

ENCROACHMENT OF AGRICULTURAL LAND AND URBAN DEVELOPMENT ISSUES; A CASE OF BAGDULA, PYUTHAN

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ABSTRACT

Land use pattern is changing day by day in Global context to national context, the major cause of change is human and their interaction with natural environment. Evidence shows agricultural land abandonment is a global land change. Populations grows and increase in agricultural demand that also rise to demand in housing land which causes for destroy of existing agricultural land in unplanned haphazard way. In scenario of Nepal a new mode of political, social and economic transformation is promoting the haphazard encroachment of agricultural land. Case study of Bagdula, Pyuthan is done to analyze the root cause and problems of change in land use pattern, also to predict the future scenario of Bagdula area through the survey data. The small neighborhood of Bagdula has been selected for the study of changing land use of the area. This area is a part of Bagdula bazaar. This article looks upon encroaching the agricultural land of surrounding, with the ongoing development and extension various consequences are emerging. Random field survey has been done for the data collection. Twenty houses are selected from the neighborhood as per the ease for surveyor due to pandemic. All the respondents are the owner of the buildings and most of the people are involved in business activities. Satellite images are also used for the data analysis which supports the data collected from the survey. This study helps us to understand the changing land use pattern of different part of Nepal. Root cause and problems of changing land use can be understood during this study. Also to predict the future scenario of this settlement this study can be beneficial.

Keywords: Agricultural land, haphazard development, land use pattern, encroachment

1 Introduction

Urban Land-use planning is the process of regulating the use of land by a central authority in urban areas, this is done in an effort to promote more desirable social and environmental outcomes as well as a more efficient use of resources (Matthew, 2002). Transportation Planning aims at strategy to improve the performance of the transportation system, it is the essential tool for urban planning (Bajracharya, 2021). Evidence shows agricultural land abandonment is a global land change process with a recent spread of abandonment. Nepal is rich in Agriculture and it relates economy, there is change in land pattern and behavior.

Land use change simply refers to the conversion of a piece of land's use by humans, from one purpose to another. The major cause of changing land use of pyuthan is migration from other places, increase in population and urbanization. To fulfill the requirements of residence agriculture lands are converted into plots and construction takes place. Another major reason is the development of this area into one of the market centers of the district. Many facilities like hospital, school, college, shopping Centre, job opportunities, and availability of agriculture land are some of the major attractions of this area. The settlement pattern of the pyuthan is linear along the road. Some part of the area lies in flat terrain of the Jhimruk river bank and the rest lies in the slope area. The population of the above-mentioned coverage area combined together was 100, 24 with 1,682 households during the project preparation phase (2003). Bagdula is a mixed settlement (core area) town. The area is cluster type with mixed

communities of Brahman, Chhetri, Kumal and Some Dalits. Bagdula is one of the rising market centers of Pyuthan District. The proposed study area covers ward no. 7, 8 of Dharmabatai VDC.

2 Literature Review

2.1 Urban land use planning

Land use planning is a technical approach for developing and managing the land into various public interests to endorse sustainable socio-economic development (Mangi, 2018). Urban an area with a large amount of people residing in it, an area that has been significantly developed, or an area where the distance between buildings is very small. Administrative criteria or political boundaries (e.g., area within the jurisdiction of a municipality or town committee), where a threshold population size such as: population density, economic function, presence of urban characteristics (e.g., paved streets, electric lighting, and sewerage) (Bajaracharya, 2021). Planning is an activity carried out in the present with the experience of the past to accommodate the future. In organizations, planning is a management process, concerned with defining goals for company's future direction and determining on the missions and resources to achieve those targets (Bajaracharya, 2021). Urban Land-use planning is the process of regulating the use of land by a central authority. In the pursuit of these goals, planners assume that regulating the use of land will change the patterns of human behavior, and that these changes are beneficial (al, 2017).

2.2 Change of agricultural land in global context

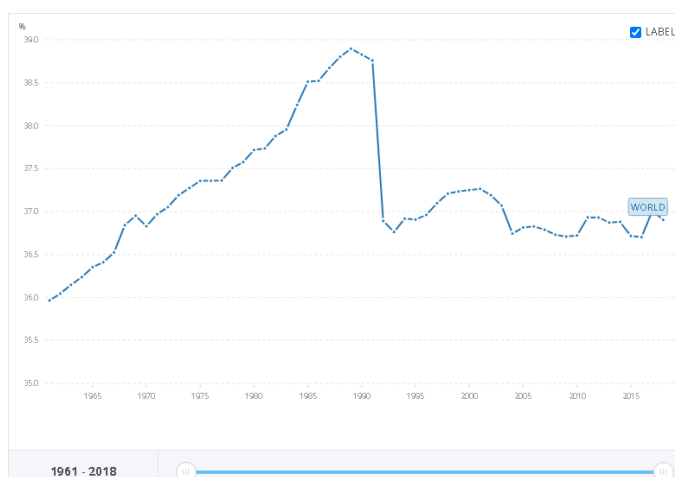


Figure 1: Graph of change in agricultural land in global context (**Agricultural Organization, 2018**)

Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures where agricultural land constitutes only a part of any country's total area, which can include areas not suitable for agriculture, such as forests, mountains, and inland water bodies (Organization, 2018). Land-use-change patterns are the result of the complex interaction between the human and the physical environment (Jan R Ritsema van Eck, 2004). Agriculture is a major use of land half of the world's habitable land is used for agriculture (Roser, 2019). The world is facing a looming scarcity of land necessary to secure agricultural commodities production and experience competition from other land uses. At the same time, evidence shows agricultural land abandonment is a global land change process with a recent spread of abandonment in the Global South. Research on agricultural land abandonment is disproportional compared to other land change processes, such as deforestation and agricultural expansion. At the same time, agricultural land abandonment has strong implications to the environment and societal well-being, including food security. There are many

challenges to understand the agricultural land abandonment process stemming from the fuzzy definition of abandonment, the ability to measure abandonment patterns, the diversity of factors driving agricultural land abandonment, and its environmental consequences.

2.3 *Change of agricultural land in National context*

Agriculture in Nepal is by far the largest sector of the Nepalese economy contributing 34.1 percent to the total GDP in 2009/2010 (MoF 2009) and two-thirds of the economically active population are engaged in this sector (CBS 2008). Although Nepal is rich in Agriculture and it relates economy there is change in land pattern and behavior. Population growth, surging consumption, and an increasing reliance on bioenergy will likely lead to rapid increases in the global demand for agricultural products (Kuemmerle T, 2009). As populations grows and increase in agricultural demand that also raise to demand in housing land which causes for destroy of existing agricultural land in unplanned haphazard way. Nepal is in a new mode of political, social and economic transformation (Kailash N Pyakuryal, 2011). The change in economic condition brings change in life style that demands new creation, which is only possible in using vacant land to meet space purpose and also because of weak policy contains the new plans are in unorganized ways which results in damage of agricultural land.

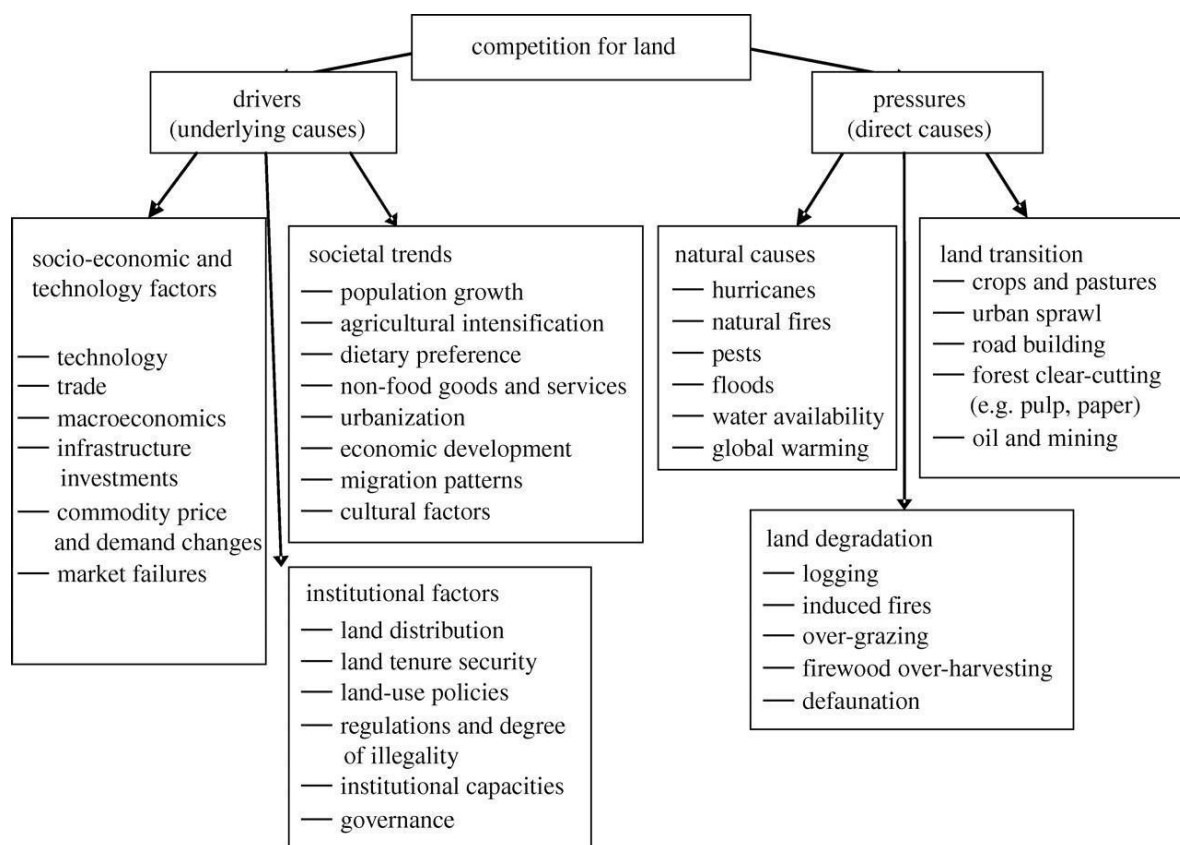


Figure 2: Conceptual analysis framework for competition for land, drivers and pressures (Contreras-Hermosilla, 2000)

2.4 *Haphazard Urbanization: land development*

Haphazard planning means lacking any obvious principle of organization, characterized by lack of order or planning, by irregularity, or by randomness (Zhao B, 2013). Urbanization is the process of human migration from rural to urban areas (Goryakin Y, 2017) and involves change of land use from

agricultural to non-agricultural (Li GR, 2017). Haphazard Urbanization has been linked to destructive geo-hazards that can cause loss of life, destruction of property, and environmental damage (Yifei Cui, 2019). That brings unhealthy living condition to living beings. poor urban planning with inadequate consideration of risk led to housing construction in dangerous areas; clearance of hillside vegetation increased erosion potential; very low-cost buildings using frail construction material and methods lacked resilience; and insufficient risk management led to weak emergency response. Land use change intensely affects the surficial processes of mass movement and leads to the occurrence of geo-hazards (Yifei Cui, 2019).

As residential and commercial areas are rapidly growing in them any part of Nepal, agricultural lands in is shrinking day by day. Study shows that people are using their agricultural land for residential purpose. Due to lack of control over land use, urbanization in the valley is in chaos. In most of area having non- developed plans and vision, they could not be implemented due to the lack of political will, clear policy, land use map and weak supervision upon construction. Relatively affordable land price, physical infrastructure and accessibility of water case mainly give of people upon that area. In the context of Nepal, the government is repeating the same mistake that it committed 30 years ago. Now is the time that it should seriously step up for the overall development and planned urbanization and 60 per cent of the problem can be solved just by amending policies, changing the working pattern and enhance political will on the issue (Shakya, 2018).

2.5 Influences of Transportation planning in agriculture

Agricultural production is very important to the economy of developing nations as a whole. It is the major occupation of the inhabitants and people of the country while it provides employment directly or indirectly (T.E.Nichols, 2000). When analyzing transport of agriculture produce, it is identified that transport costs have critical role in recognizing the link between accessibility and agricultural development. Good transport system is critically important to competent agricultural marketing (Insights, 2011). Transport creates market for agricultural produce, improves interaction among geographical and economic regions and opens up new areas to economic focus. If transportation and road networks had run in unorganized ways its damages many agricultural lands.

3 Methodology

This study falls under correlation research which measures the relationship between two Variables agricultural land and haphazard construction. Qualitative analysis with a random field survey was done using a questionnaire as a guideline for study. Questionnaire had been prepared by using two variables as the major part. Questions are prepared in close ended form with multiple choice options and also open ended to know about respondent view. Respondents had answered these questions in proper ways in both close and open-ended questions. We had taken interview of 80 people where 26 questions are closed ended and 3 questions are open ended. Also, quantitative analysis with a field survey was done and various articles are initially surfed in the Google scholar with the use of keywords like change of pattern of agricultural land in global context, national context and so on, in order to find appropriate articles for analysis. Beside these articles, intensive study of literatures was done through various other journals, websites, and conference papers and so on. Data collection is done analysis over data through bar graphs, diagrams. The research is interpretive in nature, by using survey data, satellite image and literature we also had analyzed upon future scenario of Bagdula.

4 Case study

4.1 Background

The neighborhood selected for the case study is located in Pyuthan district of Nepal. It is situated in province no 5 Lumbini. A small locality of Pyuthan Municipality known as Bagdula has been selected for the study. This is located at the bank of Jhimruk River. It is one of the market attractions of the district. Pyuthan is a hilly district 400 km west of Kathmandu in Lumbini province in mid-western Nepal. Pyuthan covers an area of 1309 km² with population of 212, 484 in 2001 and 226, 796 in 2011. Pyuthan Khalanga is the district's administrative center. Pyuthan borders Dang Deukhuri district to the southwest along the crest of the Mahabharat range and extends about 50km northeast through the middle hills to a 3000 plus meter ridge that is both Pyuthan's border with Baglung district of Dhaulagiri zone and the main watershed between the west Rapti and Gandaki River basins. Pyuthan borders Rolpa district and Gandaki River basins. Pyuthan borders Rolpa district to the west.

Bagdula is 420.7 km away from the capital of country. The Bhalubang- Khalanga highway goes through the settlement which is a feeder highway connecting to E-W highway of the country. The settlement of this place lies at the bank of the river. The Valley of Jhimruk River is the core of the Pyuthan district. Its alluvial plain is intensively planted in rice during summer monsoon and wheat is grown as a winter crop.



4.1 General information

- Topography: Hilly region
- Location: Province no 5 Lumbini, Mid-western region
- Temperature: Subtropical and mild-temperate climate s
- Population: 2,26,796
- Area: 1309km²
- Administrative Divisions: Divided in two municipalities, nine rural municipalities

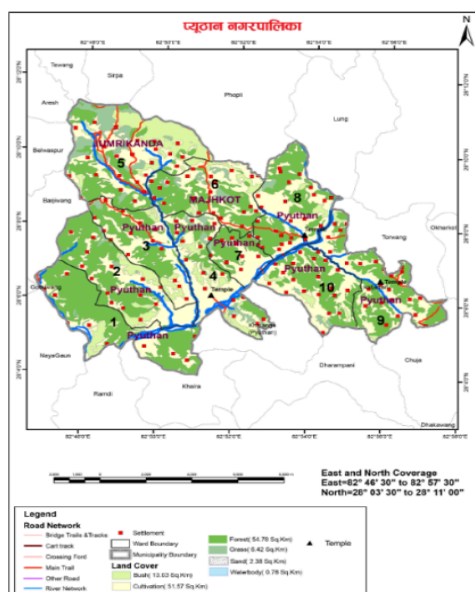
विवरण	क्षेत्रफल (वर्ग कि.मि.)	प्रतिशत
भाडी	१३.०३	१०.१०
खेतीयोग्य जमिन	५१.५७	३९.९९
वनजंगल	५४.७८	४२.४८
चरि चरन	६.४२	४.९८
बालुवा (नदि किनार)	२.३८	१.८५
खोला, नदी, पोखरी, आदि	०.७८	०.६०
कुल क्षेत्रफल	१२८.९६	१००.००

स्रोत : प्युठान नगरपालिकाको कार्यालय, २०७४

Figure 4: The chart of land use (Source: Municipal Profile 2074)

4.2 Pyuthan context (land use pattern)

According to (Municipality, 2074) the total area of Pyuthan municipality is 128.96 sq.km in which 51.57 sq.km. of total areas is agricultural land, 54.78 sq.km area is covered with forest and 0.78 sq.km area is water covered area. It is located 541- 2426 m above sea level. It is divided into three divisions. Lekali range, mountain and beshi range.



As defined by (Municipality, 2074) there is lack of proper planning of settlements. There is no separation of zoning with respect to residential zone, industrial zone, open recreational zone, green zone, hospital zone, administrative zone. There is a huge need of development proper zoning of this area. 39.99% area of municipality is agricultural land. The major crops are paddy, maize and wheat. Different pulses, mustard and vegetables are also grown as cash crops. There is a huge possibility of division of agriculture land into different pockets to increase the capacity of agricultural products.

As defined in (ITECO Nepal (P) Ltd., 2015) the district falls in the hilly region with highest elevation of 3659 meters and gradually sloping downwards to south plains reaching an elevation of 305 meters above sea level.

Subtropical and mild-temperate climate dominates the area. The spring seasons are warm and dry; summer seasons are warm_wet and humid while the winters are cool and normally dry.

The settlement pattern of the study area is linear along the road. Some part of the area lies in flat terrain of the Jhimruk river bank and the rest lies in the slope area. The population of the above-mentioned coverage area combined together was 100, 24 with 1,682 households during the project preparation phase (2003). Bagdula is a mixed settlement (core area) town. The area is cluster type with mixed communities of Brahman, Chhetri, Kumal and Some Dalits. Bagdula is one of the rising market centers of Pyuthan District. The proposed study area covers ward no. 7, 8 of Dharmabatai VDC.

In total population 56.27% female and 43.73 % male are present in Pyuthan district according to the Density of the people is 298 people per kilometer. The study area consists Pyuthan municipality 7 & 8. The area of Pyuthan municipality 7 is 4.98sq.km. & the area of Pyuthan municipality 8 is 13.04sq.km. The population of Pyuthan municipality is 2982 and the population of Pyuthan municipality 8 is 4883. The total household no in Pyuthan municipality7 is 743 and the household no in Pyuthan municipality 8 is 1132.



4.3 Study area:

The small neighborhood of Bagdula has been selected for the study of changing land use of the area. This area is a part of Bagdula bazaar. It is a market area with various facilities like shopping, hospital, school, hotel, restaurants, bank, business, residential and agriculture purpose. There is mixed type of building used for residence, commercial, and business, residential cum commercial buildings. The Bhalubang- Khalanga highway goes through the settlement which is a feeder highway connecting to



E-W highway of the country. Main market area lies on the side of this highway. With the rapid urbanization inner streets are developed with the rapid construction of building. This area was agricultural land around twelve years ago. To understand the changing land use pattern of this place this particular area is selected. It is in developing phase by encroaching the agricultural land of surrounding. With the ongoing

development and extension various consequences are emerging. If the development goes on in this pace there will be a huge unplanned and haphazard town in the near future as like Kathmandu. There is mixed group of people of Brahmin, Chhetri, Gurung and others. Mostly the people are migrants from the nearby hilly regions. Very few no's of local people are residing here. This was very fast grown settlement b for business and trade

4.4 Use of Satellite Map

To study the land use pattern of this area satellite map of this place has been analyzed. The satellite images studied are of the few years back 2008, 2012, 2014, 2017, 2020. In these images we can easily found the changing pattern of land and development of road networks. In the very first image of 2008, there is very less homes no development of roadway, whole area looks like an agricultural land. In the image of 2012 after four years the lots of changes can be seen increased no of buildings, development of roadways, streets, conversion of land can be easily identified. In the image of 2014, there is no huge change but continuing pattern can be seen. In the image of 2017, a lot of changes can be identified. Increased no of buildings, land conversion, extension of highways and streets, foot trails. Haphazard building construction can be easily identified.



Figure 10: Satellite Image of 2008

Source: Google Earth



Figure 13: Satellite image of 2017

Source: Google Earth



Figure 14: Satellite image of 2020

Source: Google Earth

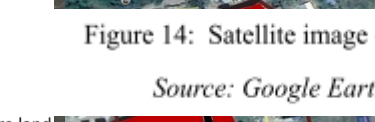


Figure 11: Satellite image of 2012

Source: Google Earth

Highway

Highway

Agriculture land

Highway

Built up area

Agriculture land

School Area

Highway

Highway

area

re land

School Area

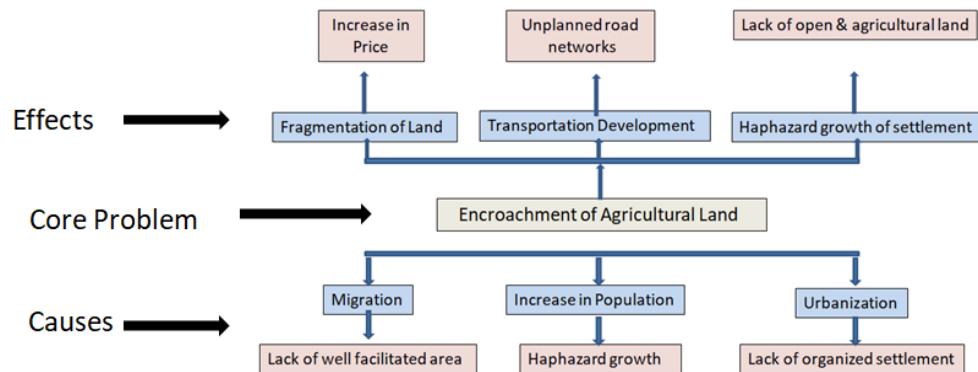
Water bodies

4.5 Cause & Effect of Changing Land use Pattern

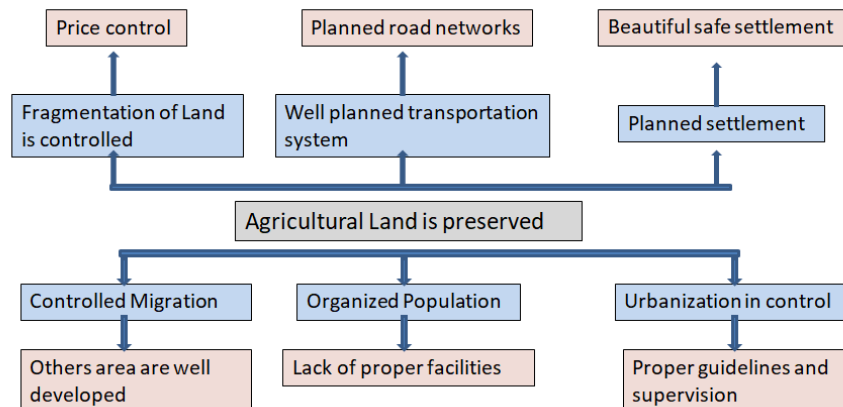
Land use change simply refers to the conversion of a piece of land's use by humans, from one purpose to another the major cause of changing land use of this area is migration from other places, increase in population and urbanization. To fulfill the requirements of residence agriculture lands are converted

into plots and construction takes place. Another major reason is the development of this area into one of the market centers of the district. Many facilities like hospital, school, college, shopping Centre, job opportunities, and availability of agriculture land are some of the major attractions of this area.

The changing land use pattern of this area is arising the questions on the future of this space. Is it going to be like the other major nearby cities like Ghorahi, Tulsipur, Butwal? Definitely if the agricultural land will convert into plots and construction goes on this speed, these open lands will be remembered in history. There is a need of quick actions like regulation guidelines, futuristic plan of this area, conserving the agricultural land and well-planned city with well balance between agricultural green areas and built-up area.



Changes in land use or land cover continue to impact local to global scale weather and climate by altering the flow of energy, water and greenhouse gases between the land and the atmosphere. Land use change has both positive as well as negative outcomes for society and the environment. From society's point of view, land use change is essential to produce food, fiber for human use as well as to provide habitable space for people.



To preserve the agricultural land fragmentation of land should be stopped by the local government by preparing proper zoning of the land into residential zone, green zone, education zone, commercial zone. Transportation needs to be considering for the planed settlement. Migration to this area needs a special attention. It is the major cause of changing land use. Policies and guidelines are the major requirement for the balanced urbanization.

4.6 Data Analysis

Questionnaire survey

Demographic Statistics

We had done survey with open ended and closed ended questionnaire that is mentioned in annex part. The respondents were divided into seven categories of age group. Out of the surveys done in 80 houses, majority of respondents belong in 40 – 49 age group and the least were from 10 -19 age group and less than 10. 85% of the respondents were male whereas, only 15% respondents were female. From the respondents 68 were male and 32 were female, this survey had been taken through house owner that means only 15% female are owner in total. As the majority of ethnic group is Brahmin, were 35% than Chhettri 30%. In total respondent 28 are Brahmin, 24 are Chhettri, 12 are Dasnami, Sanyasi, 8 are Newar. Supporting graphs had been mentioned in Annex. While talking about religion aspect all 80 respondents belong to Hindu. There are 60% of total population are nuclear and 40% are joint family that means 48 and 32 are nuclear and joint respectively.

4.6.1. Where they came from

65% of respondent were came from nearby place that is 52 respondent and 30% are local people. The migrant population came to that area, which cause in development of resident in cultivated land.

Building Information

4.6.2. Year of building construction

In the survey, majority of building age is 6-10 year that are 40% of total after that 1-5 year is 30%. There are total 32 people of 6-10 years living over their after that 24 respondent are of 1-5 years living over there and only 16 respondent are living over 16-20 years ago that means 20% of total respondent are staying larger time.

4.6.3. Type of building use

Majority of building are used for residential cum commercial purpose that means 90% of building than 5% of residential and commercial. In 80 respondent 72 people uses their houses as residential and commercial purposes by using ground floor as residential purpose and first floor for residential purpose, there are 4 building as pure residential purpose and 4 building for commercial purpose.

50% of building consists of 4.01 to 8.01 Anna. 45% consists of 2.51 Anna to 4 Anna and there are no buildings with area more than 8.01 anna. As mentioned in Annex bar graph.

4.6.4. Home constructed on agricultural land

Among 80 respondent 76 of them had built their residence in agricultural land. That means all most all respondent are using agricultural land for their residential purpose by which more chances of decreasing of agricultural land.

4.6.5. Width of street directly accessible from respondent house

Most of building consist of 80' road in front of their houses. 15% respondent has less than 5'. There are 20 respondent whom using 6-10 feet width road they are 25% of total percentage.

4.6.6. Satisfaction with road connections

All the respondent are unsatisfied with road connection.

4.6.7. Reason for non-satisfaction with road connections

Among all the respondent 40 respondent complaining about haphazard road network and traffic problem, 40 respondents mentioned about traffic problem and road condition and 40 people are mentioned about road condition and haphazard road networks. All respondent has more than 8 un-satisfactions with road connection.

4.6.8. Cause of unorganized road networks

Among all the respondent 80% lack of proper guideline and 20% as per owner desire. No respondent had chosen for supervision options Land use pattern.

4.6.9. Satisfied with the changing land use pattern of that place

95% are unsatisfied with land use pattern of that place. There is only four respondent who is satisfied with road condition.

4.6.10. Bothers you the most

Most of people are unsatisfied with decrease in agricultural land and unplanned road network. Also, some people are expecting about proper guidelines and rules.

4.6.11. Have any agriculture land nearby

55% of people has agricultural land nearby and 9% does not have. Among 80 respondent 44 has agricultural land and 36 respondents don't have agricultural land.

Open ended survey

1. If the current rate of agricultural land encroachment continues, what do you think the future of this area will look like?

"If such pattern of land development had occurred in secondary road also, there will be no agricultural land in future." Because all the agricultural land will be covered by buildings.

"Already the price of land is very high, if this goes on this speed there will be impossible to normal people for buy land on that area."

"If land use pattern of this area changes on this speed, this whole residential area could be change to commercial area as like the major cities Butwal, Ghorahi, Tulsipur."

2. Looking back over the years, what major changes have you observed in land use and development in this area?

"In the past the whole area was agricultural land, very few no's of local people were here. With the time the development of roadways, various infrastructures gradually increased in unplanned haphazard manner."

"In past land price was very low comparison to present day."

3. What improvements would you like to see in the road network to address the challenges of urban expansion and land encroachment?

“Traffic management is very much necessary on highway which also cause high noise pollution during afternoon.”

“Road width should be proper and wide enough.”

“Strict bye-laws and guidelines are very much necessary to control haphazardly grown road networks.”

According to our open ended and close ended survey we had found that, if land use pattern of this area grows in this speed: unhygienic living conditions and hazardous situations could be coming. There will be un-organized compact settlement with no open space and agricultural land, which also cause reduction in vegetation, substandard housing. Discrimination between the income's groups can arises in future. Quality of life is lowered as development pattern had occurred in such way.

5. Result and Discussion

This study mention about migration has a significant impact on both land encroachment and Bagdula's population growth. Given that just 30% of respondents were locals and 65% of respondents were migrants from nearby areas, it is evident that rural-to-urban migration is a significant factor in the region's rapid urban expansion. The data also shows that 30% of buildings are 1–5 years old and 40% of buildings are 6–10 years old, supporting the idea that construction has accelerated recently. Bagdula's rapid, uncontrolled growth may have caused issues with land use, infrastructure and settlement patterns, as evidenced by the sparse presence of older structures. The expansion of residence and market activity is a primary cause of this rapid growth. The majority of buildings have both residential and commercial uses and many people work in the business sector. In addition to contributing to economic growth, this has led to haphazard settlements, where homes and businesses are constructed without careful planning. Because of this, agricultural land is being turned into residential areas; according to 76 out of 80 respondents, they constructed their homes on ground that was once used for farming. This results in issues including inadequate drainage, a shortage of green spaces, and environmental concerns in addition to reducing the amount of cropland.

Another significant issue is inadequate road infrastructure and connection. According to the poll, 60% of people have a road that is twenty feet wide, while 15% of people have a road in front of their homes that is less than five feet wide, which is insufficient for effective traffic movement. The settlement is mostly dispersed along the roadway, which has caused traffic, making travel hazardous and challenging. Additionally, poor road conditions might make it difficult for emergency vehicles, such as fire trucks and ambulances, to get to victims in time. Poor land-use planning exacerbates these issues. Eighty percent of those surveyed feel there are no clear regulations on how land should be used and eighty-five percent are dissatisfied with the way land is being managed. Many claim that the neighborhood's growth was unplanned, leading to issues including congested neighborhoods, lack of public amenities and disorganized mixed-use buildings. The neighborhood is challenging to navigate because some homes are situated close to business zone without designated zoning.

Appropriate urban planning is required to address these issues. To ensure that residential, commercial, and agricultural spaces are used effectively, authorities should establish clear zoning regulations. To accommodate the expanding population, roads must be adequately designed and built. Above all, including the neighborhood in planning choices will guarantee that growth occurs in a way that is

advantageous to everybody. Without proper planning, Bagdula's rapid growth may cause long-term problems that will make future improvements more difficult.

6. Conclusion

Due to lack of guideline and supervision unorganized settlement of migrant became the major issue of haphazard urban development. Within short duration haphazard building construction is taking place that is the major reason for land encroachment. Most of people of Bagdula taking secondary occupation as agriculture and business as major occupation that are also main reason for encroachment of agricultural land. People themselves agree that they encroached agricultural land due to lack of proper zoning, guideline, policy that can guide them. Study shows that settlement of Bagdula is linear settlement along highway, due to rapid urbanization streets are developing as per owner's desire. Some buildings even don't have proper access to any roadway or streets. Most of people are unsatisfied with road connection, people residing on highway have major issue of traffic problem and most of the people complain about haphazard road networks and unsatisfied road condition. From the study we can conclude that people are not satisfied with decrease in agricultural land, road network, and lack of any guidelines and policies. Satellite images of Bagdula also support the results of survey which shows continue changing pattern of land and conversion of agricultural land into built up space. If land use policies had made on time, Bagdula area could be transfer to: unhygienic living conditions, hazardous situations, unorganized compact settlement with no open space and agricultural land, discrimination between the incomes groups could be came on future.

7. Suggestions and Recommendations

- ☐ Division of zoning is very much required for the planned development, there must include of land use guideline and policy
- ☐ In developing area like Bagdula, where just blooming of haphazard development upon encroachment of land, there required a strict agricultural policy like no fragmentation on fertile agricultural land.
- ☐ In case of unavailability of local land use policy, land use policy of Nepal should be followed.
- ☐ In developing area, transportation needs to be well planned and organized form. Municipality has to make proper bye laws regarding road network and strict penalties provision.
- ☐ This study has broad in form, further study and research can be done in broad way.

8. Future study

- ☐ For data collection 80 number of buildings has been chosen due to the limited time which is not enough for the study. So, in further research more detail survey needs to be done for the exact results and data.
- ☐ Transportation is also major part of urban area, in this research we had focused on land use pattern and its changes mainly, for future research transportation can be best topic of research.
- ☐ Relevant land use planning policy related to haphazard development and encroachment of agricultural land can be studied, if we have to interpret upon such policy.

Acknowledgement

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Annex

A. General Information

1. Do you own this house?

☐ Yes ☐ No

2. What is your age group?

☐ Below 20

☐ 20-39

☐ 40-59

☐ 60+

3. What is your occupation?

☐ Business

☐ Agriculture

☐ Private Job

☐ Government Official

☐ Other (Please specify): _____

4. How long have you been staying in Bagdula?

☐ Less than 5 years

☐ 5-10 years

☐ More than 10 years

5. If yes, from where did you migrate?

☐ Nearby municipality

☐ Other district

☐ Local resident

B. Land Use & Development

6. When was your house constructed?

☐ 1-5 years ago

☐ 6-10 years ago

☐ More than 10 years ago

7. Was your house built on land that was previously used for agriculture?

☐ Yes

☐ No

8. What type of land was it when you bought it?

☐ Agricultural land

☐ Plotted land

☐ Open bare land

9. Are you satisfied with the changing pattern of land use?

☐ Yes

☐ No

10. What is the biggest problem resulting from land-use change?

- ☐ Loss of agricultural land
- ☐ Unplanned road networks
- ☐ Poor urban planning

11. Do you own any nearby agricultural land?

- ☐ Yes
- ☐ No

C. Infrastructure & Urban Planning

12. What is the width of the street directly accessible from your house?

- ☐ Less than 5 ft
- ☐ 6 - 10 ft
- ☐ More than 10 ft

13. What type of road do you access from your home?

- ☐ Highway
- ☐ Street
- ☐ Foot trail

14. Are you satisfied with road connectivity?

- ☐ Yes
- ☐ No

15. What needs to be changed in urban planning?

- ☐ More strict zoning laws
- ☐ Better Road infrastructure

Open ended survey

1. If the current rate of agricultural land encroachment continues, what do you think the future of this area will look like?
2. Looking back over the years, what major changes have you observed in land use and development in this area?
3. What improvements would you like to see in the road network to address the challenges of urban expansion and land encroachment?