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Land Use Dynamics And Its Impacts On Livelihood In Bamenda III Municipality

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Abstract: ***This article examines the dynamics of land use and its impact on livelihood in Bamenda III. The objective is to gain insights into the changing land use patters, understand the causes behind these dynamics and assesses the implications for the local community. The study employs a mixed-methods approach, combining quantitative surveys and qualitative interviews. A sample of households and key informants from the study area was selected to gather data on demographic information, land use changes, livelihood activities and the perceived impacts.The finding reveals significant changes in land use, driven primarily by factors such as construction works, agriculture, urbanization and climate change. These changes have had both positive and negative effects on livelihoods, including limited land for farming, decreased agricultural productively and increased vulnerability to food shortages. The study also highlights the environmental implications of land use change, such as soils erosion, deforestation anddecreased water quality, based on the findings. Based on the finding, recommendations are made for sustainable land management practices, community involvement and policy interventions to mitigate the negative impacts of land use change and promote resilient livelihoods. This paper contributes to the understanding of land use dynamics in Bamenda III and provides valuable insights for decision-makers, researcher and stakeholders involved in land use planning and natural resource management.***

Keywords: Climate change, Dynamic, Land use, Livelihoods, urbanization.

I. BACKGOUND AND STUDY AREA

Land use change and dynamics have long-standing impacts on the livelihoods of people globally. Land use can be defined as how humans use, manage, and modify land resources to meet their needs and goals. Land use change occurs when there is a shift in the way land is used. Such changes in general (can be prompted by various factors such as urbanization, deforestation, agriculture, and industrialization. These changes have significant implications for human livelihoods and the natural environment Lambin & Meyfroidt, 2010). Livelihood refers to the capability of an individual or group of people to obtain the resources needed for a sustainable and satisfactory life. Livelihoods are highly dependent on land use dynamics. Changes in the way land is used can have profound effects on the way people live, particularly those who rely on the land for their livelihoods. With increasing population growth, the demand for land has also risen, putting more pressure on land-use conversion and in turn, and the impact on livelihoods has also increased (Bryceson, 2004).

The study of land use dynamics and livelihoods has a long history, with the earliest research conducted in the late 19th century. Early research focused on the impact of land use on agricultural production, with the work of Von Thunen (1826) and Marsh (1864) among the most influential. In the 20th century, research shifted to include a wider range of land use types, including forestry, mining, and urban development (Goudie, 2000). More recently, research has shifted to focus on the impact of land use dynamics on livelihoods. This includes the impact of land use change on food security, poverty, and health (Kamete, 2018). Additionally, research has looked at the role of gender in land use dynamics and livelihoods, with a focus on how women are affected by land

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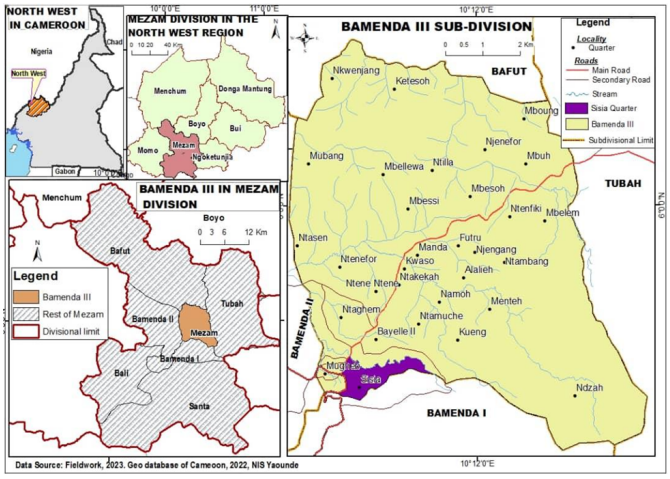
use change (Binagwaho et al., 2018).In many developing countries, the population is rapidly growing, putting pressure on the available land resources. As a result, there is often a shift towards more intensive and commercial forms of agriculture, which can have negative impacts on the environment and local communities (Oyekale, 2014). Additionally, the increasing demand for natural resources, such as timber and minerals, has led to the expansion of extractive industries, further exacerbating land use dynamics and livelihoods.

Studies have shown that land use dynamics in developing countries can have significant impacts on livelihoods. For example, a study by Habtamu and Mekonnen (2017) in Ethiopia found that changes in land use patterns had led to the displacement of local communities and a decline in traditional livelihood activities such as farming and pastoralism. Similarly, a study by Adewumi et al. (2020) in Nigeria found that the expansion of oil palm plantations had led to the displacement of communities and a decline in biodiversity, which in turn had negative impacts on local livelihoods.

The impact of land use dynamics on livelihoods is often gendered, with women and men experiencing different impacts. For example, a study by Etwire and Seini (2019) in Ghana found that changes in land use patterns had led to a decline in women's access to land, which in turn had negative impacts on their livelihoods. Similarly, a study by Adhikari and Williams (2016) in Nepal found that women's access to forest resources had declined due to changes in land use patterns, which had negative impacts on their livelihoods.

LOCATION OF BAMENDA III

The Bamenda III Municipality is the gateway to and from the divisions of Boyo, Ngokentunjia, Bui and Donga Mantung. It is located between latitude 6°1'0" and 6°25'0"N and Longitude 10°02'0" and 10°15'0"E of Green which Meridian. It is an important transit for passengers and goods to and from the North West Region. Bamenda III is linked to the North West region by the Bamenda-Kumbo highway, Bamenda-Fundong highway, Bamenda-Wum and Bamenda – Mamfe highway. To the West is Bamenda-Bafoussam highway. It is boundary by Tubah Sub division to the west, Bamenda I Sub-Division to north, Bamenda II Sub-Division to the Est and Bafut to the south. It has total surface area of 22.9km² and estimated population that stands at 105,244 according to the 2008 projections by CAMGIS. This increase growth of the population has been putting pressure on the existing resources in general and on land use in particular. It is an integral part of Bamenda City and Mezam division. It is made up of urban and rural areas. Both urban and rural areas of the municipality are largely unplanned as they have, and have continued to develop spontaneously and haphazardly. The Bamenda III Council area show great ecological variations and consequently climate variations. Figure 1 below is the location of Bamenda III Sub-Division.



Source: Bamenda III Council, 2024

Figure 1: Location of Bamenda III Sub-Division

II. MATERIAL AND METHOD

The study was based on field surveys after consulting the documents dealing with the issue.A total of 100 questionnaires are intended to be administered through a random selection in three villages of Bamenda III Sub-Division, there are (Nkwen 55; Sisia 36, Bayellé1: 9) to residents using land as a woman to have more information concerning land use in the study areas. The interviews were carried out with administrative authorities including mayor of the municipality of Bamenda III and the regional delegate of Agriculture and rural Development. Photos and field survey were taken using the GPS camera application. The superposition of maps on the land using different dates (1996; 2015; 2023) made it possible to appreciate the evolution of the space covered by human influence and to understand the impacts on the lives of populations including economic activity remains agriculture. The information's obtained at NIS and CNI allowed us to complete the information on the field and produce the location map and the different land use map of Bamenda III. We also organized focus groups to appreciate and better understand the resident's point of view on the issue. For the cartographic work process is done using one main methods. This method includes, the GPS point inputted in the ArcGIS. Also, and absolute X, Y was used to create a point or the vertex using and exact X, Y location.

III. RESULTS AND ANALYSIS

The dynamics of land utilization play a crucial role in shaping the sustenance of rural livelihoods in diverse geographical contexts. In the specific case of Bamenda III Municipality, situated in Cameroon's North West Region, it is of utmost importance to comprehend the intricate connection between land usage patterns and the well-being of rural communities.

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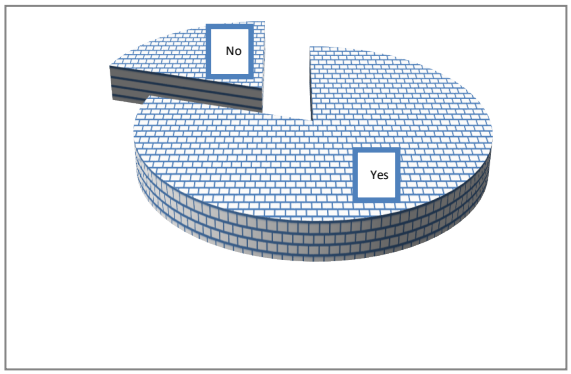
A. CAUSES OF LAND USE DYNAMICS

In the study of land use dynamics and livelihood in Bamenda III, it is essential to examine the causes that drive changes in land use patterns. Understanding the underlying factors behind these dynamics provides valuable insights into the forces shaping the landscape and its impact on the community. This section explores the causes of land use dynamics, shedding light on the key drivers influencing land use change in the area. By identifying these causes, we can better comprehend the complex interplay of social, economic, and environmental factors that contribute to the transformation of land use in Bamenda III (Figure 2)



Source: Field Work, 2023

Figure 2: Change of land use

Figure 2 indicates that out of the total respondents, 80% have noticed a change in the use of land in their area. This suggests that a majority of the individuals surveyed have observed transformations or alterations in how land is being utilized in their locality. On the other hand, 20% of the respondents stated that they have not noticed any changes in land use. It is important to further investigate the nature and extent of these observed changes in order to better understand the dynamics and factors influencing land use patterns in the area. This information can be valuable for assessing the impacts of land use dynamics on livelihoods and informing future land management and planning decisions.

B. LAND USE CHANGES OBSERVED

The study on land use dynamics and livelihood in Bamenda aims to explore the changes in land use patterns within the area and their implications for local livelihoods. These changes include construction, agriculture, and other unspecified factors. Construction activities indicate urban development and infrastructure projects, while changes in agriculture suggest shifts in farming practices. Other unspecified changes may involve industrialization or natural resource extraction. Figure 3

Figure 3: Types of Land use changes observed Source: Field Work, 2023

Among the respondents who noticed a change in land use in their area, a significant majority, 52%, mentioned construction as the most prominent change. This suggests that there has been a notable increase in construction activities, which may indicate urban development, infrastructure projects, or expanding built-up areas. Additionally, 16% reported agriculture as a significant change in land use. This indicates a shift in land allocation towards agricultural activities, such as farming or cultivation, which could reflect changes in agricultural practices or an increased focus on food production.

Furthermore, 13% mentioned other unspecified changes in land use, suggesting that there are various diverse alterations occurring in the area that have not been specifically categorized. These changes could encompass factors like land conversion for industrial purposes, commercial development, or changes related to natural resource extraction. It is worth noting that 19% stated that they did not observe any specific changes in land use. This group of respondents may have perceived the land use in their area to be relatively stable or unchanged. Analyzing the reported changes in land use, such as construction, agriculture, and other unspecified factors, can provide insights into the evolving patterns and dynamics of land utilization in the area. Understanding these changes, with percentages taken into account, is essential for assessing their implications on livelihoods and sustainable development in the region. There have been significant changes in the past years (Figure 4).

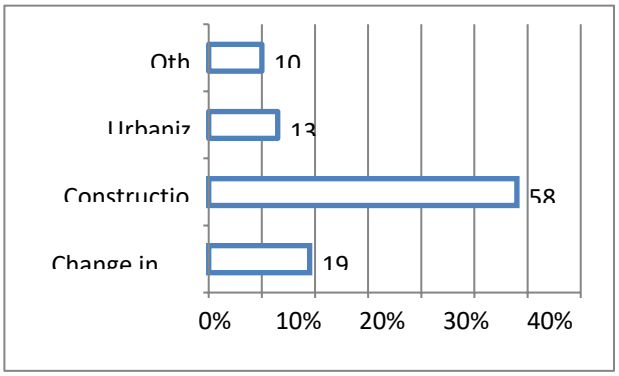


Figure 4: Changes in recent years Source: Field Work 2023

The population have reported several changes in the land they have been using for the past recent years. A significant

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proportion, 58%, mentioned construction works as the most prominent change. This indicates a substantial level of ongoing construction activities taking place in the area, which could signify infrastructure development or urban expansion. Additionally, 19% reported a change in the farming system, indicating a shift in agricultural practices or techniques employed on the land. This suggests that farmers in the area have adapted their farming methods to meet evolving needs or market demands. Furthermore, 13% mentioned urbanization as a notable change, suggesting that the land has experienced increased urban development, with the expansion of built-up areas or the establishment of new urban infrastructure. Lastly, 10% reported other unspecified changes, which could encompass a range of factors not specifically mentioned. These changes may involve activities such as natural resource extraction or alterations in land use for commercial purposes. Understanding and analyzing these percentages provide valuable insights into the evolving landscape and the impact of these changes on land use patterns and livelihoods in the region.

C. TREND IN LAND USE DYNAMICS

Landcover/use	1996	2015	2023
Forest	2,650.52	1913.42	1888.1
Grassland	1066.86	1093.17	1320.76
Wetlands/swamps	258.18	74.31	129.47
Farmland	1821.78	2389.46	1787.31
Built-up	1161.45	1488.43	1833.15
Total	6958.79	6958.79	6958.79

Source: calculated from classified images in table 1.

Table 1: Statistics for land cover/use (1996 – 2023)

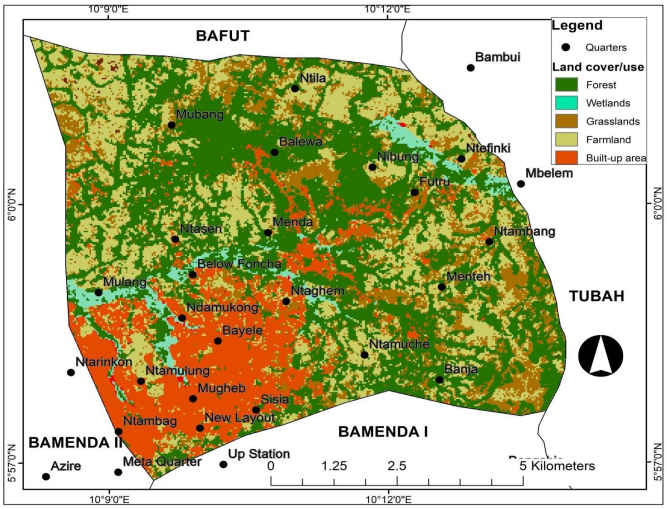
Over the period from 1996 to 2023, there have been notable changes in land cover and land use across various categories. The statistics provide insights into the trends observed in forested areas, grasslands, wetlands/swamps, farmland, and built-up areas. The data reveals a concerning decline in forested land over the years. In 1996, the land area covered by forests stood at 2,650.52 units, but by 2015, it had decreased to 1,913.42 units. The trend continued into 2023, with a further decline to 1,888.10 units. This suggests a significant loss of forest cover, potentially due to deforestation, urbanization, logging, or infrastructure development. The decline in forests is alarming as it impacts biodiversity, ecosystem services, and contributes to climate change. Contrasting with the decline in forests, the statistics indicate a positive trend for grasslands. The area covered by grasslands increased slightly from 1,066.86 units in 1996 to 1,093.17 units in 2015. By 2023, the expansion continued, reaching 1,320.76 units. This expansion could be attributed to reforestation efforts, natural succession on previously deforested land, or changes in land management practices. It is a hopeful sign, as grasslands play a crucial role in providing habitat for various species and supporting livestock grazing.

The data also reflects changes in wetlands and swamps. From 1996 to 2015, there was a substantial decrease in wetland area, dropping from 258.18 units to 74.31 units. However, in 2023, there was a slight recovery, with the wetland area increasing to 129.47 units. The initial decline could be attributed to drainage for agriculture or urban development. The subsequent increase might indicate efforts towards wetland conservation or restoration, acknowledging the ecological importance of wetland ecosystems.

The statistics reveal fluctuations in farmland areas. From 1996 to 2015, there was an increase in farmland, expanding from 1,821.78 units to 2,389.46 units. However, by 2023, the farmland area decreased to 1,787.31 units. These changes could be a result of shifts in agricultural practices, changing crop demands, or land use policies. The increase from 1996 to 2015 suggests agricultural expansion, while the subsequent decrease might indicate land conversion back to other uses or shifts in agricultural practices.

Lastly, the data shows an upward trend in built-up areas. The built-up land area increased from 1,161.45 units in 1996 to 1,488.43 units in 2015, further expanding to 1,833.15 units in 2023. This signifies the ongoing process of urbanization, as human settlements, infrastructure, and commercial areas expand to accommodate population growth and economic development. The expansion of built-up areas can have implications for natural habitats, ecosystem fragmentation, and the need for sustainable urban planning.

In summary, the statistics on land cover/use changes between 1996 and 2023 highlight the complex interactions between human activities, environmental factors, and policy decisions. The decline in forests, increase in grasslands, fluctuations in wetlands and farmland, and expansion of built-up areas reflect the dynamic nature of land use. These changes have implications for biodiversity, ecosystem services, and the sustainability of our environment. It is crucial to understand and address the underlying drivers of these trends to promote responsible land management and conservation practices.



Source: Sentinel-2A (2015)

Figure 5: Land cover/use in 1996

In 1996, the land cover/use map shows a considerable extent of forested areas, depicted by large green patches. This indicates the presence of thriving forest ecosystems. The map also displays significant expanses of grassland, representing open landscapes suitable for grazing and wildlife habitat. Wetlands and swamps are visible as blue areas, indicating water bodies and marshy regions. Extensive agricultural fields

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are represented as farmland, showcasing a reliance on agriculture for food production. Additionally, there are scattered clusters of buildings and urbanized regions, highlighting the presence of developed or built-up areas.

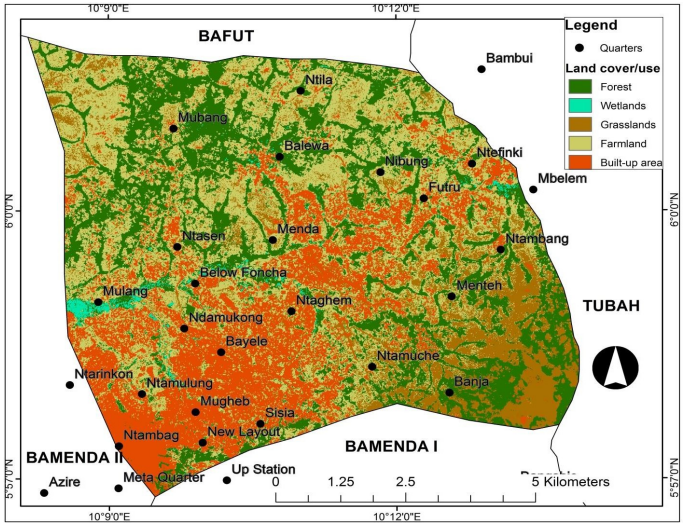

Figure 6: land use cover in Bamenda III (2015) Source: Sentinel-2A (2015)

The land cover/use map for 2015 reveals noticeable changes in land categories. Comparing it to the 1996 map, there is a visible decline in forested areas, with smaller forest patches indicating deforestation or forest degradation. The expansion of built-up areas is evident, as urbanized regions and clusters of buildings have increased in size and number. The grassland areas might show slight growth, potentially due to reforestation efforts, natural succession, or changes in land management practices. Wetland areas have decreased, possibly due to drainage for agriculture or urban development. Farmland areas might have expanded, reflecting agricultural intensification or land-use changes.

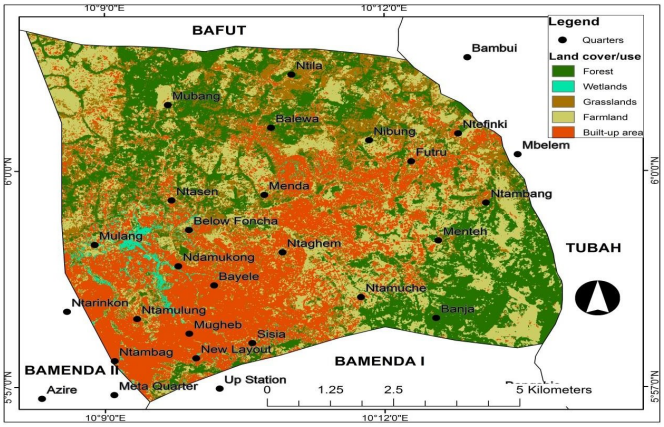

Figure 7: land use cover in Bamenda III (2023) Source: Sentinel-2A (2015)

The land cover/use map for 2023 further illustrates changes in land categories. Continuing from 2015, the decline in forested areas becomes more pronounced, with even smaller forest patches indicating continued deforestation or forest fragmentation. The expansion of built-up areas persists, with urbanized regions continuing to grow and clusters of buildings becoming more prominent. Grassland areas might show further expansion, indicating land-use changes or conservation efforts to preserve these ecosystems. Wetland areas might show a slight recovery, potentially due to conservation or restoration initiatives recognizing their ecological importance. Farmland areas might have decreased, reflecting shifts in agricultural practices, land restoration efforts, or changes in market demands.

By analyzing each year separately, it becomes evident that deforestation, urbanization, agricultural expansion, and conservation efforts have played significant roles in shaping the land cover/use patterns observed over time. The changes in land categories highlight the dynamic nature of land use and the need for sustainable land management practices to balance economic development with environmental conservation.

D. CAUSES OF LAND USE CHANGE

The causes of land use change are multifaceted and influenced by various factors. Land use change refers to the conversion, modification, or reorganization of land cover and land management practices over time. It occurs due to a combination of natural processes, human activities, and socio-economic factors. Natural causes of land use change include geologicalevents, climate change, and natural succession. However, human-induced factors play a significant role in driving land use change. These factors can include population growth, urbanization, industrialization, agricultural expansion, infrastructure development, deforestation, mining, and changes in land tenure systems. Socio-economic factors such as economic incentives, technological advancements, policy decisions, and cultural practices also contribute to land use change (Figure 8)

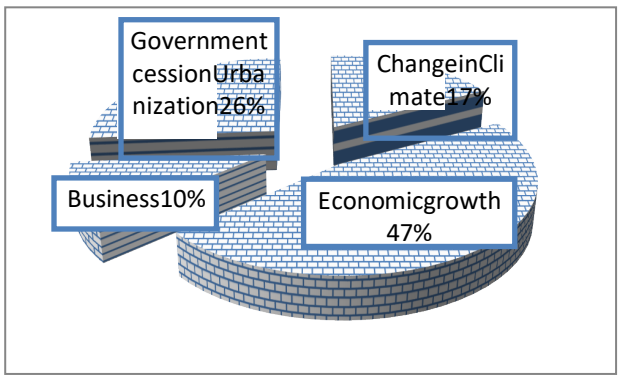

Figure 8: Main cause of land use change Source: Field Work

Figure 8 reveals the populations' perspectives on the main causes of land use change in their area. Among the respondents, 17% attributed land use change to changes in climate. This suggests that environmental factors, such as shifts in temperature, precipitation patterns, or extreme weather events, have played a significant role in influencing land use decisions and practices.

The majority of respondents, accounting for 46%, identified economic growth as the primary driver of land use change. This finding highlights the strong link between economic development and land use transformations. It suggests that the pursuit of economic growth has led to extensive changes in land utilization, including activities such

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as industrialization, infrastructure development, or urban expansion driven by economic considerations.

A smaller proportion, representing 10% of the respondents, mentioned business activities as the main cause of land use change. This implies that commercial ventures, entrepreneurship, or specific industries have contributed to altering land use patterns. This could include land allocation for commercial purposes, changes in land management practices to support business activities, or the expansion of certain sectors impacting land utilization.

Furthermore, 26% of the respondents identified government-led urbanization efforts or land allocation decisions as the primary cause of land use change. This highlights the significant role of government policies, urban planning initiatives, and land development schemes in shaping land use patterns. It suggests that deliberate actions by the government, such as urbanization projects or the allocation of land for specific purposes, have had a substantial impact on land use in the area (Table 2).

Impact	Frequency	Percentage
Increased the demand of land for housing	59	62.7
Decreasein agriculture	21	22.3
Increase in economic activities	14	15
Total	94	100

Source: Field Work, 2023

Table 2: Impact of population growth on land use

According to the population, the increasing population has led to several notable effects on land utilization.

The majority of respondents, accounting for 62.7%, mentioned that population growth has significantly increased the demand for land for housing purposes. This indicates that as the population expands, there is a greater need for residential areas to accommodate the growing number of households. Consequently, agricultural land or undeveloped areas may be converted into residential spaces, leading to changes in land use patterns and potentially impacting the availability of land for agriculture.

Furthermore, 22.3% of the respondents highlighted a decrease in agricultural land as an impact of population growth. This suggests that as urbanization and the demand for housing increase, agricultural land may be encroached upon or converted for non-agricultural purposes. This reduction in agricultural land could have implications for food production, agricultural livelihoods, and overall food security in the area.

In addition, 15% of the respondents identified an increase in economic activities as a result of population growth. This implies that a growing population creates opportunities for businesses, industries, and services to expand and cater to the needs of the increasing population. Such economic activities require land for infrastructure, offices, factories, and commercial spaces, leading to changes in land use patterns.

Understanding the impacts of population growth on land use is crucial for effective land management and sustainable development planning. It highlights the need for comprehensiveland use policies that consider the housing needs of the population, protect agricultural land, and promote economic development while preserving the environment and ensuring long-term sustainability (Table 2).

Impacts	Frequency	Percentage
Food shortage	45	48
Increased rent	14	15
Rapid increase in Temperature	9	9.5
Climate change due to deforestation	7	7.5
No	19	20
Total	94	100

Source: Field Work, 2023

Table 2: Impacts of land use dynamics on livelihood

The majority of respondents, accounting for 48%, mentioned that land use dynamics have resulted in food shortage. This suggests that changes in land use patterns, such as the conversion of agricultural land for non-agricultural purposes, have had adverse effects on food production and availability. The scarcity of food can significantly impact the livelihoods of individuals and communities who rely on agriculture or local food sources for their sustenance and income.

Furthermore, 15% of the respondents highlighted an increase in rent as a consequence of land use dynamics. This indicates that changes in land use, such as urbanization or commercial development, have led to a surge in demand for housing or business spaces. As a result, rental prices have risen, potentially placing financial strain on individuals or businesses that depend on affordable rental options for their livelihoods.

Moreover, 9.5% of the respondents identified a rapid increase in temperature as an impact of land use dynamics on livelihood. This suggests that alterations in land use, such as deforestation or urbanization, have contributed to changes in local microclimates, leading to higher temperatures in the area. This can have detrimental effects on livelihood activities that are sensitive to temperature variations, such as agriculture or outdoor labor, impacting productivity and overall well-being.

Additionally, 7.5% of the respondents mentioned climate change resulting from deforestation as an impact on livelihood. This implies that land use changes involving deforestation, such as clearing land for agriculture or logging, have wider climate change implications. These changes can disrupt livelihood activities and natural resource availability, posing challenges for local communities in adapting to the impacts of climate change and maintaining sustainable livelihoods. 20% of the respondents indicated that they did not perceive any impacts of land use dynamics on livelihood. This perspective may arise from a variety of factors, including personal circumstances, limited awareness of the potential impacts, or a lack of direct experience with significant changes in land use dynamics. Understanding the perceived impacts of land use dynamics on livelihood is crucial for effective land management and livelihood planning. It emphasizes the need for balanced approaches to land use that

consider the implications for food security, affordable housing, climate resilience, and the preservation of natural resources.

E. EFFECTS OF LAND USE CHANGE ON LIVELIHOOD

The effects of land use change on livelihoods refer to the impacts and consequences that alterations in the way land is utilized can have on the well-being and economic activities of individuals and communities. Land use change can encompass various processes, such as urbanization, agricultural expansion, deforestation, and infrastructure development. These changes can significantly influence livelihoods, affecting aspects such as food security, access to resources, income generation, and overall quality of life. Understanding the effects of land use change on livelihoods is crucial for informing sustainable land management practices, promoting resilience, and safeguarding the livelihoods of individuals and communities in the face of evolving land use dynamics (Figure 9)

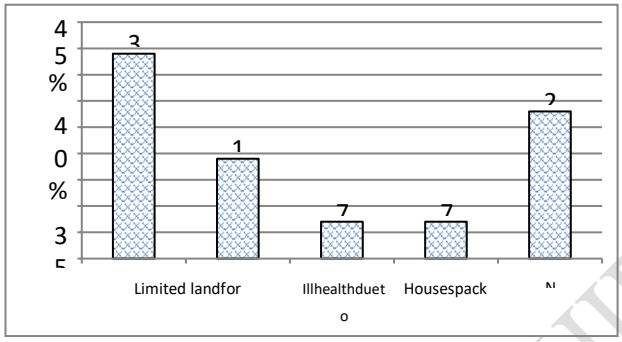

Figure 9: Effects of land use change on livelihood Source: Field Work, 2023

The data collected provides valuable insights into the perceived effects of land use change on the livelihoods of people in the community.

According to 39% of the respondents, land use change has resulted in limited land availability for farming. This suggests that changes in land use patterns, such as urbanization or the conversion of agricultural land for other purposes, have reduced the amount of land suitable for farming activities. As a result, individuals engaged in agriculture face challenges in accessing sufficient land for cultivation. This limitation can significantly impact their livelihoods and agricultural productivity, potentially leading to decreased income and food production.

Moreover, 19% of the respondents mentioned famine or hunger as a consequence of land use change. This indicates that changes in land use, such as the reduction of agricultural land or shifts in agricultural practices, have adversely affected food production and availability. The limited availability of productive land for farming can lead to insufficient food production, resulting in food insecurity and posing challenges to the livelihoods of individuals and communities who depend on agriculture for their sustenance.

Additionally, 7% of the respondents identified ill health resulting from a rapid increase in temperature as an impact of land use change. Changes in land use, such as deforestation or urbanization, can contribute to changes in local microclimates, leading to higher temperatures in the area. These increased temperatures can have implications for people's health and well- being. Individuals may experience heat-related illnesses, making it challenging for them to engage in livelihood activities and potentially affecting their overall quality of life.

Similarly, 7% of the respondents mentioned houses being packed together as an effect of land use change. This suggests that changes in land use, such as urbanization or increased housing density, have resulted in houses being built in close proximity to each other. This can impact the living conditions and quality of life for individuals and families in the community, potentially affecting their sense of privacy and overall well-being.

Furthermore, 28% of the respondents indicated that they did not perceive any impacts of land use change on livelihoods. This perspective may arise from various factors, including personal circumstances, limited awareness of the potential impacts, or a lack of direct experience with significant land use changes.

Understanding the perceived impacts of land use change on livelihoods is crucial for effective land management, livelihood planning, and policy development. It emphasizes the need for a balanced approach that considers the availability of agricultural land, food security, health impacts, and the quality of living conditions (Figure 10).

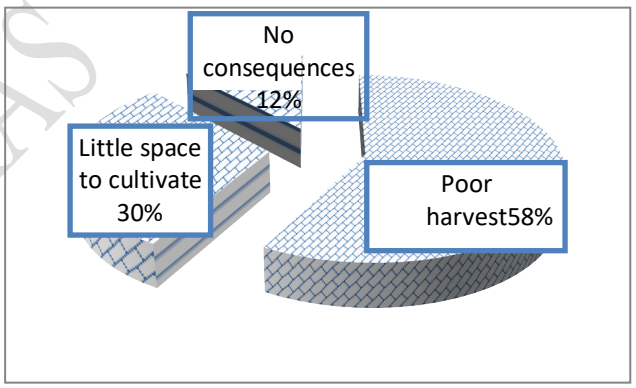

Figure 10: Consequences of land use change on activities Source: Field Work, 2023

The consequences of land use change on activities can have significant impacts on individuals and communities. The respondents identified several key consequences. According to 58% of the respondents, one of the primary consequences of land use change is poor harvest. Changes in land use patterns, such as urbanization or the conversion of agricultural land for other purposes, can result in limited access to fertile land for cultivation. This limitation can lead to reduced agricultural productivity, lower crop yields, and ultimately, poor harvests. Such consequences can have direct implications on food security, income generation, and the overall livelihoods of individuals engaged in agricultural activities.

Furthermore, 30% of the respondents highlighted the little space available to cultivate as a consequence of land use change. This suggests that changes in land use, such as urban expansion or infrastructure development, have resulted in reduced land availability for cultivation. Limited space for farming can restrict the ability to engage in agricultural activities, leading to smaller farm sizes, reduced crop

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diversity, and potential challenges in meeting the demands for agricultural produce.

Moreover, 12% of the respondents indicated that they did not experience any consequences resulting from land use change on their activities. It is worth noting that this perspective may arise from various factors, including personal circumstances or limited awareness of the potential consequences. However, it is important to consider that land use change can have wide-ranging effects, and even if some individuals do not perceive immediate consequences, they may still be indirectly affected in some ways (Figure 11)

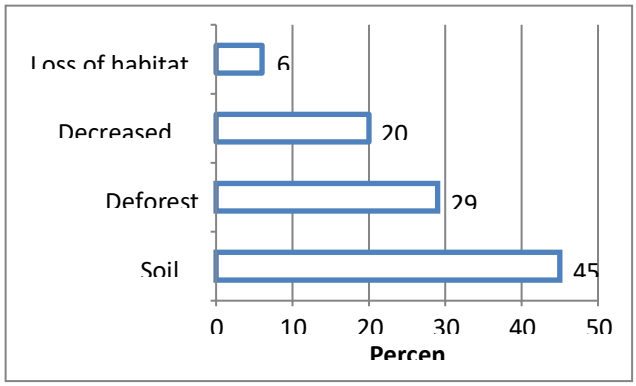

Figure 11: Environmental effects of land use change Source: Field Work, 2023

The environmental implications of land use change in the specific land being used are crucial to consider as they can have far-reaching consequences for the ecosystem. The respondents identified several key environmental implications.

According to 45% of the respondents, one of the significant environmental implications of land use change is soil erosion. Changes in land use patterns, such as deforestation or unsustainable agricultural practices, can result in the loss of topsoil through erosion. This can lead to reduced soil fertility, decreased agricultural productivity, and increased sedimentation in water bodies, adversely impacting both land productivity and aquatic ecosystems.

Furthermore, 29% of the respondents highlighted deforestation as a prominent environmental implication of land use change. Deforestation involves the clearing of forests, often for the purposes of agriculture, urbanization, or industrial activities. This process can lead to the loss of valuable forest ecosystems, disruption of natural habitats, reduction in biodiversity, and increased carbon emissions. Deforestation also contributes to climate change, making it a significant concern for environmental sustainability.

Additionally, 20% of the respondents mentioned decreased water quality as a consequence of land use change. Changes in land use, such as urbanization, industrial activities, or improper agricultural practices, can result in the pollution and contamination of water sources. This can negatively impact water quality, affecting aquatic life, ecosystems, and human health. Itunderscores the need for responsible land management practices to safeguard water resources and maintain their quality.

Moreover, 6% of the respondents identified the loss of habitat for wildlife as an environmental implication of land use change. The conversion of natural habitats into other land uses, such as agriculture or urban areas, can lead to habitat fragmentation and destruction. This loss of habitat poses a significant threat to wildlife species, impacting their survival, biodiversity, and overall ecological balance.

F. STAKEHOLDERS INVOLVEMENT IN LAND USE CHANGE AND MEASURES TO REDUCE NEGATIVE EFFECTS

Stakeholder involvement in land use change is essential for addressing its negative effects and implementing measures to mitigate them. Government agencies, civil society organizations, local communities, and landowners all have crucial roles to play in this process. By engaging in participatory planning, promoting sustainable land management practices, building capacity, establishing supportive policies and regulations, and raising awareness, stakeholders can collectively work towards reducing the negative impacts of land use change on livelihoods and the environment. Collaboration and cooperation among stakeholders are vital for achieving sustainable land use practices that prioritize the well-being of communities, protect natural resources, and foster resilient and inclusive development (Table 3).

Community involvement	Frequency	Percentage
Empowering local communities to participate in decision making Processes that affects their natural resources	48	51
Providing them within necessary skills to manage this resources sustainably	40	42.5
Others	6	6.5
Total	94	100

Source: Field Work, 2023

Table 3: Community involvement in the management and conservation of resources

Community involvement in the management and conservation of resources is crucial for achieving sustainable development and ensuring the well-being of both the community and the environment. The data collected highlights the perspectives of the respondents regarding community involvement, with the following percentages assigned to each:

According to 51% of the respondents, empowering local communities to participate in decision-making processes that affect their natural resources is an essential aspect of community involvement. This recognizes the importance of including community members in discussions, planning, and policy-making related to resource management. By involving local communities, their knowledge, experiences, and perspectives can be integrated into decision- making processes, leading to more inclusive and sustainable outcomes that align with their needs and aspirations.

The population of Bamenda III reveals that, 42.5% of the respondents emphasized the significance of providing necessary skills to local communities for the sustainable

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management of resources. This highlights the importance of capacity-building initiatives that equip community members with the knowledge, skills, and tools required to manage natural resources in a sustainable manner. By enhancing their capacity, communities can effectively participate in resource management, adopt sustainable practices, and contribute to the long- term conservation of resources (Table 4).

Alternative	Frequency	Percentage
Encouraging sustainable agriculture	34	36.5
Preserving natural areas	40	42.5
Supporting economic development	10	10.5
Promoting fair distribution of soil resources	10	10.5
Total	94	100

Source: Field Work, 2023

Table 4: Alternative livelihood options

Exploring alternative livelihood options is vital for diversifying income sources, promoting sustainability, and enhancing the resilience of communities. According to 36.5% of the respondents, encouraging sustainable agriculture is seen as an important alternative livelihood option. This highlights the recognition of agriculture as a potential avenue for income generation and food security. Emphasizing sustainable agricultural practices can help optimize productivity, minimize environmental impact, and promote long-term viability for farmers. This may include techniques such as organic farming, agroforestry, or the use of efficient irrigation methods.

Furthermore, 42.5% of the respondents emphasized the significance of preserving natural areas as an alternative livelihood option. This suggests an awareness of the value of natural resources, such as forests, wetlands, or wildlife habitats, for ecotourism, biodiversity conservation, and income generation. Preserving these areas can create opportunities for eco-friendly tourism, nature-based businesses, or sustainable resource utilization that benefit both the community and the environment.

Additionally, 10.5% of the respondents mentioned supporting economic development as an alternative livelihood option. This suggests a focus on broader economic initiatives aimed at job creation, entrepreneurship, and business development. Such initiatives may include promoting small-scale industries, providing training and support for entrepreneurship, or attracting investment to the area, all of which can contribute to income diversification and economic growth.

Moreover, another 10.5% of the respondents highlighted the importance of promoting a fair distribution of soil resources as an alternative livelihood option. This underscores the recognition of the significance of land access and tenure security for livelihood opportunities. Ensuring equitable distribution and secure land rights can enable individuals and communities to engage in various income-generating activities such as farming, agribusiness, or land-based enterprises.

By considering and implementing these alternative livelihood options, communities can reduce their dependence on a single income source, enhance their resilience to changing socio- economic and environmental conditions, and contribute to sustainable development. It is important to note that these options are not mutually exclusive and can complement each other, creating a diverse and balanced livelihood portfolio for communities.

a. ROLE OF STAKEHOLDERS

Government agencies and civil society organizations play significant roles in addressing the negative impacts of land use change on livelihoods. Government agencies have the responsibility to develop and enforce policies and regulations that promote sustainable land use practices, protect natural resources, and safeguard the well-being of communities. They can provide technical expertise, financial support, and capacity-building programs to enable communities to adopt sustainable practices and mitigate the adverse effects of land use change. Civil society organizations play a crucial role in advocating for the rights and interests of local communities affected by land use change. They can raise awareness, facilitate community engagement, and promote sustainable land management practices through educational initiatives, grassroots movements, and policy advocacy. By working together, government agencies and civil society organizations can address the negative impacts of land use change on livelihoods through collaborative efforts, policy reforms, and community empowerment (Table 5).

Role	Frequency	Percentage
Providingtechnicalandfinancialsupportforsustainablelanduse practice	23	24
Promotingcommunitybased naturalresourcemanagement	39	42
Puttingin placepolicies that supportsustainablelivelihoods	32	34
Total	94	100

Source: Field Work, 2023

Table 5: The role the government agencies or civil society organizations play in addressing the negative impacts of land use change on livelihood

Government agencies and civil society organizations play crucial roles in addressing the negative impacts of land use change on livelihoods.

According to 24% of the respondents, providing technical and financial support for sustainable land use practices is seen as a key role for government agencies and civil society organizations. This highlights the importance of assistance in the form of knowledge, expertise, and financial resources to promote sustainable land management practices. Such support can include training programs, capacity-building initiatives, access to credit or grants, and the dissemination of best practices to enable individuals and communities to adopt sustainable land use practices.

Furthermore, 42% of the respondents emphasized the role of promoting community-based natural resource management. This suggests a recognition of the value of empowering local communities to actively participate in the management and conservation of natural resources.

Government agencies and civil society organizations can facilitate the establishment of community-based organizations, provide technical guidance, and foster collaboration among community members. This approach promotes a sense of ownership, encourages sustainable practices, and ensures that the benefits derived from natural resources are shared equitably within the community.

Additionally, 34% of the respondents highlighted the importance of government agencies and civil society organizations putting in place policies that support sustainable livelihoods. This underscores the role of these entities in creating an enabling environment through policy development, implementation, and enforcement. Policies can address land tenure issues, promote sustainable agricultural practices, encourage diversification of livelihoods, and regulate land use changes to minimize negative impacts. By establishing supportive policies, government agencies and civil society organizations contribute to the protection of livelihoods and the sustainable use of land resources.

Through their respective roles, government agencies and civil society organizations can work together to address the negative impacts of land use change on livelihoods. By providing technical and financial support, promoting community-based natural resource management, and establishing supportive policies, these entities can empower communities, foster sustainable practices, and ensure that land resources are managed in a manner that preserves livelihoods, enhances resilience, and protects the environment. Collaboration between these stakeholders is essential for creating sustainable and inclusive pathways for communities to thrive amidst changing land use dynamics.

IV. DISCUSSION

Government agencies play a vital role in setting policies and regulations that govern land use. They must develop comprehensive and well-enforced land use policies that prioritize sustainable practices. This include incorporating environmental considerations, promoting the conservation of natural resources and ensuring the equitable distribution of land rights. Additionally, government agencies should provide technical and financial support tolocal communities, facilitating capacity-building programs and promoting sustainable land management practices. Collaborative decision-making processes involving stakeholders at all levels should been couraged to ensure inclusive and effective governance. The involvement of government agencies, civil society organizations, local communities, research institutions, and the private sector is crucial for addressing the challenges posed by land use change in Bamenda III. If these conditions are met, stakeholders can collectively work towards sustainable land use practices, the protection of livelihoods, and the preservation of the environment. It is through collaboration, empowerment, and knowledge exchange that meaningful change can be achieved in promoting sustainable land use and improving the well-being of communities in Bamenda III.

V. CONCLUSION

In conclusion, land use change has significant implications for livelihoods and the environment. The data presented reflects the diverse dynamics and challenges faced in Bamenda regarding land use, demographic characteristics, and their impacts on livelihoods. It is evident that the changes in land use, driven by various factors such as construction, agriculture, urbanization, and economic growth, have both positive and negative effects. These changes have implications for food security, housing, agriculture, environmental sustainability, and overall community well-being. However, through community involvement, alternative livelihood options, stakeholder engagement, and the role of government agencies and civil society organizations, it is possible to address the negative impacts of land use change, promote sustainable practices, and enhance the resilience of communities. This requires a comprehensive approach that considers the social, economic, and environmental dimensions of land use, while prioritizing the needs and aspirations of local communities. By working together and implementing appropriate measures, it is possible to achieve a balance between development and the preservation of natural resources, ensuring a sustainable and prosperous future for the community in Bamenda III.

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