can be built in the area.

The local government views Giri Bandhu Tea Estate as a key area for urban expansion but faces legal and economic challenges. They see the land's potential for planned development, including infrastructure and business growth, but legal disputes and concerns over fairness in the land exchange process create obstacles. While investment opportunities are recognized, officials also worry about the displacement of tea workers and the decline of the tea industry. Political and public pressure further complicates the situation. Overall, the government remains cautious, aiming to balance urban growth with legal and social concerns.

5.2.2 Questionnaire Survey

5.2.2.1 Residents on Former Estate Land (New settlement)

The first questionnaire survey was conducted with people living in the new settlement developed after 2060 B.S. on the former estate land, covering 51 Bigha out of 71 Bigha. The survey was completed with 32 respondents (22 male and 10 female). The respondents were asked 19 sets of questions (sample shown in the annex). The individuals involved in the survey included residents, businesspeople, hotel owners, and organization representatives.

Table 5-6 Major Topic of discussion with Residents on Former Estate Land

| Section of Analysis | Highest Responses (Total: 32 Respondents) |
|---------------------------------------------|---------------------------------------------------------------------------------------------|
| Why move here? | Affordable land (15), Business (6), City proximity (11) |
| Land use? | Residential (14), Commercial (11), Vacant (7) |
| Infrastructure satisfaction? | Yes (11), No (3), Partially (18) |
| Challenges? | Legal issues (18), Infrastructure problems (14) |
| Biggest benefit? | Increased property value (19) |
| Impact of land conversion? | Strongly positive (7), Somewhat positive (13), Somewhat negative (9), Strongly negative (3) |
| Should tea estate land continue conversion? | Yes (8), No (7), Only if planned (17) |

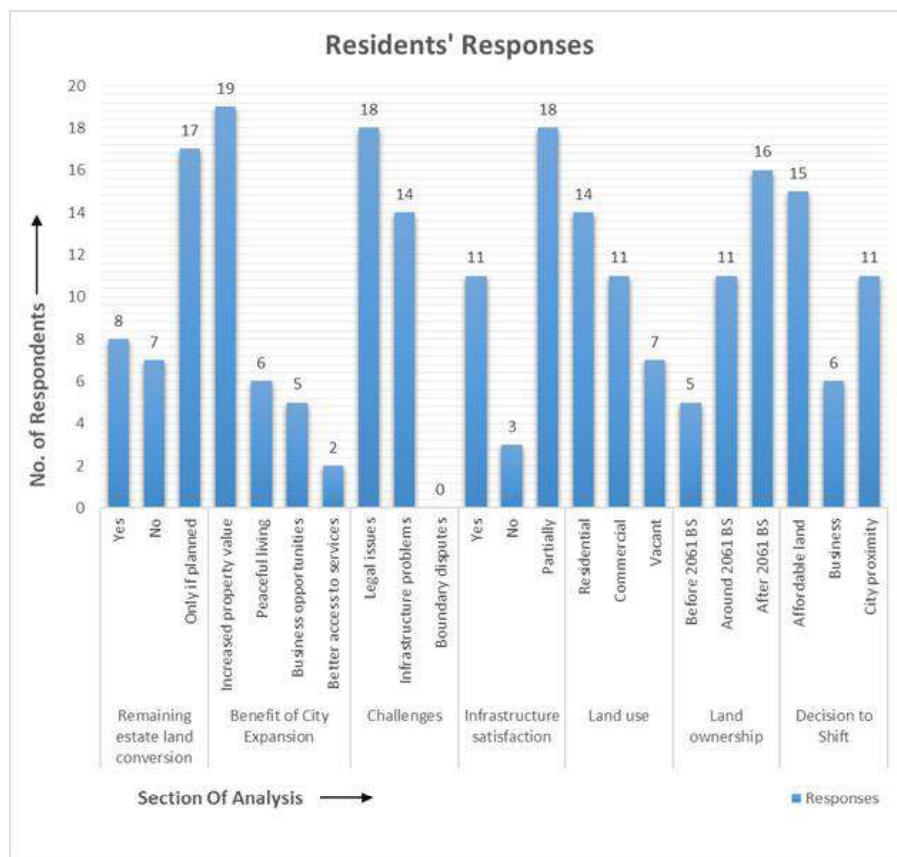


Figure 5-20 Analysis of Responses from Residents on Former Estate Land

5.2.2.2 Workers & Management Team of the Tea Estate

The Second questionnaire survey was conducted with workers and management team of Giri Bandu Tea Estate. The survey was completed with 21 respondents (12 male and 9 female). The respondents were asked 17 sets of questions (sample shown in the annex). The individuals involved in the survey included Tea pickers, office management team, and office worker who were both full time and half time staffs of Giri Bandu Tea Estate pvt. Ltd.

Table 5-7 Major topic of discussion with Workers & Management Team of the Tea Estate

| Section Of Analysis | Highest Responses (Total: 21 Respondents) |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Job roles? | Tea Puckers (12), Factory workers (5), Management staff (4) |
| Urban expansion effects? | Job insecurity (16), Reduced land (18), Lower wages (4) |
| Considered switching jobs due to changes? | Yes (9), No (12) |
| Challenges faced? | Less land for tea cultivation (13), Uncertainty about employment (5), Increased cost of living (3) |
| Tea estate's importance? | Strongly agree (2), Agree (5), Disagree (3), Strongly disagree (11) |
| Impact of urban expansion on jobs? | Loss of opportunities (14), More business (12) |
| Should tea estates be protected from further conversion? | Yes (9), No (7), Unsure (5) |

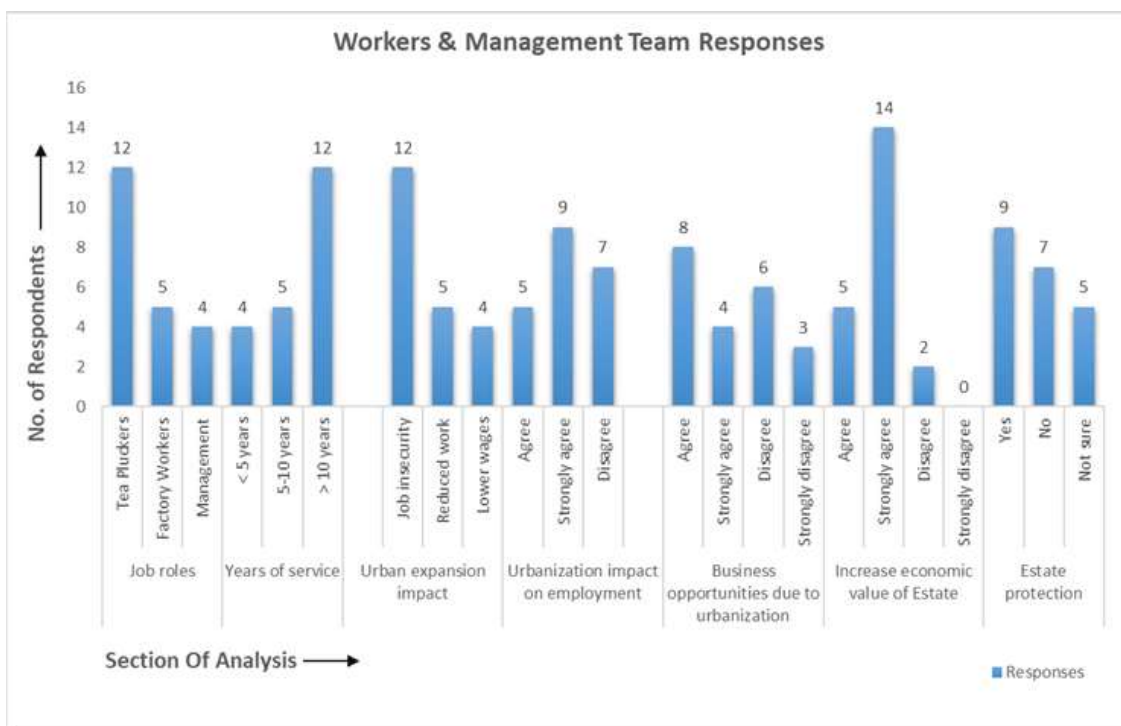


Figure 5-21 Analysis of Responses from Workers & Management Team of the Tea Estate

5.2.2.3 General people (Residents of Birtamod city Nearby Estate, Visitors in tea estate etc.)

The third questionnaire survey was conducted with the general public, including residents of Birtamod city near the estate, visitors to the tea estate, and people with knowledge related to the Giri Bandu case. The survey was completed with 26 respondents (17 male and 9 female). The respondents were asked 14 sets of questions (sample shown in the annex). The individuals involved in the survey included visitors from almost three age groups (children, young adults, and the elderly), longtime residents of Birtamod Municipality, people living in rental properties, and new residents of the city.

Table 5-8 Major topic of discussion with General people (Residents of Birtamod city Nearby Estate, Visitors in tea estate etc.)

| Section Of Analysis | Highest Responses (Total: 26 Respondents) |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Noticed expansion? | Yes (20), No (0) |
| Main drivers of conversion? | Population growth (6), Housing demand (3), All (15) |
| Benefits of expansion? | Business growth (9), Increased land value (14) |
| Challenges? | Traffic congestion (5), Environmental degradation (4), Loss of greenery (6) |
| Tea estate land preservation? | Yes (13), No (10), Not sure (3) |
| Support for further conversion? | Yes (4), No (9), Only if planned properly (13) |
| Observed infrastructure improvements? | Better roads/transport (4), Improved utilities (3), New public services (4), Increased commercial space (5) |

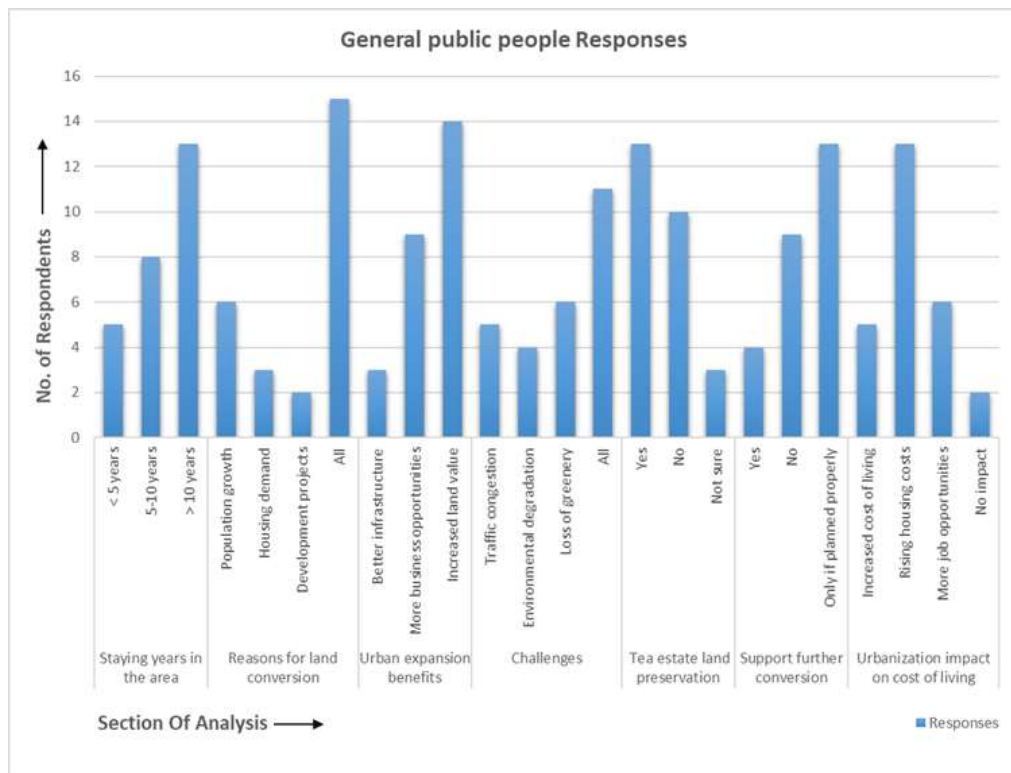


Figure 5-22 Analysis of responses from general people (Residents of Birtamod city Nearby Estate, Visitors in tea estate etc.)

6 CHAPTER SIX: INTERNATIONAL CASE STUDY AREA

6.1 EXPANSION INTO GREEN BELTS IN AHMEDABAD, GUJARAT

6.1.1 Location:

Ahmedabad Urban Agglomeration, Gujarat, India. Key expansion areas include South Bopal, Thaltej, Gota, Bopal, and the outer edges of the Sarkhej-Gandhinagar (SG) Highway and the Sardar Patel (SP) Ring Road. These zones were once agricultural hinterlands but have now emerged as high-value real estate clusters.

6.1.2 Original Land Use:

The lands at the urban periphery were traditionally used for agriculture, grazing, orchards, and seasonal cultivation. They were demarcated as low-density, ecologically sensitive green buffers in Development Plans formulated by the Ahmedabad Urban Development Authority (AUDA). These areas also contained semi-rural villages and open commons that played an important role in ecological balance and food security for the region.

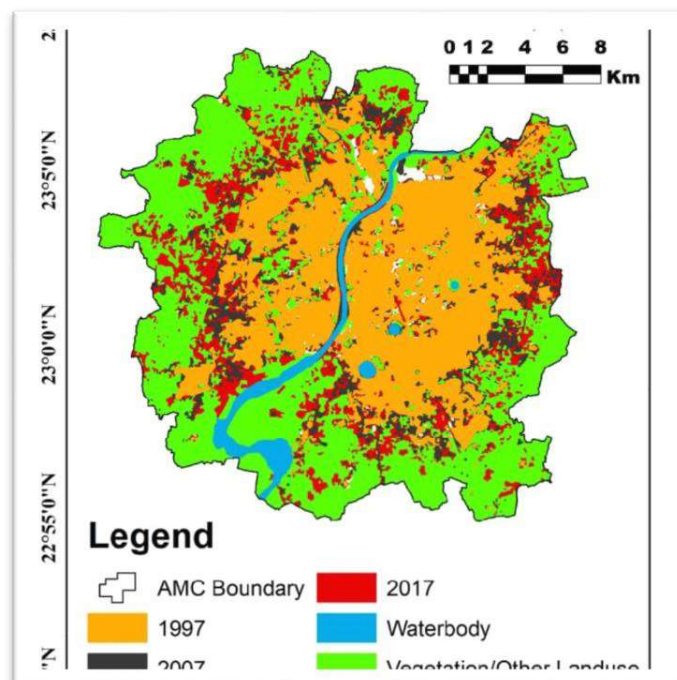


Figure 6-1 Built-up-Change-in-1997-2007-and-2017-in-AMC-area

6.1.3 Drivers of Urban Growth:

Since the early 2000s, Ahmedabad has seen intensified urbanization driven by population growth, migration from smaller towns and rural areas, and increased industrial and commercial investments. Infrastructure projects like the SG Highway and SP Ring Road significantly boosted the accessibility of peripheral zones. With improved mobility, these lands became lucrative for private developers. The expansion of institutions such as Gujarat International Finance Tec-City (GIFT City), SEZs, and IT/ITES parks further amplified land demand. As land prices in the urban core escalated, the peripheral green zones became the focus of speculative real estate markets. Additionally, the Gujarat government's pro-growth policies, including liberal land-use conversion mechanisms, encouraged the privatization and commodification of green belt lands.

6.1.4 Issues/Impacts:

The consequences of this expansion are multifaceted. First, the violation of the green belt concept has been widespread. What were once continuous ecological buffers have been fragmented by built infrastructure, such as gated communities, high-rise apartments, commercial complexes, and townships. This fragmentation disrupts ecological corridors, reduces groundwater recharge zones, and contributes to the intensification of the urban heat island effect.

Second, the infrastructure in these newly urbanized areas often lags behind the speed of development. Roads are congested, drainage is inadequate during monsoons, and water supply networks are frequently overstretched. The Ahmedabad Municipal Corporation (AMC) and AUDA have struggled to keep pace with infrastructure provisioning in these newly integrated areas.

Third, there are legal and institutional concerns. The conversion of agricultural and green zone lands into buildable urban parcels has frequently occurred through Town Planning (TP) Schemes. While TP Schemes are a legitimate planning tool in Gujarat, they have been criticized for being used to facilitate ad hoc conversion, often influenced by private interests. This has led to allegations of regulatory capture, wherein planning bodies

appear to accommodate market interests over ecological or long-term urban sustainability goals.

6.1.5 Key Observations:

Empirical studies by CEPT University and independent planning researchers have highlighted that a significant portion of Ahmedabad's green belt area, envisioned in the 2011 Development Plan, has been compromised. Peripheral growth has followed a corridor-led pattern, particularly around major roads, where development is fastest. The city's urban footprint has expanded horizontally rather than vertically, encouraging land-intensive growth and furthering automobile dependency.

Additionally, changes in land use have negatively affected traditional agricultural communities. Many landowners sold their holdings to developers without long-term safeguards, leading to the displacement of agrarian livelihoods and a shift toward informal employment or real estate speculation.

6.1.6 Policy Recommendations:

To mitigate these challenges, it is essential to revisit and revise the Development Plan with a renewed commitment to ecological sustainability. Strengthening the enforcement of zoning and land-use regulations is crucial. AUDA and AMC should prioritize environmental impact assessments before granting approvals in green buffer zones.

A shift toward compact city planning is also needed—one that promotes vertical growth, re-densification of underutilized core areas, and transit-oriented development. Reinvestment in affordable housing within existing urban areas would reduce pressure on peripheral green spaces. Furthermore, establishing urban growth boundaries (UGBs), along the lines of Portland (USA) or Curitiba (Brazil), could help control unplanned peripheral expansion.

Finally, public participation and transparency in planning decisions must be institutionalized. Inclusion of local stakeholders, particularly peri-urban communities and

ecological experts, would ensure that land-use decisions balance development needs with environmental imperatives.

6.1.7 Studied by:

Both CEPT University researchers and AUDA have acknowledged and reported the ongoing problem of urban sprawl encroaching upon green belts and agricultural lands in the peripheral areas of Ahmedabad. CEPT University is a leading institution in the fields of planning and architecture based in Ahmedabad. Researchers at CEPT have studied patterns of urban development and have highlighted issues such as the loss of green spaces and the misuse of land. The Ahmedabad Urban Development Authority (AUDA), which is the official government body responsible for regulating land use and implementing urban planning strategies in the region, has also identified these issues in its reports (Saleem Ahmad yattoo, July 2019).

The 2011 Development Plan, prepared by AUDA, was a long-term strategic document that included a number of proposals and regulations aimed at conserving the city's ecological balance. These included specific provisions to protect green areas, restrict urban development in designated buffer zones, and preserve agricultural land around the city.

However, in practice, these proposals were not effectively enforced. Urban infrastructure such as roads and residential buildings were constructed in areas that were originally designated as protected green zones. Additionally, land-use classifications were often altered or bypassed, sometimes with political or administrative support. This allowed private developers to expand urban settlements into previously undeveloped areas.

As a result, the urban footprint of Ahmedabad has extended into zones that were originally meant to serve as ecological buffers, similar to patterns observed in the Giri Bandhu Tea Estate in Nepal or in the case of Gurugram, Haryana.

6.2 GURUGRAM’S URBAN SPRAWL INTO AGRICULTURAL LAND, HARYANA

6.2.1 Location:

Gurugram, located in southern Haryana, lies directly adjacent to the southern edge of Delhi within the National Capital Region (NCR). Originally a rural district, Gurugram has transformed over the past three decades into one of India's most rapidly urbanizing regions. Its proximity to the national capital has made it a prime destination for spillover urban growth, particularly after the liberalization of India’s economy in the 1990s.

Key zones of urban expansion include the Sohna Road corridor, Badshahpur and adjoining villages, the Manesar industrial area, Sector 58–72 in the urban master plan, and the Golf Course Extension Road. These areas, once dominated by agricultural activities and open fields, have now become dense urban clusters of high-rise buildings, private townships, and commercial centers. (kumar, 2023)

6.2.2 Original Land Use:

The land that has now been urbanized was previously fertile agricultural terrain interspersed with seasonal ponds, johads (traditional water harvesting systems), grazing commons, and small rural settlements. Some areas, especially in the southern and southwestern zones of the district, were part of the ecologically sensitive Aravalli hill system, which served as critical green lungs and groundwater recharge zones for the region. These spaces also supported biodiversity and offered resilience against climate-induced vulnerabilities such as urban flooding and droughts.

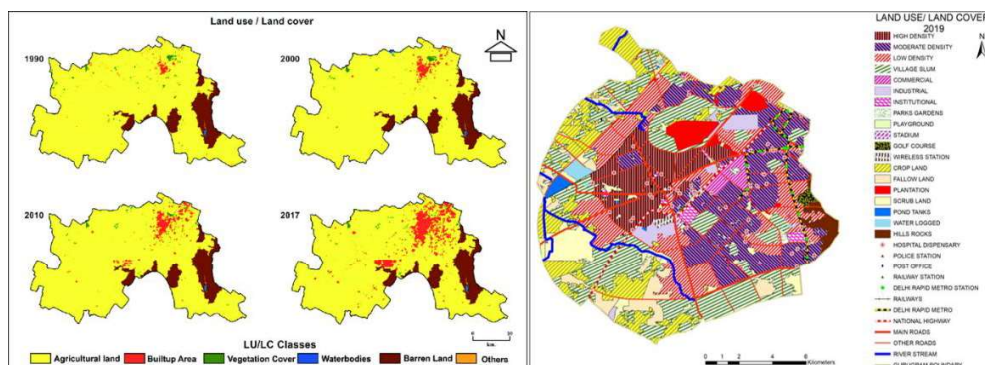


Figure 6-2 Land Use Land Cover Gurugram District

6.2.3 Drivers of Urban Growth:

Multiple structural and policy factors have driven Gurugram's transformation. Its strategic location along National Highway 8 (NH-8), connecting Delhi to Jaipur, offered exceptional regional connectivity. The Delhi Development Authority (DDA)'s restrictive planning in central Delhi indirectly pushed growth pressures toward Haryana, particularly into Gurugram. From the early 2000s, the emergence of Cyber City, a dedicated IT and corporate hub, attracted multinational corporations and technology firms, fueling a demand for commercial real estate, high-end housing, and support infrastructure.

Private developers such as DLF, Unitech, Vatika, and Ansal played a critical role in the conversion of agricultural lands into real estate ventures. Farmers and landowners were incentivized or pressured to sell land, often with little understanding of long-term consequences. The Government of Haryana further reinforced this trend by approving the Gurugram-Manesar Urban Complex Master Plan, which facilitated large-scale land-use change from rural/agricultural to residential, commercial, and industrial purposes.

6.2.4 Issues and Impacts:

The impacts of Gurugram's rapid and mostly unregulated urbanization have been substantial and multidimensional. A major concern has been the widespread encroachment into fertile agricultural land and village commons. Dozens of villages have been transformed into urban colonies with little integration into citywide planning frameworks. Groundwater recharge zones and seasonal ponds, which were essential for water conservation and flood prevention, have either been destroyed or significantly degraded. Construction-related dust, air pollution, and soil contamination have increased dramatically, especially in zones under constant real estate development.

The city's rapid vertical growth has far outpaced the development of essential public infrastructure. Many residential sectors still suffer from inadequate sewerage systems, irregular water supply, and the absence of public health facilities or schools. High-rise apartments stand beside underdeveloped areas, resulting in stark inequalities in access to basic services. Moreover, the destruction of Aravalli forest tracts—either illegally or

through institutional neglect—has led to a decline in biodiversity and ecological fragmentation.

Socially, this transformation has disrupted traditional livelihoods. Farmers who sold their land often lacked the skills to participate in the new economy, leading many to take up informal or low-wage jobs. Others have faced legal disputes over compensation, land title irregularities, and the loss of community-owned assets. Gurugram's urbanization, therefore, is not merely a spatial transformation but also a socio-economic restructuring with deep implications for equity and inclusion.

6.2.5 Key Observations:

The conversion of agricultural land into urban zones in Gurugram has been vast and mostly irreversible. A large portion of the urban footprint today stands on what was once productive farmland. This growth has occurred with minimal regard for cohesive urban planning, resulting in a highly fragmented urban form characterized by gated communities, isolated commercial hubs, and informal settlements. The region has experienced heightened environmental degradation, including plummeting groundwater levels, reduced green cover, and worsening air and water quality. Despite its image as a modern urban success story, Gurugram faces increasing challenges of livability, ecological vulnerability, and spatial inequality.

6.2.6 Policy Recommendations:

To address these growing issues, Gurugram urgently needs integrated land-use planning that supports both urban growth and the protection of farmland and ecological assets. Land use decisions should be guided by long-term sustainability goals rather than short-term real estate interests. Strengthening public infrastructure in newly urbanized areas must be prioritized, including roads, water systems, sanitation, and public services.

Environmental conservation must also be embedded into urban planning through the creation of protected green zones, ecological corridors, and the revival of traditional water systems such as johads and baolis. A moratorium on further encroachment into the Aravalli range and the enforcement of the Aravalli Notification by the Ministry of

Environment, Forest and Climate Change (MoEFCC) is essential. Lastly, inclusive planning approaches that involve local communities, displaced farmers, and informal sector workers must be adopted to ensure that Gurugram’s development is equitable, sustainable, and resilient.

6.3 COMPARATIVE STUDY

| Feature | Ahmedabad :Urban Expansion into Green Belts | Gurugram: Urban Sprawl into Agricultural Land |
|---------------------|----------------------------------------------------|------------------------------------------------------|
| Original Land Use | Green belt & agriculture | Agriculture & grazing lands |
| Nature of Expansion | Ring road/township-driven | Highway + IT corridor-driven |
| Key Drivers | Real estate, infra dev, TP schemes | Private developers, NCR spillover |
| Main Land Use Shift | Farms → apartments, villas | Fields → colonies, malls, IT parks |
| Ecological Concern | Urban heat, flood risk | Water scarcity, loss of biodiversity |
| Planning Loophole | Misuse of TP schemes | Uncontrolled conversions & weak implementation |
| Urban Form Result | Fragmented low-rise + gated communities | High-rise, car-centric vertical sprawl |

7 CHAPTER SEVEN: CONCLUSION

This research has explored the key factors driving urban expansion into the green landscape of urban edges, specifically focusing on the transformation of the Giri Bandhu Tea Estate. It has analyzed how various forces—including population growth, land speculation, infrastructure expansion, and economic incentives—have contributed to the decline of estate land on the outskirts of Birtamod Municipality. Additionally, the study has examined how different stakeholders, including estate owners, local residents, planners, and authorities, perceive and respond to these urban-driven changes.

The transformation of the Giri Bandhu Tea Estate into an urban expansion zone highlights the dynamic interplay between economic growth, demographic shifts, and environmental sustainability. The study identified key drivers of urban encroachment, including population growth, land speculation, infrastructure development, and shifting socio-economic priorities. The once-thriving tea estate has gradually been fragmented due to unregulated land conversion, leading to a decline in green spaces and ecological balance.

By integrating qualitative and quantitative methods, the research has provided insights into the estate-to-urban transition, highlighting both the opportunities and challenges of this transformation. It has identified the risks of unplanned urban sprawl, such as the loss of agricultural land, environmental degradation, and socio-economic displacement. At the same time, it has attempted to understand the motivations behind urban expansion and the governance gaps that allow it to occur unchecked.

Stakeholder analysis revealed varied perceptions regarding this transition. While land developers and new settlers perceive the expansion as an opportunity for economic prosperity, traditional tea estate workers and conservationists express concerns over job displacement and environmental degradation. The findings underscore the urgent need for strategic urban planning that balances development with sustainability. Without proper regulatory frameworks and conservation strategies, urban sprawl will continue to erode the remaining green landscapes, exacerbating issues such as congestion, pollution, and loss of biodiversity.

To ensure a sustainable estate-to-urban transition, policy interventions should focus on planned urban development, green space conservation, and economic diversification. Integrated approaches—incorporating stakeholder collaboration, land-use zoning, and sustainable infrastructure—can help mitigate the negative externalities of urban expansion while fostering a resilient and inclusive urban environment.

Ultimately, this study underscores the need for balanced urban planning strategies that accommodate growth while preserving critical green spaces. Through stakeholder collaboration, policy interventions, and sustainable development practices, a more resilient and managed urban expansion can be achieved, preventing further ecological and socio-economic disruptions in urban edge areas.

8 CHAPTER EIGHT: RECOMMENDATION

Unplanned urban areas, food insecurity, and environmental instability are likely due to the ongoing and projected huge urban expansion at the expense of valuable farmed land. It is critically necessary to create and carry out appropriate urban plans for the preservation of green spaces that are found on the outskirts of the city. To build a resilient urban environment and promote sustainable growth, careful urban planning that protects farmland, green fringes, and open spaces is crucial. The government's primary goal should be to put in place preventive strategies to reduce large-scale immigration by using various migration control measures and redirection initiatives.

8.1 MANAGEMENT OF ALREADY EXPANDED AREAS: EXPLORE POLICY AND PLANNING MEASURES

In unorganized development, the study suggests that land subdivision in urban fringe is haphazard and incoherent so some inner plots are deprived from proper accessibility. It is not a desirable aspect because the land remains as waste and land parcels could not be used in their full economic potential. This weakness can be reduced or eliminated in planning interventions. In most of the formal planning interventions, infrastructures are furnished at the beginning of the project which is underutilized for a longer period of time as the building activities start slowly. The farmers get deprived of practicing agriculture and reduced land parcel results in reduced productivity. This could be managed by staged development based on long term planning action. Institutions like VDC could take initiative in this regard. Local Self Governance Act 1999 has given planning authority to the VDCs too. The concept of guided land development (GLD), which is implemented within the municipalities of Kathmandu Valley, should be applied at the initial level of planning in the fringe area. VDC would prepare a comprehensive plan of road network comprising urbanizable areas and identify phase wise intervention so that it would help in control haphazard development and the serviced land could be supplied incrementally in the market. It would help farmers to continue with agriculture occupation.

8.2 REMAINING ESTATE LAND SHOULD BENEFITS BOTH GIRI BANDU STAKEHOLDER AND THE GOVERNMENT

8.2.1 Tourism

Giri Bandu Tea Estate is a captivating destination that invites tourists to experience the rich heritage of tea cultivation in Nepal. Located in the picturesque (beautiful) region of Birtamode, this tea estate is not just a place to learn about tea manufacturing; it's a serene retreat enveloped by rolling hills and verdant tea gardens. Visitors can walk through the well-maintained plantations, where they will witness the delicate process of tea picking, and even have the chance to interact with local workers who are passionate about their craft.

As visitor explore the estate, they take a moment to soak in the stunning views that stretch across the landscape. The cool breeze and fresh aroma of tea leaves create a soothing atmosphere that enhances the experience. The estate often hosts guided tours, allowing tourists to delve deeper into the history and significance of tea production in this region. Additionally, the estate features a charming tea house where you can savor freshly brewed tea made from the very leaves grown on-site, an experience that is as satisfying as it is delicious.

Whether people are a tea aficionado or simply looking for a peaceful getaway, Giribandhu Tea Estate offers a unique opportunity to connect with nature while discovering the intricate world of tea production. This overlooked treasure is ideal for families, couples, and solo adventurers, ensuring a remarkable experience that honors the richness of Nepal's farming heritage.

Visitors:

- Visits during the morning to enjoy the serene atmosphere and also to witness the tea-picking process.
- Visits to taste the fresh tea brewed from the estate's own leaves.
- Visits to capture the stunning views of the tea gardens and the surrounding landscape.

- Visits to learn more about tea production.

8.2.2 Economically fruitful

The remaining land of Giri Bandu Tea Estate holds significant economic potential if utilized strategically. A well-planned approach can ensure that the land benefits both Giri Bandu stakeholders and the government by generating revenue, creating jobs, and promoting sustainable economic growth. By integrating urban expansion with economic productivity, the transformation of the estate-to-urban transition area can contribute to the local and regional economy.

8.2.3 Industries

To maximize economic benefits, specific industries should be considered for development on the remaining estate land. These industries should align with local needs, market demand, and environmental sustainability while ensuring a fair distribution of benefits between the estate stakeholders and government authorities. Some potential industries include:

- **Agro-Processing Industries** – Establishing tea-based processing units, organic farming ventures, and value-added agricultural products can preserve the estate's historical identity while generating economic returns.
- **Tourism and Hospitality** – Developing eco-tourism resorts, heritage tea gardens, and cultural hubs can attract visitors, boost local businesses, and create employment opportunities.
- **Education and Research Centers** – Setting up institutions focused on agricultural research, urban planning, and sustainable development can contribute to knowledge-based growth.
- **Light Manufacturing and Handicrafts** – Small-scale industries such as tea packaging, textile production, and local handicrafts can support the livelihoods of residents while minimizing environmental impact.

- Green Technology and Renewable Energy – Establishing solar farms, waste management plants, and eco-friendly construction initiatives can ensure sustainable development.

By implementing these industry recommendations, the transformation of Giri Bandu Tea Estate can be both economically beneficial and strategically aligned with urban expansion while safeguarding the interests of all stakeholders involved.

8.2.4 Land Use and Land Development Strategy

- Guided the municipality's expansion through the implementation of a land use plan and zoning guidelines.
- Identified agricultural lands, conservation zones, and water recharge areas, and imposed restrictions on development in these regions.
- Conducted a review of existing building bylaws.
- Enforced strict measures to control the municipality's growth.
- Launched planned residential development initiatives.

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<https://myrepublica.nagariknetwork.com/news/current-condition-of-controversial-giri-bandhu-tea-estate>

10 CHAPTER TEN: ANNEX

10.1 ANNEX 1 = GIS MAPS

10.2 ANNEX 2 = QUESTION SETS FOR KII AND QUESTIONNAIRE SURVEY

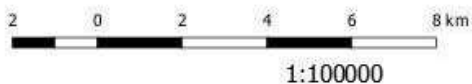
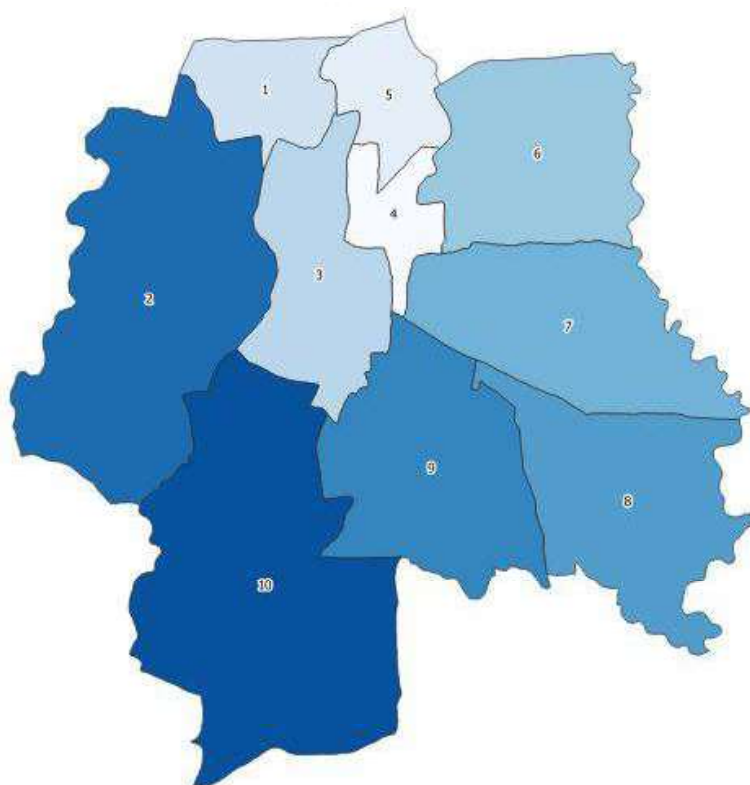
10.3 ANNEX 3= COMMENTS FROM EXTERNAL EXAMINER

10.4 ANNEX 4= APPROVAL LETTER

10.5 ANNEX 5= RESEARCH PAPER

10.6 ANNEX 6= PLAGIARISM TEST

**WARDS AS PER AREA
(BIRTAMODE MUNICIPALITY)**



LEGENDS

- ROAD_Dissolve
- footway
- living_street
- path
- primary
- residential
- service
- tertiary
- track
- track_grade4
- trunk
- GPNP

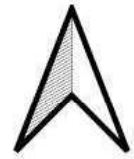
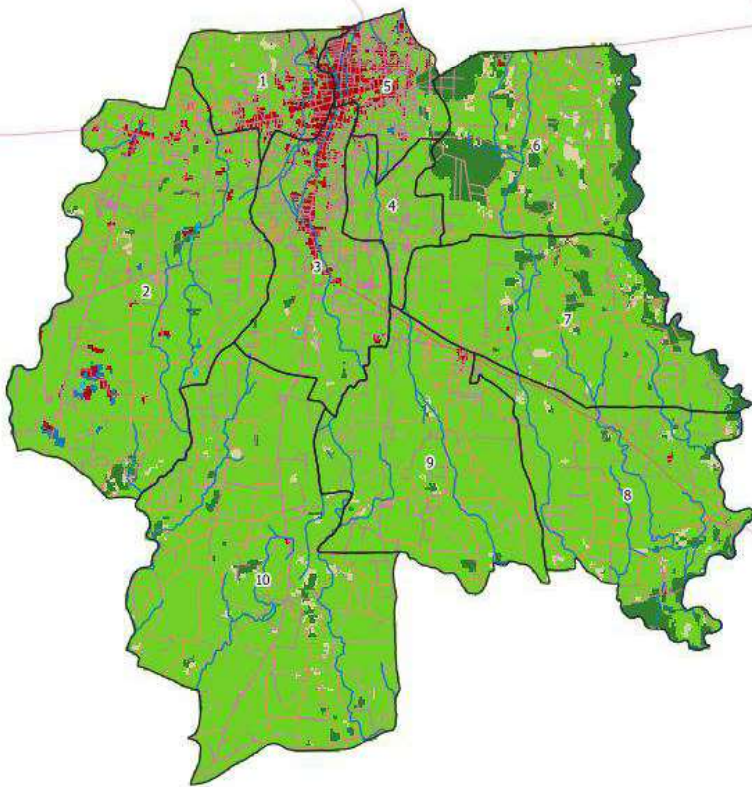
Map Title:
ROAD NETWORK MAP(BIRTAMODE)

Prepared By:
Binita Khadka-079Msurp004

Source:
Survey department
ICIMOD Land use Nepal

Date Of Submission : Feb, 2025

**LAND USE MAP, 2011
(BIRTAMODE MUNICIPALITY)**



LEGENDS

- Transparent_Birtamod_ward
- Fin_SSRNRoutesStatus
- river
- Road_osm
- LC_Birtamode_011
- Waterbody
- Forest
- Riverbed
- Built-up Area
- Cropland
- Grassland
- Other

Map Title:
LAND USE MAP, 011 (BIRTAMODE)

Prepared By:
Binita Khadka-079Msurp004

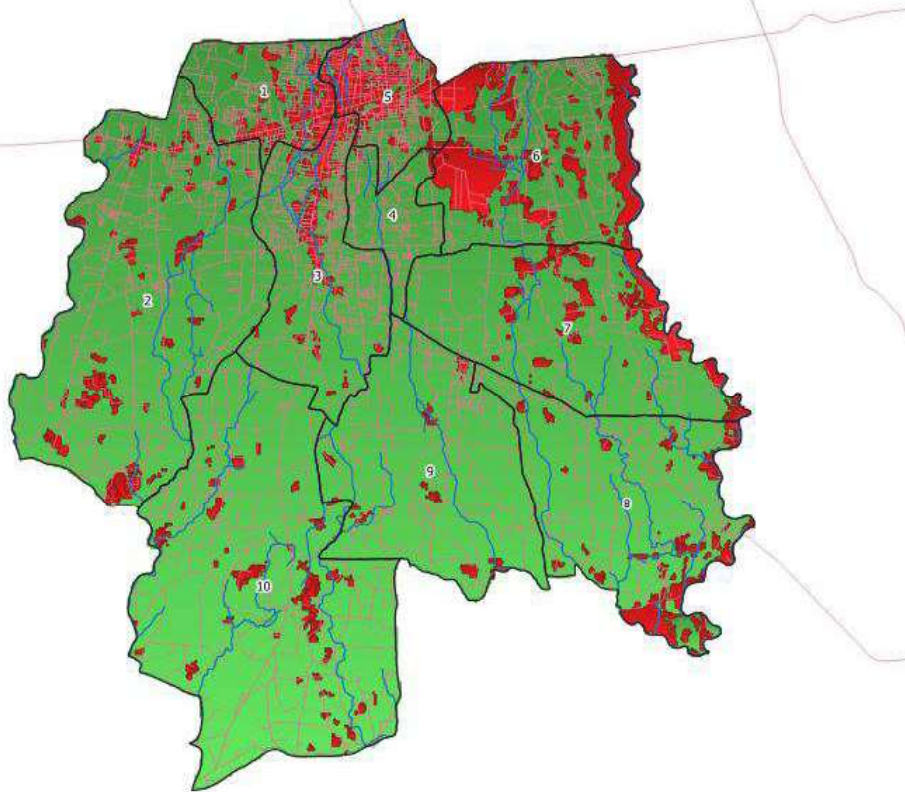
Source:
Survey department
ICIMOD Land use Nepal

Date Of Preparation : Mar, 2025



1:100000

**LAND USE MAP, 2022
(BIRTAMODE MUNICIPALITY)**



LEGENDS

LC_Birtamode_022

Waterbody

Forest

Riverbed

Built-up Area

Cropland

Grassland

Other

Fin_SSRNRoutesStatus

river

Road_osm

Map Title:

LAND USE MAP, 2022 (BIRTAMODE)

Prepared By:

Binita Khadka-079Msurp004

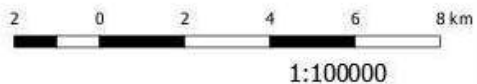
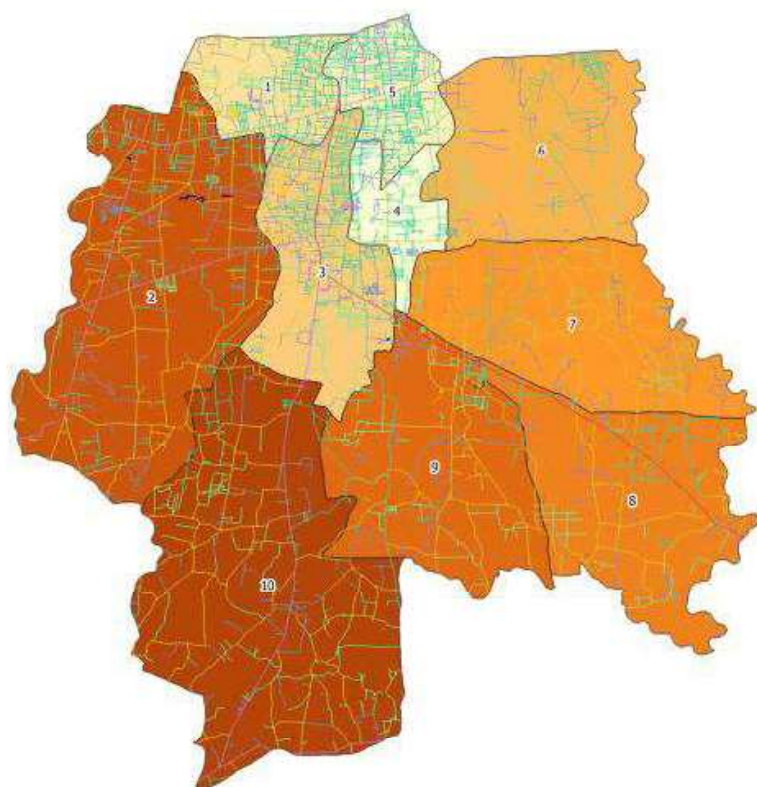
Source:

Survey department

ICIMOD Land use Nepal

Date Of Preparation : Mar, 2025

ROAD NETWORKS (BIRTAMODE MUNICIPALITY)



Locational Map

LEGENDS

- ROAD_Dissolve
- footway
- living_street
- path
- primary
- residential
- service
- tertiary
- track
- track_grade4
- trunk
- GPNP

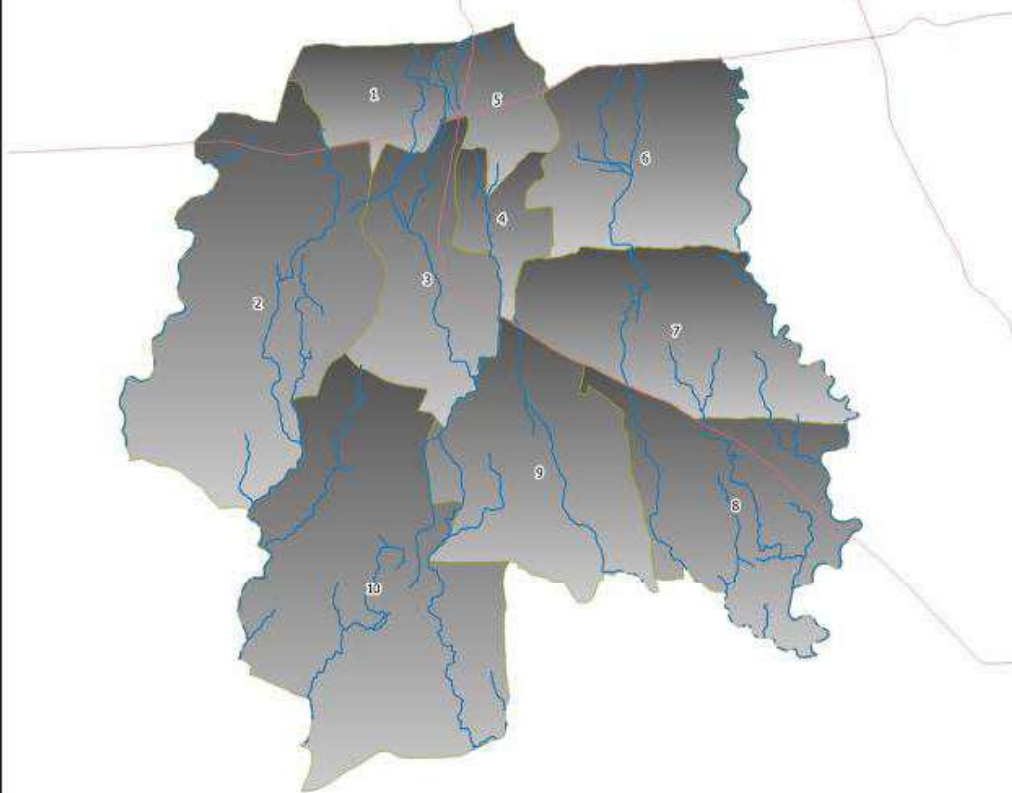
Map Title:
ROAD NETWORK MAP(BIRTAMODE)

Prepared By:
Binita Khadka-079Msurp004

Source:
Survey department
ICIMOD Land use Nepal

Date Of Submission : Feb, 2025

MAJOR RIVERS (BIRTAMODE MUNICIPALITY)



LEGENDS

- river
- Birtamod_ward
- Road_osm
- lc2022
- 1
- 11
- Districts
- Transparent_Birtamod_ward
- GPNP
- Province

Map Title:
ROAD NETWORK MAP(BIRTAMODE)

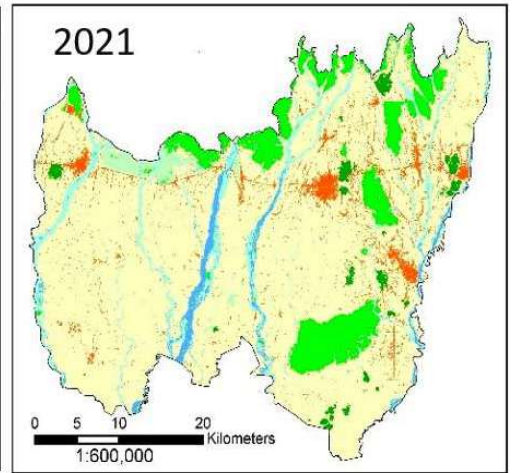
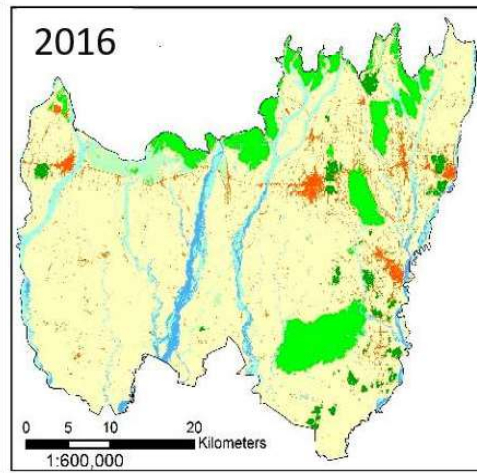
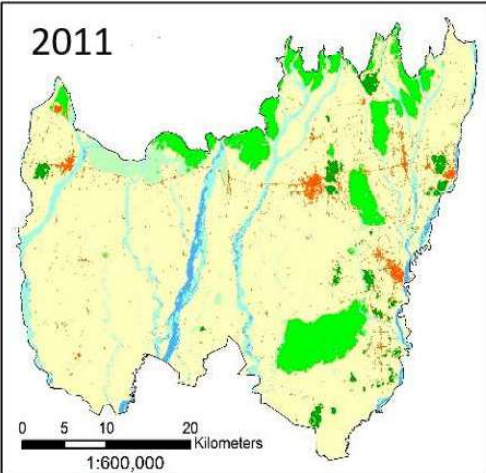
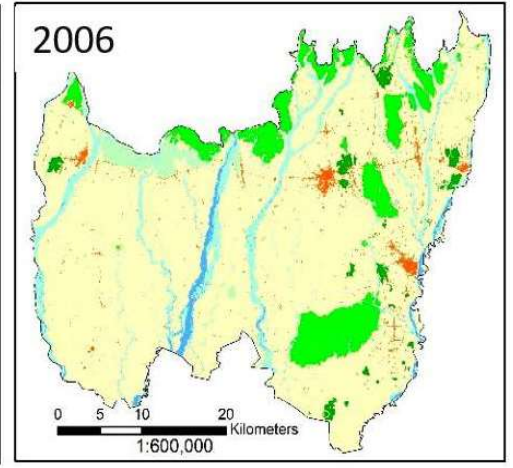
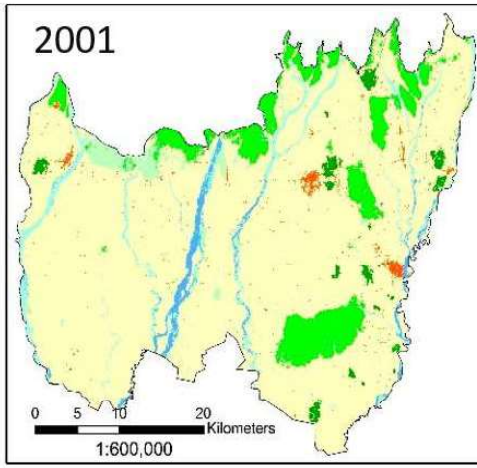
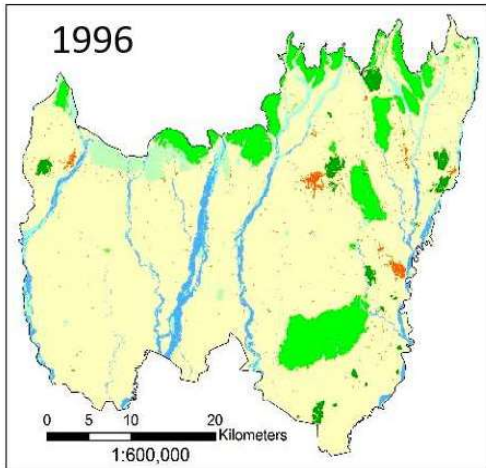
Prepared By:
Binita Khadka-079Msurp004

Source:
Survey department
ICIMOD Land use Nepal

Date Of Submission : Feb, 2025

2 0 2 4 6 8 km

1:100000



Data Sources: Landsat Images, 5, 7 and 8, USGS Website. Survey Department of Nepal. Road Network: Google Earth Images, Department of Road, Nepal

JHAPA

NEPAL

JHAPA

Ilam

Morang

INDIA

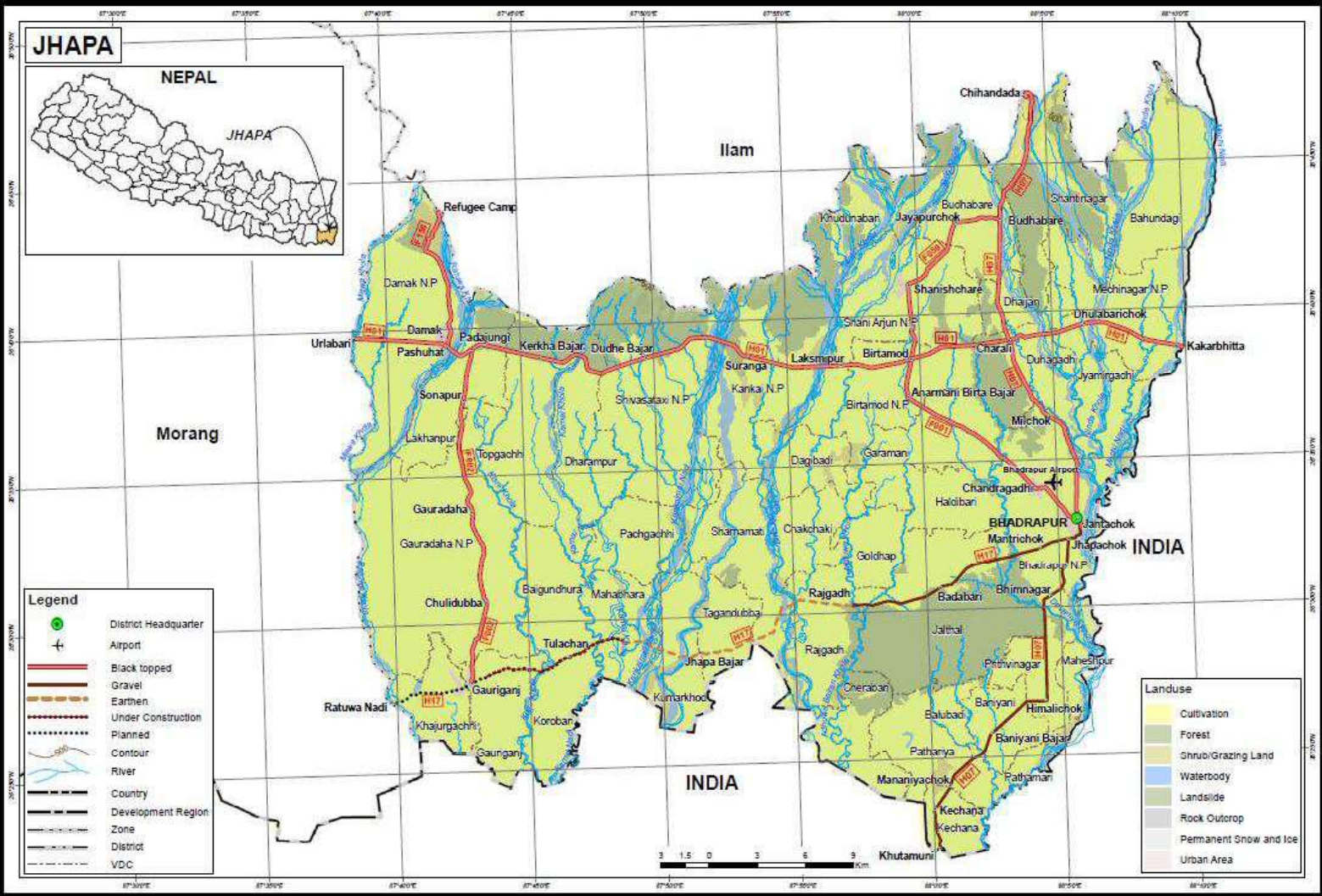
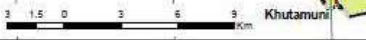
INDIA

Legend

- District Headquarter
- Airport
- Black topped
- Gravel
- Earthen
- Under Construction
- Planned
- Contour
- River
- Country
- Development Region
- Zone
- District
- VDC

Landuse

- Cultivation
- Forest
- Shrub/Grazing Land
- Waterbody
- Landslide
- Rock Outcrop
- Permanent Snow and Ice
- Urban Area



ANNEX 2



TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING, PULCHOWK CAMPUS
DEPARTMENT OF ARCHITECTURE
MSC in Urban Planning

Questionnaire for KII

Title of the Thesis: “Urban Expansion in Green Zones of Urban Edges: A case of Giri Bandu Tea Estate”

Objective of the Study: To explore contributing factors of urban expansion in study area.

Dear Respondent,

This survey aims to understand your perception of the changing landscape of Giri Bandhu Tea Estate due to urban expansion. I will group all information I have gathered and analyze to reach logical conclusion for my study. I will use the information and publish in my research thesis and paper. Would you be willing to participate voluntarily in the survey?

Yes = No =

Please you can ask if you have any doubt regarding this research

Name of the Interviewer:

Name of the Key Informant:

Designation:

Gender:

Age group:

KII QUESTIONNAIRE:

I. With Giri Bandhu Tea Estate Owners (Chairman):

Can you provide a brief history of the Giri Bandhu Tea Estate's land ownership and management?

Ans:-

What are the primary objectives of the estate today? Has this shifted over the years?

Ans:-

How has urbanization affected tea production and operations on the estate?

Ans: -

What challenges are faced in keeping the tea plantations while cities grow around them?

Ans:-

What is the estate's perspective on the conversion of land to urban uses?

Ans:-

How much of the original estate land is still used for tea cultivation?

Ans:-

Were you involved in or aware of the decision to convert parts of the estate into plots for sale? If yes, what factors led to this decision?

Ans:-

How do workers perceive the transition of estate land into urban areas?

Ans:-

Are there any concerns about job security or livelihood as urbanization progresses?

Ans:-

How has urban expansion around the estate affected its operations?

Ans:-

What role does the estate play in the local economy today?

Ans:-

How do you view the legal and ethical implications of converting estate land into other uses?

Ans:-

What are your plans for the remaining tea estate land?

Ans:-

How does the estate management plan to ensure sustainable practices in the face of urban expansion?

Ans:-

KII QUESTIONNAIRE:

II. With Land developer/ real estate developer:

What factors drive the demand for land in the area surrounding Giri Bandhu Tea Estate?

Ans:-

Are buyers mostly local or from outside the region? What are their main motivations?

Ans:-

How do buyers see the value of land which was previously used for agricultural or tea estate land?

Ans:-

How have land prices in the area changed over the past 10–15 years?

Ans:-

Are there any challenges faced when dealing with legal or regulatory constraints on land sales?

Ans:-

What benefit you see in converting green zones into urbanized areas?

Ans:-

Do you plan projects in terms of environmental sustainability and land use policies?

Ans:-

What measures would you suggest to balance urban development with preserving green spaces like tea estates?

Ans:-

Do you foresee further conversions of green zones into urban plots in this area?

Ans:-

KII QUESTIONNAIRE:

III. Local Government (Municipality member):

Policies and Regulations on Estate Protection

What role does the municipality play in regulating land conversion from green spaces to urban development?

Ans:-

What policies and regulations exist to protect green zones in urban edge areas like Giri Bandhu Tea Estate?

Ans:-

How effectively are these policies enforced in this area?

Ans:-

Are there specific guidelines or zoning regulations for urban expansion near tea estates?

Ans:-

What are the major legal or administrative challenges in implementing these regulations?

Ans:-

Infrastructure and Service Provision

How does the municipality plan for basic services such as roads, drainage, sanitation, and water supply in newly developed areas?

Ans:-

Has urban expansion led to any transportation or traffic congestion issues in Birtamode Municipality?

Ans:-

What long-term strategies are in place to improve urban infrastructure in the expanded areas?

Ans:-

Future Planning and Recommendations

What are the municipality's long-term urban expansion plans, particularly concerning former tea estate lands?

Ans:-

How can urbanization in this area be managed in a more sustainable and environmentally friendly manner?

Ans:-

What policy reforms or municipal initiatives are needed to regulate urban expansion effectively?

Ans:-

How can different stakeholders (municipality, private sector, community groups) collaborate to ensure balanced urban growth?

Ans:-



TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING, PULCHOWK CAMPUS

DEPARTMENT OF ARCHITECTURE

MSC in Urban Planning

Questionnaire survey: With Residents on Former Estate Land (New settlement)

Title of the Thesis: “Urban Expansion in Green Zones of Urban Edges: A case of Giri Bandu Tea Estate”

Objective of the Study: To explore contributing factors of urban expansion in study area.

Dear Respondent,

This survey aims to understand your perception of the changing landscape of Giri Bandhu Tea Estate due to urban expansion. I will group all information I have gathered and analyze to reach logical conclusion for my study. I will use the information and publish in my research thesis and paper. Would you be willing to participate voluntarily in the survey?

Yes = No =

Please you can ask if you have any doubt regarding this research

Name (Optional): _____

Age: _____

Gender: Male Female Other

Occupation: _____

Land ownership and reasons for settlement:

1. When did you purchase or settle in this land?

Before 2061 BS

Around 2061 BS

After 2061 BS

2. How did you decide to buy land which was already a part of a tea estate?

Affordable land prices

Business opportunities

Proximity to city area

Other: _____

Current use of land and available infrastructure:

3. How are you currently using the land?

Residential house

Commercial building (hotel, shop, college, etc.)

Vacant land

Other: _____

4. What infrastructure and facilities (e.g., roads, water, and electricity) are available in this area?

Paved roads and proper drainage

Consistent electricity access

Waste management services

Public transportation options

Internet and telecommunication services

5. Are there any issues related to infrastructure or services in this recently urbanized zone?

Poor road conditions or lack of proper drainage

Frequent electricity outages

Inadequate waste management

Limited access to public transportation

No major issues faced

6. Are you satisfied with the infrastructure in this area?

Yes

No

Partially

Challenges and benefits:

7. Were you aware of the history of the land (as part of the tea estate) before purchasing it?

Yes, I was fully aware

Somewhat aware

No, I was not aware

8. Have you faced any challenges or disputes related to this land?

Legal ownership issues

Land boundary disputes

Infrastructure or utility-related problems

No challenges faced

9. What benefits have you gained from residing in this converted area?

Better access to markets, schools, and healthcare

Improved transportation and infrastructure

Increased property value

More job or business opportunities

Other: _____

10. Do you feel the transformation from green space to urbanized land has positively or negatively impacted your lifestyle?

Strongly positive impact

Somewhat positive impact

No impact

Somewhat negative impact

Strongly negative impact

Impact of Land Conversion:

11. Do you think urban expansion has improved your living conditions?

Yes

No

Not sure

12. What changes have you observed since moving here? (Select all that apply)

Increase in population

Better roads and facilities

More business opportunities

Environmental issues (pollution, loss of greenery, etc.)

13. Do you think tea estate land should continue being converted for urban development?

Yes

No

Only if done in a planned manner

Feedback and Suggestions:

Do you believe sufficient planning was done before this area was developed?

Ans:-

What improvements would you like to see in the area to support sustainable development?

Ans:-

Gender: Male Female Other

General Information:

1. Job Role:

Tea Plucker

Field Worker

Factory Worker

Supervisor

Management Staff

2. How long have you been working in the tea estate?

Less than 5 years

5-10 years

More than 10 years

Impact of Urban Expansion on Employment:

3. Have you noticed a decrease in available tea plantation land?

Yes

No

4. Has urban expansion affected your job security?

Yes, I feel insecure about my job

No, my job remains stable

Not sure

5. If yes, how has it affected you? (Select all that apply)

Reduced work opportunities

Lower wages

Job loss of co-workers

Other: _____

6. Have you considered switching jobs due to these changes?

Yes

No

7. What challenges do you face due to urban expansion? (Select all that apply)

Less land for tea cultivation

Uncertainty about future employment

Increased cost of living

Other: _____

8. The tea estate is an important source of income for many local workers.

- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

9. The urban expansion of the tea estate area will lead to the loss of employment opportunities for estate workers.

- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

10. The transformation of the estate into an urban area will create more business and trade opportunities.

- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

11. The economic value of the estate's land is increasing due to urban expansion.

- Strongly Disagree
- Disagree
- Agree
- Strongly Agree

Future of the Tea Estate:

12. Do you think the tea estate should be protected from further land conversion?

Yes

No

Not sure

13. What actions should be taken to secure workers' jobs? (Select all that apply)

Government policies to protect tea estates

Alternative employment programs

Better wages and benefits

Other: _____

Do you have any suggestions for balancing urban expansion and tea estate preservation? _____



TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING, PULCHOWK CAMPUS

DEPARTMENT OF ARCHITECTURE

MSC in Urban Planning

Questionnaire survey: With General people (Residents, Visitors etc.)

Title of the Thesis: “Urban Expansion in Green Zones of Urban Edges: A case of Giri Bandu Tea Estate”

Objective of the Study: To explore contributing factors of urban expansion in study area.

Dear Respondent,

This survey aims to understand your perception of the changing landscape of Giri Bandhu Tea Estate due to urban expansion. I will group all information I have gathered and analyze to reach logical conclusion for my study. I will use the information and publish in my research thesis and paper. Would you be willing to participate voluntarily in the survey?

Yes = No =

Please you can ask if you have any doubt regarding this research

Name (Optional): _____

Age: _____

Gender: Male Female Other

Occupation: _____

General Information:

1. How long have you been living in this area?

Less than 5 years

5-10 years

More than 10 years

Perception of Urban Expansion:

2. Have you noticed an increase in settlement near the tea estate land?

Yes

No

3. What do you think are the main reasons for the land conversion? (Select all that apply)

Population growth

Demand for housing

Development projects

Other (Please specify): _____

4. Do you think urban expansion has benefited the local community?

Yes

No

Not sure

5. If yes, what are the benefits? (Select all that apply)

Better infrastructure

More business opportunities

Increased land value

Other: _____

6. What are the challenges of urban expansion? (Select all that apply)

Traffic congestion

Environmental degradation

Loss of greenery

Other: _____

7. How has urban expansion around the tea estate affected your daily life?

Better access to resources and transport

- Increased congestion and pollution
- Higher living costs
- No significant impact

Opinions on Tea Estate Land Use:

8. Should tea estate land be preserved for agriculture?

- Yes
- No
- Not sure

9. Would you support further conversion of tea estate land into urban settlements?

- Yes
- No
- Only if planned properly

Challenges and Concerns:

10. How does urbanization affect the cost of living, housing, and employment opportunities in the area?

- Increased cost of living (higher prices for goods and services)
- Rising housing costs and land prices
- More job opportunities in businesses and services
- No significant impact

11. Are there any infrastructural improvements that you have observed since the conversion of estate land?

- Better roads and transportation facilities
- Improved access to water, electricity, and sanitation
- New public services (e.g., schools, healthcare centers)
- Increased commercial and business spaces
- No noticeable improvements

Suggestions:

1. How do you think urban development in this region could be made more sustainable?

Ans:-

2. What role do you think the government or estate owners should play in balancing development with environmental preservation?

Ans:-

ANNEX 3: FINAL PRESENTATION COMMENTS:

| S.N | Professors | Comments | Addressed Comments (Page No.) |
|------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Er. Chakravarti kantha (External Examiner) | <ol style="list-style-type: none">1) Research question and Objective terminologies2) Total land area, Urban Expanded area and remaining tea plantation area of Estate Land3) First conclusion and then recommendation | <ol style="list-style-type: none">1) Correction is in Page number 62) There is no exact information about the total area of the estate land, as some parts are vacant and their status is unclear. However, the area used for settlement expansion and the tea plantation is confirmed to be 70 and 280 Bighas respectively.3) Corrected in page No. 98 |
| 2 | Er. Saroj Basnet (External Examiner) | International case study – case of India was preferred | Two similar cases: Expansion into green belts in Ahmedabad, Gujarat and Gurugram’s urban sprawl into agricultural land, Haryana of India are added in page No. 90 |



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गोश्वारा पो. नं. २८०, थापाथली, काठमाडौं

फोन: ०१-५३३९७६६

Date: April 21, 2025

To Whom It May Concern:

This is to certify that the paper titled "**Urban Expansion In Green Zones Of Urban Edge: A Case Of Giri Bandu Tea Estate Birtamod, Jhapa**" (Submission# 551) submitted by **Binita Khadka** as the first author, which had been accepted for presentation after the peer-review process, has successfully been presented at the 16th IOE Graduate Conference held during April 18 - 20, 2025. Kindly note that the final revision of the papers and publication process of the conference proceedings is still underway and hence inclusion of the accepted manuscript in the conference proceedings is contingent upon timely response to further edits during the publication process.



Dr. Raj Kumar Chaulagain,

Convener,

16th IOE Graduate Conference



Urban Expansion In Green Zones Of Urban Edge: A Case Of Giri Bandu Tea Estate Birtamod, Jhapa

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Abstract

Urban expansion at the edge of cities has become a pressing issue, particularly in regions with significant green landscapes. This paper tries to have a better understanding about the transformation of Giri Bandhu Tea Estate in Birtamode Municipality, Jhapa district due to urban expansion. Specifically, this paper aims to identify key factors driving this expansion, analyzes stakeholder responses towards the socio-economic and environmental consequences. A mixed-method approach, incorporating site observations, stakeholder interviews, and secondary data analysis, is utilized. The findings highlight the impacts of rapid urbanization, including the loss of farm land and ecological degradation, underscoring the need for sustainable urban planning strategies. Aims to provide the systematic, reliable and latest data related to population growth urbanization process and land use land cover dynamics. Furthermore, the study discusses policy gaps and challenges in urban governance that contribute to the unchecked conversion of green spaces into urban settlements.

Keywords

Urban Expansion, Green Zones of Urban edges, Peri-Urbanization, land use change and tea Estate conversion

1. Introduction

Urban expansion is an inevitable consequence of population growth, economic transformation and infrastructural advancements. It involves the outward physical growth of cities into surrounding rural or green landscapes, leading to significant land-use transformations[1]. As cities expand outward, green zones at urban edges—including agricultural lands, forests, and tea estates—are increasingly under pressure. In Nepal, rapid urbanization, particularly in the Terai region, has led to unplanned land conversion, replacing ecologically significant landscapes with fragmented urban settlements. The loss of these green spaces disrupts environmental degradation, reduces agricultural productivity, and accelerates urban sprawl. The case of Giri Bandu Tea Estate in Birtamode Municipality, Jhapa, can represent the rapid conversion of green landscapes into urban settlements. This study explores the transformation of Giri Bandu Tea Estate, where estate land is being converted into urban settlements. This tea estate, historically known for its ecological and economic contributions, is increasingly threatened by unplanned urbanization.

The estate is now experiencing significant land-use transformation due to rising population density, Enormous mass migration, mainly from the adjacent mid-hill districts such as Taplejung, Ilam, and Panchthar, increasing housing demand, real estate development, and inadequate urban planning policies[2]. This transformation reflects a broader trend in Nepal's Terai region, where urbanization has intensified over the past few decades. According to official estimates, more than 1,500 hectares of arable land in Jhapa have been lost to urban plotting, underscoring the urgency of addressing urban expansion at city edges[3]. Although Studying urban expansion in green farmland like tea estate is necessary for sustainable urban development and environmental conservation, tea estates in Nepal remain understudied in the context of urban expansion. The increasing urban footprint in green zones poses serious ecological, economic, and social challenges. Despite extensive research on urbanization's impact on agricultural land and forests, but the impact on tea estates one of significant green spaces at urban areas or peripheries remains largely unexplored. Limited attention has been given to tea

estates, which play a dual role in economic and ecological sustainability. This study aims to bridge that gap by analyzing how urban expansion affects Giri Bandu Tea Estate and how different stakeholders perceive and respond to these changes. The major objective of this study was to explore key factor contributing to the decline of green zone (Estate Land) on the outskirts of Birtamod municipality and to analyze how different stakeholders (estate owner, local residents, planners and authorities) perceive and respond to these urban- driven changes. This study focuses specifically on the Estate-to-Urban Transition in Birtamode Municipality, where a significant portion of Giri Bandu Tea Estate land has already been converted into urban plots. By analyzing the drivers of this transformation and stakeholder perspectives, the findings of the study are expected to inform sustainable urban planning policies, helping to balance development conserving green spaces.

1.1 Research Question

“What Are The Contributing Factors (Drivers) Of Urban Expansion In Study Area and How Do Stakeholders Of Estate Area Respond To These Urban-Driven Changes.” The research questions are addressed by taking the case of Giri Bandu tea estate, a green zone located at the edge of Birtamod municipality of jhapa district.

1.2 Scope and limitations

Firstly, this study focuses on green landscapes found only in urban edges, within which especially the tea plantation area situated at the edge of Birtamod municipality, jhapa. Other type of green landscape available in urban edges are not considered in this research. Additionally, the geographical scope is limited to a specific urban edge area (e.g., Giri-Bandhu Tea Estate) of Birtamod municipality, which may not fully represent urbanization and urban expansion trends in other regions. Secondly, the study focuses on the sold 71 bighas (out of 344 bighas) of Giri-Bandhu Tea Estate land, where urban expansion and settlement had already began in 2061 B.S (2004 A.D). But it strongly excludes the current political controversy of Giri Bandu land , which involves ownership of land and plotting of the remaining 200 biga in exchange with same amount of land in different place. Furthermore study gives an overview of current urban growth but doesn't fully consider long-term effects or future changes. Also, relying on

opinions from key stakeholder may lead to biases, as their responses could be incomplete or influenced by their personal views.

2. Literature Review

2.1 Urban Expansion: Concept and Its Driving factors in city Area

Urban expansion refers to the outward growth of cities into surrounding rural and peri-urban areas. This process is often driven by economic and demographic changes, which lead to the transformation of land use and significantly affect both social and ecological systems. The outward spread of cities encompasses changes in infrastructure, land ownership, and the use of natural resources. Urban expansion can take various forms, each with distinct characteristics[4]:

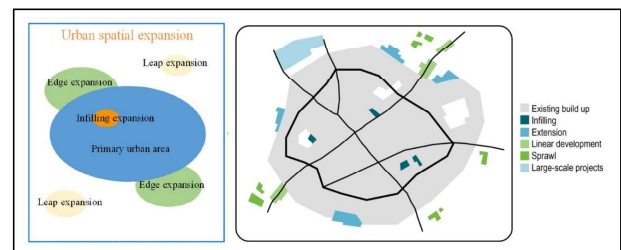


Figure 1: Definition and major types of Urban expansion (Zhijian Chang, September 2022)

Urban expansion can take several distinct forms, each with its own characteristics. Infilling refers to the redevelopment of underutilized spaces within existing urban areas, such as abandoned industrial sites, turning them into productive or residential spaces. Extension, on the other hand, involves the gradual outward growth of urban areas into previously rural or undeveloped regions. Linear development occurs along major transport corridors, where urbanization follows the paths of roads and railways, often resulting in concentrated growth along these routes. Sprawl is an unplanned and scattered form of urban growth, typically seen on the outskirts of cities, leading to inefficient land use and a lack of organization. Lastly, large-scale projects, such as the creation of new industrial zones or commercial areas, are often driven by infrastructure development and governmental planning, expanding urban areas to accommodate new economic activities.

The expansion of urban areas is driven by several factors, including: Population Growth and Migration: The increasing rural-to-urban migration raises the

demand for housing and public services, contributing to the growth of urban areas. **Land Prices and Speculation:** Low-cost peripheral lands become attractive to developers, encouraging unregulated urban sprawl[5]. **Infrastructure Development:** Expansion of road networks and public services leads to urban growth along transport routes, facilitating further development. **Economic and Political Factors:** Job opportunities, conflicts, and changes in policies influence urban growth patterns, dictating where and how cities expand.

2.2 Green Zones of Urban Edges

Green zones are transitional areas located at the boundaries of urban development and natural landscapes such as agricultural lands, forests, and parks. These zones play a crucial role in providing ecological services, regulating urban climates, and maintaining biodiversity[6],[7]. They also act as buffers against the environmental impacts of urbanization. Urban expansion presents significant threats to green spaces, gradually eroding their presence due to several contributing factors. Unregulated land conversion is one of the primary drivers, where farmlands and forests are replaced by housing and commercial developments, decreasing the availability of these vital green zones. Additionally, the expansion of infrastructure—such as roads, utilities, and industrial areas—disrupts the ecological balance of these spaces, further accelerating their degradation. Legal and policy gaps also play a role, as weak enforcement of land use regulations allows uncontrolled urban sprawl, exacerbating the loss of green areas. The consequences of this degradation are far-reaching, including the loss of biodiversity as construction activities destroy habitats, increasing environmental risks such as flooding, reduced air quality, and the urban heat island effect. Moreover, the socioeconomic impact is significant, with the displacement of farmers and the loss of agricultural land leading to economic hardships for communities that depend on these lands for their livelihoods.

2.3 Urban Growth and Edge Development Theories:

Urban growth and edge development are influenced by multiple theoretical perspectives, each explaining the patterns and driving forces behind urban expansion[8]. These theories provide a framework for

analyzing the Estate-to-Urban Transition Area in Birtamode Municipality, explaining how urban expansion reshapes green landscapes at the urban edge. Refer to Table 1 for Details.

| Key Concept | Relevance to Study Area |
|--------------------------------------------------|-----------------------------------------------------------------|
| Bid Rent Theory | |
| Land value decreases with distance from the city | Lower land prices in estates might have drive settlement growth |
| Axial Growth Model | |
| Growth follows transport routes | Estate's proximity to the highway spurs urbanization. |
| Concentric Zone Model | |
| Cities expand in rings | Shows estate land shifting as urbanization spreads |
| Sector Model | |
| Growth in wedges along transport/economic zones | Explains estate land conversion along transport corridors. |
| Multiple Nuclei Model | |
| Cities grow around multiple centers | Urban growth near Tek Bahadur Buspark |
| Peri-Urbanization Theory | |
| Transition zones mix rural and urban uses | Estate shifts from farmland to built-up areas |

Table 1: Edge Development Theories And Relevance to Study Area

2.4 Land-Related Policies and Regulations of Nepal

This study focuses on urban expansion in the green landscape of urban edges, specifically the Estate-to-Urban Transition Area of Giri Bandhu Tea Estate. Land-related policies and regulations are crucial because they provide the legal framework that governs land conversion, urban development, and environmental protection. By analyzing these policies, the study can assess how well Nepal's regulatory framework supports or hinders sustainable urban expansion in the estate-to-urban transition area. It also helps in proposing policy recommendations for managing future land-use changes effectively. Refer

to Table 2 for Details.

| Key Provisions | Relevance to Study Area |
|-------------------------------------------------|-------------------------------------------------------|
| Land Act, 1964 | |
| Land ceiling, ownership, fragmentation control | Guides estate land conversion |
| National Land Use Policy, 2015 | |
| Zoning system | Guides land classification, prevents haphazard growth |
| Urban Policy, 2007 | |
| Planned expansion, infrastructure | Ensures infrastructure in transition areas |
| Local Government Operation Act, 2017 | |
| Local control over land use, taxation | Empowers municipalities in land transitions |
| Land Use Act, 2019 | |
| Restricts conversion, scientific classification | Regulates estate-to-urban transformation |
| Building Code and Regulations | |
| Construction, safety, density rules | Governs building in urbanized estate areas |

Table 2: Edge Development Theories And Relevance to Study Area

3. Methodology

The research adopts a mixed ontology, blending positivism and constructivism, recognizing urban expansion as both a measurable physical phenomenon, such as land use changes and population growth, and a socially constructed reality shaped by human behaviors and decisions. Knowledge is gathered through both positivist methodologies, such as data on land use patterns and demographic changes, and constructivist approaches, analyzing stakeholder behaviors and perceptions. The study follows a deductive logic system, starting with general urban growth models and applying them to the specific case of Giri Bandhu Tea Estate’s transformation into an urban settlement, testing the hypothesis that urban expansion into green zones aligns with established city expansion theories. The methodology combines quantitative and qualitative approaches to gather comprehensive data. Methods of data collection include a literature review, where existing articles and documents, such as census data and municipal

records, are analyzed; site observation, where physical changes in urbanizing areas are noted; and a questionnaire survey focused on mobility patterns, conducted both online and in-person. Additionally, key informant interviews with stakeholders such as tea estate owners, workers, and real estate developers provide qualitative insights into the effects of urban growth, while focused group discussions with tea estate workers and visitors explore the impact on tea plantations and livelihoods. The research objectives are twofold: first, to explore the factors contributing to the decline of green zones on the outskirts of Birtamode Municipality, and second, to analyze how various stakeholders perceive and respond to urban-driven changes. Data collected from these methods help identify the major drivers of urban expansion and the reactions of those affected by the transformation of green spaces into urban areas.

4. Study Area

4.1 Introduction

The Giri Bandhu Tea Estate is located in Birtamod Municipality, Jhapa district on both sides of the Mahendra Highway, making it a prominent landmark in the area. The estate, run by the Giri family for over 50 years, is one of Nepal’s key tea manufacturers, operating two tea estates and a large, modernized processing plant. Founded in the 1950s by Shamsheer Giri and his brothers.



Figure 2: Giri Bandu Tea Estate Land Area

Birtamod Municipality, located in Jhapa district of Province No. 1, is a major commercial hub and a rapidly urbanizing area. The municipality was initially a forested area, urbanization began with deforestation and migration, accelerating after the construction of the East-West Highway and during the

Maoist insurgency. The municipality is home to large tea estates and small-scale industries.

4.2 History

During the Rana regime (1977 B.S.), land was granted to individuals based on the extent of forest they cleared with an aim to encourage resettlement in the Terai, reduce population pressure in the hills, and boost agricultural development. King Mahendra introduced the Land Reform Act, capping land ownership at 28 bighas in the Terai. However, land used for agriculture or industry was exempt, though it could not be sold. If an industry stop operations, the land was to revert to government ownership.

The Giri family owned approximately 500 bighas of land. To bypass the land ceiling law, they distributed ownership among relatives before the act was enforced. Despite this, they retained 342 bighas, later converting those into a tea plantation under Giri Bandhu Tea Estate Pvt. Ltd. Legally, this land belonged to the government if not used for tea cultivation.

4.3 Current Situation

The Giri Bandhu Tea Estate land has two parts:

Tea Plantation Area (280 Bighas): The estate currently occupying 280 bighas, is a part of Birtamod Municipality-5 and Arjunthara-11 in Jhapa, covered by tea plantations and forests. The land is targeted for a land swap. Real estate agents are investing billions to facilitate the exchange of this valuable land with less valuable plots in Kachanakbal and Jhapa Rural Municipalities.

New Settlement (70 Bighas – Former Estate Land): Around 70 bighas Land that was formerly part of the estate have been converted into urban settlements. The area in present day includes commercial institutions such as Tek Bahadur Giri Bus Park, Pathibhara Engineering College, and Kantipur Driving Center operate in the plotted area, more than two dozen hotels and a large human settlement. Approximately 400 families reside on the land, which has been divided into 1,153 plots. 51 bighas of land located in Birtamod-5 and Arjunthara-11, 38 bighas have been plotted, while the remaining land is vacant.

5. Data Analysis and Findings

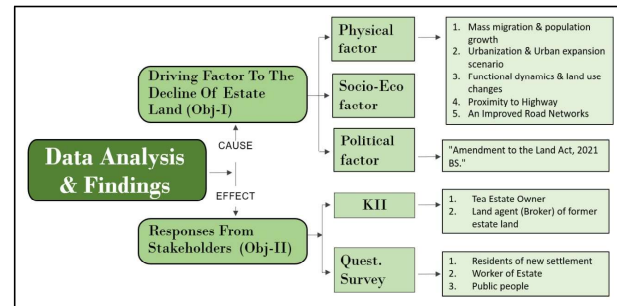


Figure 3: Flow chart for Data Analysis and findings from case study Area

5.1 Factor Contributing to the Decline of Tea Estate land(OBJ-1)

5.1.1 Physical Factors

The Giri Bandu Tea Estate has undergone significant physical transformations due to urban expansion. One of the most notable changes is the conversion of tea cultivation land and vacant areas into new settlements. This shift in land use has led to a decline in green spaces and increased urbanization, particularly along road networks. The presence of noise and dust pollution has intensified due to ongoing construction activities and rising vehicular movement, which contributes to worsening air quality. Infrastructure development has driven rapid expansion along major roads, but unauthorized encroachments into the Right of Way (RoW) have caused road safety, pedestrian, and traffic issues. The township's growth follows a ribbon pattern, with higher density near Birtamode market and less development further away.

5.1.2 Mass migration and population growth

Mass migration Enormous mass migration, mainly from the adjacent mid-hill districts such as Taplejung, Ilam, and Panchthar, along with Terhathum and Dhankuta, was primarily due to political instability between 1996 and 2006[9],[5]. After 2006, as the political insurgency settled, infrastructure development, including road networks, hospitals, bus parks, and academic institutions, accelerated.

Population growth The study area lies in the Jhapa District of Nepal, This area has been experiencing accelerated urban growth since 1996. The urbanization process is influenced by migration and population growth has recorded a remarkable impact on urban growth towards city's edges due to

suitability of land for housing and affordable and minimum land price.

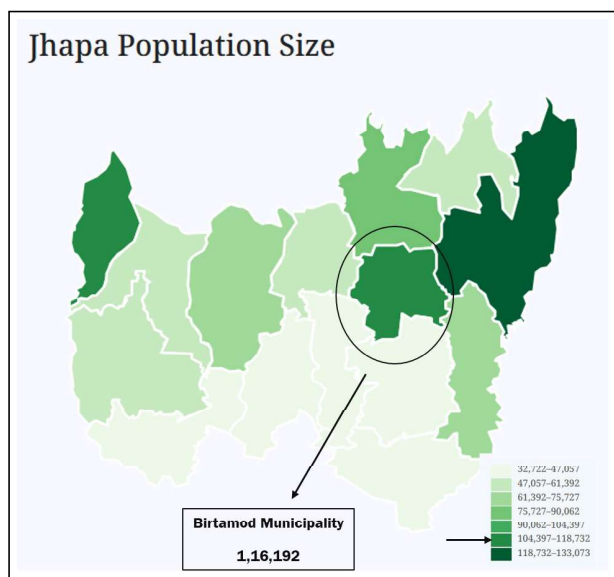


Figure 4: District and municipality level population data of study area (Source: CBS)

From urbanization perspective, Birtamode is second rapidly urbanizing Municipality of Jhapa district with population size above 1 lakh.

The population data from 2001, 2011, and 2021 shows a consistent and significant increase over the two decades [5]. In 2001, the total population was 58,001, which grew to 81,878 in 2011, reflecting a growth of 23,877 people in ten years. This trend continued over the next decade, with the population reaching 116,192 in 2021, marking an increase of 34,314 individuals. The growth rate appears to have accelerated between 2011 and 2021, indicating rapid urbanization and expansion in the area.

| Year | Population | Area, in Hectare | Pop Density, Nos/Hectare |
|------|------------|------------------|--------------------------|
| 2001 | 58001 | 7794 | 7.4 |
| 2011 | 81878 | 7794 | 10.5 |
| 2021 | 116192 | 7794 | 14.9 |

Table 3: Population, Area, and Population Density over the Years

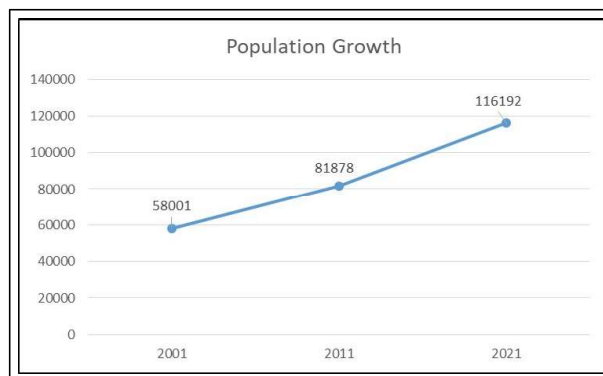


Figure 5: Population Growth of Birtamode Municipality (Source: CBS)

5.1.3 Urban Expansion Scenerio

Driving factors, which are defined as the underlying elements trigger urban expansion are responsible for the urban expansion which occurs at specific temporal and spatial levels[10]. Contextual reference is required for a better understanding of the drivers of urbanization, since distinct factors play different roles in specific time and space.

1996–2001: Slow growth (1.56)

2001–2006: Rapid expansion to 27.12 km² (19.57)

2006–2011: Continued rise to 37.09 km², but at a slower 7.35

2011–2016: Sharp increase to 58.65 km² (11.63)

2016–2021: Growth continued to 70.90 km², at a 4.18[3]

The accelerated urbanization of Jhapa district is mainly driven by economic opportunity, political condition and development activities in specific periods which are further accompanied by access to public services, population growth, topography, government plans/policies and globalization factors. Such conditions are also seen in other Nepalese cities. Similarly, urban sprawl is additionally driven by physical conditions, public service accessibility and globalization as well as plans and policies. The major drivers of urbanization in the rapidly urbanizing city. Which properly reflects and represents the urbanization scenario of the Tarai region, particularly the adjoined Jhapa District.

5.1.4 Functional dynamics and land use changes

The urbanization process is influenced by migration and population growth has recorded a remarkable impact on other LULC, mostly prime green zones

(agricultural land)[11]. Settlements are scattered and unmanaged. Between 1996 and 2021, a wide range of change in land-use was observed, including a linear increase in urban area, the continuous decline of cultivated land, minimal change in forest cover and shrubs and fluctuations were observed for the area of tea farming.

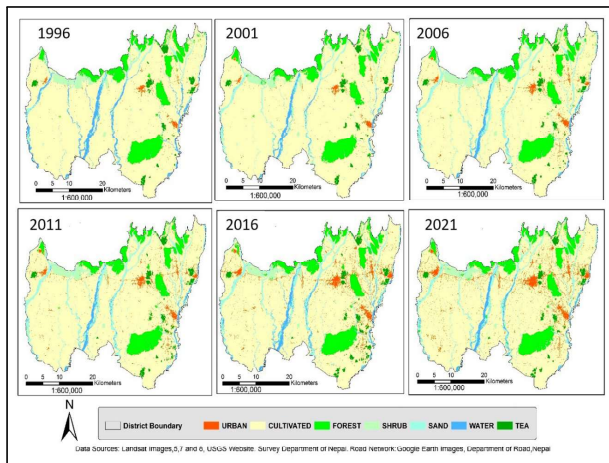


Figure 6: LULC maps of Jhapa district for 1996–2021

5.1.5 Available Road Networks

According to the Axial Growth Model discussed in literature review, urban development tends to occur more along transportation lines, with areas close to the transportation grows more, while areas farther away develop less. Also, in urban studies, areas closer to highways typically experience more development due to better transportation connections[2],[7]. Former Estate land, where new settlement has emerged, this transition area is located close to East-West Highway (as clearly shown in the figure below). This proximity to the highway is a significant reason for the conversion of estate land into urban settlements. So this is consider another key driving factor of urban expansion towards the study area (estate land), which, in turn, leads to a reduction in green space at the city's edge.

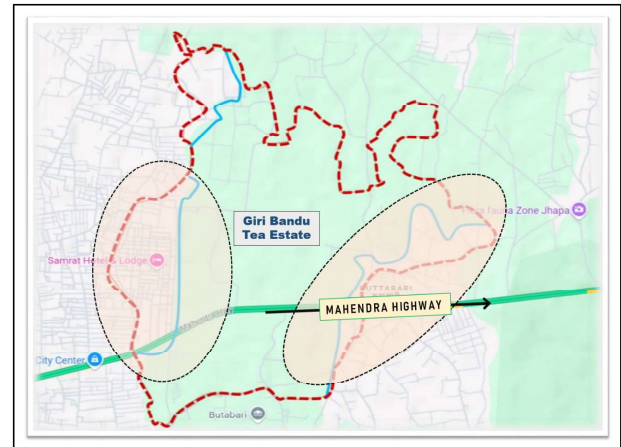


Figure 7: Proximity to Highway of study area)

5.1.6 An Improved Road Network

Being a part of the Terai region, Jhapa district enjoys relatively better road infrastructure compared to the hilly and mountainous districts.

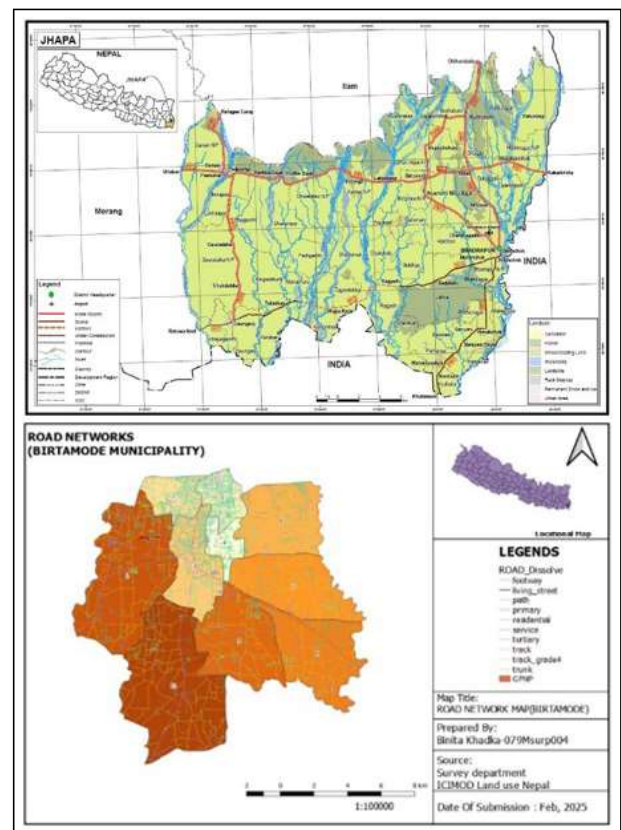


Figure 8: Available road networks in district and municipal level)

The district is positioned along the E-W Highway, Nepal's longest and most significant road corridor. Additionally Mechi Highway, providing connectivity between the Terai and the hilly regions.

Similarly Birtamode Municipality, is located at the intersection of the E-W and Mechi Highway, making it a junction for trade and mobility. The municipality has expanded its road infrastructure in recent years, improving connectivity within residential, commercial, and industrial areas. Additionally, Birtamode also benefits from good cross-border connections as it is close to the Nepal-India border. Overall, Jhapa district and Birtamode Municipality have a well-developed and expanding road network that supports economic activities, enhances trade, and improves accessibility contributing to urban growth and expansion towards city edges like in estate land.

5.1.7 Socio-Economic Factors

The socio-economic landscape of Giri Bandu Tea Estate is changing as traditional tea-based livelihoods decline, with tea cultivation dropping by 70% due to urban expansion. Many estate workers now face job losses and have to find new sources of income or migrate for work. The growing demand for real estate has led to rising land values, unregulated plotting, and informal settlements, creating inequality in access to services. While some recognize the need to preserve green spaces, economic pressures continue to drive urban growth. The lack of proper planning and policy enforcement complicates sustainable development and strains local infrastructure.

5.1.8 Political Factors

”Amendment to the Land Act, 2021 BS.” The Land Act of 2021 BS (amended over time) excluded land used for industries, agricultural activities, and institutions like schools or hospitals from being sealed. To protect their land from nationalization, the Giri brothers established the Giri Bandhu Tea Estate in 2020 BS, registering it before the land reform act. In 1964, a Nepal Gazette notice confirmed that their 500 bighas of land would not be sealed as long as it was used for tea production. However, the land is now being targeted by the land mafia for illegal sales and exchanges. Despite the estate’s original purpose, plans to sell its valuable land for real estate purposes in Birtamod are underway, involving illegal land transactions and speculations.

5.2 Analyzing Responses from Stakeholders of Estate Area (Obj-ii)

To gather opinion and responses from stakeholders, 6 key stakeholders were considered in this study. A

mixed-method approach was followed for stakeholder analysis to gain both qualitative insights (Via KII) and quantitative data (Via questionnaire surveys). Among these 6 stakeholders, KII was conducted with 3 stakeholders: the Tea Estate owner, local government and the Real Estate agent. A questionnaire survey was carried out with the remaining 3 stakeholders: Residents on former estate land, workers and management team of the estate and General public (visitors or residents) of Birtamod municipality.

Perspectives of stakeholders through KII:

1. Estate Owner: Chairman Mr. Chatra Giri denied rumors that the government gave them the land for free, clarifying that Giri Bandhu Tea Estate belongs to his family and has been passed down through generations. He emphasized that the estate is private property, not state-owned. Giri also explained that the tea cultivation in Giri Bandu land was started before the Land Act came into effect in 1964 (2021 BS). Since the company was established in 1963, the area around tea estate has developed into the Birtamode market, which has lowered the land’s fertility. As a result, tea production has fallen by 70%, affecting the livelihoods of tea workers. Due to increasing pressure from locals to remove the tea farm from the area, he explained that they submitted an application to exchange Giri Bandhu’s land for other plots within the province. 2. Real Estate agent of former estate land: Mr. Bishnu Kumar Rai views the Giri Bandhu Tea Estate land as a valuable asset with great potential for urban development. He emphasizes his long-term vision for transforming the area into a well-organized city, with facilities such as hospitals and schools, benefiting both the region and its people. He believes the land exchange proposal, once approved, will play a key role in realizing this dream. Despite challenges, including legal disputes and local resistance, Rai is determined to leave a lasting legacy by contributing to organized urbanization in Jhapa. He acknowledges the complex political issues surrounding the project but remains confident in the transformative potential of the land and its future development. 3. Local Government: The Supreme Court has ordered the nationalization of 70 bighas of Giri Bandhu Tea Estate land not used for tea production. This has left the local government uncertain about the next steps. Currently, the land is under a development ban, preventing new residential or commercial construction. Due to ongoing legal disputes and ownership controversies, the government has halted

all development, refusing to issue new building permits or allow expansion. The local government views Giri Bandhu Tea Estate as a key area for urban expansion but faces legal and economic challenges. They see the land's potential for planned development, including infrastructure and business growth, but legal disputes and concerns over fairness in the land exchange process create obstacles. While investment opportunities are recognized, officials also worry about the displacement of tea workers and the decline of the tea industry. Political and public pressure further complicates the situation. Overall, the government remains cautious, aiming to balance urban growth with legal and social concerns.

5.3 The results from the questionnaire survey:

Residents on former Estate Land 32 Respondents' Sample data were taken asking 19 questions to each respondent.

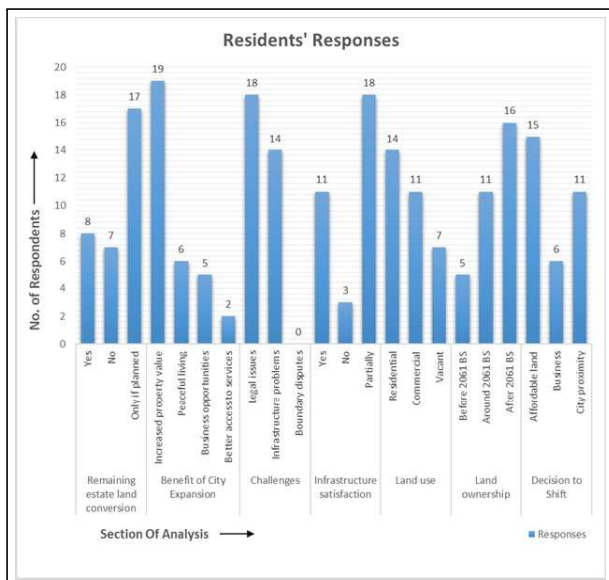


Figure 9: Resident Response)

General Public View 26 general public were asked 14 questions

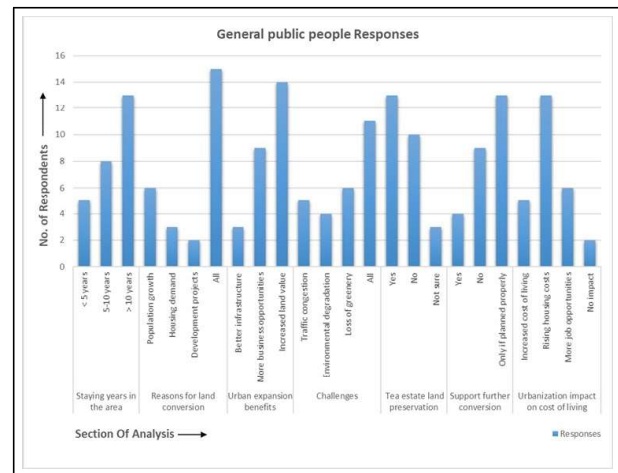


Figure 10: General Public Response)

Worker's View 21 workers were asked 17 questions

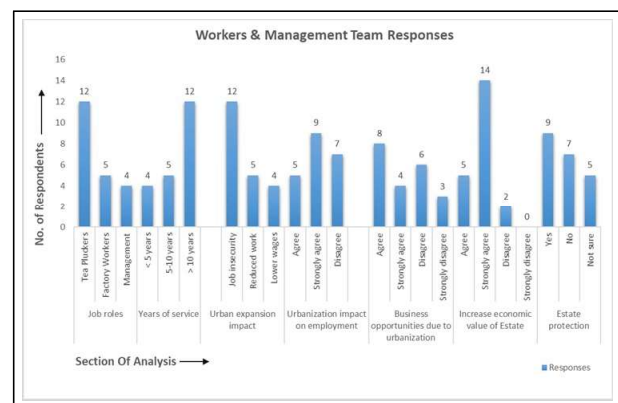


Figure 11: Worker's Response)

6. Recommendation

The ongoing urban expansion towards Giri Bandu Tea Estate and its surrounding areas can be effectively managed through two key strategies. First, Management of Already Expanded Areas requires exploring policy and planning measures to address the haphazard land subdivision and underutilization of infrastructure in the urban fringe. A phased development approach, guided by the Local Self Governance Act 1999 and implemented by institutions like the VDC, can regulate land use, improve accessibility, and ensure the continued viability of agricultural practices. Second, the Remaining Estate Land should be strategically developed to benefit both the Giri Bandu stakeholders and the government. This can be achieved by fostering sustainable economic growth through tourism, agro-processing industries, and eco-tourism, while maintaining the estate's historical significance.

Through guided land use planning, zoning, and enforcement, urban development can be harmonized with the preservation of green spaces and the promotion of local economic activities. These two strategies will ensure a balanced, sustainable transition from estate land to urban space while benefiting all stakeholders involved.

7. Conclusion

This research examined the impacts of urban expansion on the Giri Bandhu Tea Estate and its surrounding green landscapes. It highlighted key drivers such as population growth, mass migration, land speculation, infrastructure development, increasing housing demand and availability, suitability and affordable land price in edge area far from city Centre, that have led to the fragmentation of the estate land and the decline of ecological balance. Stakeholder perceptions varied, with some viewing expansion as an opportunity for economic growth, while others expressed concerns about job displacement and environmental damage. The study emphasizes the urgent need for strategic urban planning to balance development with environmental conservation. By integrating sustainable practices, stakeholder collaboration, and policy interventions, it is possible to guide the estate-to-urban transition while preserving critical green spaces and ensuring long-term prosperity for all involved.

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