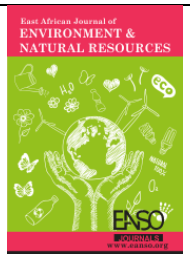

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Original Article

The Impact of Urbanization on Agricultural Land Cover Change: Case Study of Kicukiro District, Rwanda

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ABSTRACT

Urbanization refers to the migration of people from rural areas to urban areas, which is characterized by increased infrastructure and population density. Many factors, including population growth, economic development, industrial expansion, rural-to-urban migration, and regulatory changes, cause urbanization. The primary emphasis of this study was the impact of urbanization on changes in agricultural land use in Kicukiro, Rwanda. The factors affecting urbanization in Kicukiro District were explored, together with the effects of urbanization on the district's agricultural land cover change. The study used a descriptive research design and a multifaceted framework to gather and analyze data through a case study approach and an empirical investigation to describe and investigate agricultural land cover change in the context of urbanization in one of Kicukiro District's divisions. The Primary data was collected using survey questionnaires, interview guides, and remote sensing using GIS, and Secondary data was gathered through documentation and remote sensing on a population of 13,5463 households from Kicukiro district and a sample size of 99 households calculated using Yamane Slovin's formula at a 10% margin of error. The results showed a mean score of 4.13 and a std of 0.62, explaining that they believed that urbanization leads to a rise in major city growth and urban concentration. A mean score of 4.24 and Std of 0.75, meaning that the respondents believed that new agricultural methods are a result of town expansion. The ANOVA test was conducted, and showed an F-critical of 4.210, and an F-statistic of 16.907, greater than the F-statistic, meaning that the model was statistically significant in predicting the influence of independent variables. The linear regression model was fitted to study data and indicated that all independent variables affect the dependent variable at a 62.8% level, which indicated that 37.2% of the change in agricultural land cover in Kicukiro district is due to other factors not included in this study. The study concluded that urbanization is a major factor in Kicukiro's population growth, infrastructural development, economic expansion, and loss of agricultural land and recommended that to address the urbanization issues and rural economy, Kicukiro District shall strike a balance between agricultural

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preservation and urban growth to satisfy both urban and rural needs while safeguarding the district's potential for farming for future generations.

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INTRODUCTION

Urbanization is not a recent occurrence; it has been happening since around 5000 B.C.. The degree of urbanization, which has been increasing over time, is shown by the proportion of the population living in urban areas relative to the total population. The world became more urbanized after World War II. Significant urbanization was evident in industrialized parts of Europe, North America, and Oceania, where more than half of the population resided in urban areas (United Nations, 2007). Over 40% of people lived in cities in Latin America and the Caribbean, indicating a high degree of urbanization. Africa and Asia had the lowest urbanization rates, with about 40% of their populations residing in cities in 2000. Nevertheless, from 1950 onwards, Asia and Africa experienced quicker urbanization than the developed regions, Latin America, and the Caribbean. Between 1950-1960 and 1990-2000, Africa experienced changes ranging from 25% to 17%, while Asia saw variations from 19% to 16%. Africa has the least amount of urbanization but the fastest rate of urbanization, according to Amis (1990). Developed nations' rates of urbanization growth have been declining more quickly than those of emerging nations. Additionally, the pace of population increase is typically slower or more stable, which has an impact on the rate of urbanization. Higher rates of urbanization were experienced and would continue to be experienced until they reached the level of approximately 80% urban, where the rate of urbanization tends to decline. In 2000, the urbanization levels of developing countries, especially those in Africa and Asia, were less than 40% (Cohen, 2006). Simulations up until 2035 revealed a steady reduction in farmers across all scenarios due to an ageing agricultural population and poor succession rates; this trend will persist as long as not all farmers who cease their operations are replaced. The results also showed that these declines are expected to occur more quickly on the rural-urban periphery (Alam, 2018). In Rwanda's metropolitan area, population expansion and the resulting urbanization have changed land usage due to increased demand for land. Among other things, agricultural activities have suffered because of changes in land usage. The unsustainable use of natural resources in urban areas brought about by urbanization in Rwanda has also resulted in

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environmental degradation, including solid waste accumulation, wetland destruction, and water pollution, all of which have reduced the ecological services that the natural environment provides (Matagi 2001; Walter et al. 2005). Urbanization has a big impact on how agricultural land is used in the Kicukiro region. Among the problems linked to this complex effect are land availability, poverty dynamics, consumer behaviour, and environmental sustainability. The relationship between urbanization and agricultural land cover changes in the Kicukiro district still needs to be investigated, even though this topic has been the focus of several studies (Ayele & Tarekegn, 2020). Furthermore, little is known about how Rwandan farmers' well-being is impacted by urbanization in both rural and urban areas. Thus, the study aims to explore the effects of urbanization on rural farm households in Kicukiro based on their distance from the urban centre. According to Munyaneza et al. (2023), the substantial changes in land cover and usage brought about by the expansion of urbanization pose a severe danger to agricultural areas. Recent estimates indicate that Rwanda's agricultural area has decreased by around 27% because of urbanization, mostly brought on by population expansion (Munyaneza et al., 2023). Converting agricultural land into urban areas threatens food security and exacerbates environmental issues, including biodiversity loss and soil erosion (Uwimbabazi and Lawrence, 2011). The tension between urban growth and the preservation of agricultural land is a significant issue in Rwanda, where over 70% of the workforce is employed in agriculture (NISR, 2022). The effects of these shifts are far-reaching; as cities grow, there is less land available for farming, forcing farmers to use smaller plots and increasing competition for available land. This tendency is particularly evident in the Kicukiro region, where urbanization caused agricultural land to drop by 37.76% between 2002 and 2022 (Hakim et al., 2021). According to the Rwanda Environment Management Authority (2018), inadequate land use planning and policy implementation make the problem worse by permitting unchecked urban expansion to further encroach on rural areas. This study therefore, aimed to analyze the factors influencing urbanization in the Kicukiro district, evaluate the agricultural land cover change in Kicukiro district, and examine the impact of urbanization on agricultural land cover change in Kicukiro district with a focus on the underlying causes of these changes and their socioeconomic implications to further understand how urban growth may be managed sustainably while protecting vital agricultural resources.

Dependency Theory: The idea that certain locations and individuals have been "underdeveloped" due to deliberate coercion or the inherent logic of capitalism is a commonality across all dependency and world-systems theorists (Wallerstein 1980; Timberlake 1985b).In order to comprehend the changes in city form brought about by the shift from pre-capitalist to capitalist modes of production, the dependency theory places a strong emphasis on historical processes. Additionally, it emphasises how reliant capitalism's expansion was in the Third World, underscoring the significance of outside economic forces in city studies. Dependency school holds that industrialised nations depend on developing nations to provide their businesses with raw resources. Foreign investment in large-scale agricultural production results from displacing peasant farmers in rural communities. Furthermore, significant foreign investments in capital-intensive industries in metropolitan centres led to an increase in production and industrialization. This has a multiplier impact since new enterprises emerge to provide services that are directly or indirectly related to manufacturing operations in metropolitan areas. Since they migrated to metropolitan regions, rural residents have been led astray into believing that there are high-paying job prospects in the city. When they arrive in metropolitan regions, and to their dismay, they cannot find high-paying jobs, they end up in the informal sector.

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Urban Bias Theory: This is another method for researching urban expansion in developing countries. According to Lipton (1977), policies prioritize urban areas over rural ones, leading to the concentration of facilities and the creation of favourable conditions in urban areas. Additionally, governments in developing countries usually invest domestic funds in building infrastructure for growth. Even though a greater proportion of people reside in rural areas, these amenities are primarily found in cities, where hospitals, schools, libraries, and other government and semi-government establishments are among the facilities. Sometimes, policymakers ignore resources that rural residents who work as farmers may invest in, such as roads, small-scale irrigation systems, and agricultural equipment and storage facilities. Higher standards of living are established in metropolitan regions, resulting in a difference between urban and rural communities. As a result, rural residents tend to relocate to metropolitan regions in order to take advantage of advantageous legislation.

Sustainable Urbanization Theory: The Sustainable Urbanization Theory states that for an urban area to be sustainable over the long run, social fairness, environmental preservation, and economic expansion must all be balanced. According to McGranahan and Satterthwaite (2014), unchecked urbanization leads to problems including social inequality, increasing pollution, and the loss of agricultural land. This paradigm encourages dense urban growth, efficient land management, and integrated planning to prevent urban expansion and protect natural resources (UN-Habitat, 2020). It also promotes the use of green infrastructure, sustainable transportation, and climate-resilient urban policies to lessen environmental degradation (Angel et al., 2011). In relation to agricultural land cover changes, Sustainable Urbanization Theory highlights the importance of peri-urban farming, greenbelt initiatives, and zoning regulations to preserve ecological integrity and food security (UNEP,2013). Finally, in order to create resilient, habitable, and sustainable urban settings, the theory emphasizes the necessity of inclusive policies and participatory governance (Bai et al., 2018). The effects of urbanization on rural farm households' well-being close to urban centres in developing countries are supported by empirical research; these effects extend beyond the total area of land involved and have a significant impact on agricultural output and food security (Ziem et al., 2021). It might be argued that to utilize the productive labour force that has already been displaced from rural agricultural villages, Sub-Saharan Africa's urbanization must be accompanied by adequate and significant investment in industry and infrastructure. Notably, urbanization not only takes up vast amounts of farmland but also imposes financial restrictions that lower agricultural output, ultimately resulting in the marginalization of agriculture and significant difficulties with food security (Huang & Du, 2019). Known for their fertile and productive agricultural land, the regions surrounding metropolitan cities are increasingly at risk from the fast pace of urbanization. Farmers consequently lose vital resources for survival because of this rapid shift, and many farmers in rural areas thus lose their land rights (Coulibaly & Li, 2020). Research indicates that urbanization significantly affects rural farm households' well-being in developing nations (Darrouzet-Nardi, 2011; Navarro et al.., 2022.

Large areas of farmland are being encroached upon by urbanization, which also creates economic constraints that lower agricultural production, marginalizing farms and raising serious issues with food security and farmers lose vital resources for their livelihoods because of the fertile and productive agricultural land surrounding urban centres being quickly transformed into metropolitan regions (Liu et al., 2022). The process poses several problems, such as diminished economic opportunities and heightened susceptibility to rural farming households near urban centres. Therefore, to effectively utilize the labour force that urbanization has displaced from rural farming families, Sub-Saharan countries need to invest more

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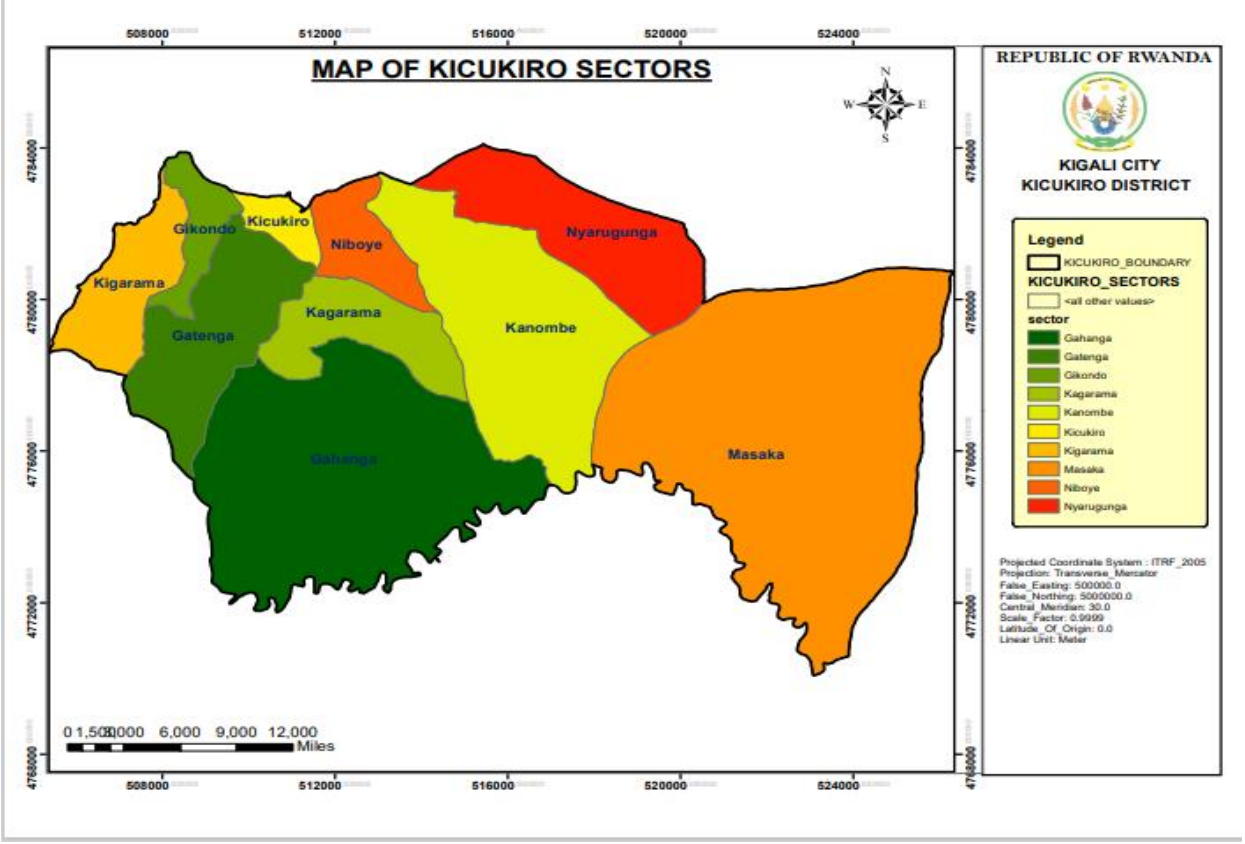
in infrastructure and industrialization (Gutu& Sakketa, 2023.

MATERIALS & METHODS

Study Area

The research was conducted in Kicukiro District, one of three districts of the city of Kigali, the capital of Rwanda. The district is composed of eight (8) sectors: Gahanga, Gatenga, Gikondo, Kagarama, Kanombe, Kicukiro, Kigarama, Masaka, Niboye, and Nyarugunga, with a total area of 166.7 km2 and 491,731 residents (NISR, 2022). It is hydrographically defined by streams and rivers, particularly the Akagera and Nyabarongo rivers, both of which source from the Akagera River basin. It is characterized by an average annual temperature of 22 °C, 900 to 1,150 mm of precipitation, and a moderate environment, counting two distinct seasons the rainy season (March-May), and the dry season (October to November). Demographically, Kicukiro district is made up of 51.3% males and 48.7% Females. According to Nahayo (2022), the district is covered by Churches, a thriving market, the Bralirwa Brewery, other nonprofit organizations, and Genocide Memorial Sites. Significant changes in land use, notably the transformation of agricultural areas into residential and commercial areas, have brought Kicukiro's rapid urbanization, with several households expanding significantly from 240,893 to 481,786 between 2000 and 2020, an indicator of a notable rise in urban growth. In addition, Ingabire (2023) revealed that agricultural land fell from 82.61% to 10.16% in 2023 due to residential and transportation areas significantly growing.

Figure 1: Study Area Map



Source: *ArcMap, 2025.*

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Research Design and Data Collection

According to Yin (2003), Research design is the logical sequence that connects empirical data to a study's initial research questions and, ultimately, to its conclusions. This study used a descriptive and multifaceted framework for gathering and analyzing data through a case study approach, an empirical investigation to describe and investigate agricultural

According to Mugenda (2003), the population is the entire set of elements from which the researcher hopes to make inferences. In this article, the targeted population was 13,5463 households from Kicukiro land cover change in the context of urbanization in one of Kicukiro District's divisions. Primary data was collected using survey questionnaires, interview guides, and remote sensing using GIS. The secondary data was gathered through documentation and remote sensing.

Population, Sample Size & Sampling Techniques

district, with a sample size of 99 respondents, calculated using Yamane Slovin's formula, calculated at a 10% margin of error, and reached using purposive and stratified sampling techniques.

Table 1: Aggregation of Sample Size/Kicukiro District

Kicukiro sectors	Total Sample size	Local Leaders/ Professionals	Residents/ households
Kagarama	10	2	8
Niboye	8	2	6
Gatenga	7	1	6
Kicukiro	8	3	5
Gikondo	10	3	7
Gahanga	13	3	10
Kanombe	9	2	7
Nyarugunga	8	2	6
Kigarama	11	1	10
Masaka	15	5	10
Total	**99**	**24**	**75**

Source: *Researcher, 2025.*

Data Analysis & Considerations

The SPSS software was used to analyze quantitative data through quantitative analysis, using both descriptive analyses to calculate means and standard deviations. The linear regression model $Y=\alpha+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\varepsilon$ was developed using inferential analysis to study correlation and regression between independent and dependent variables of the research. X_1 represents Population Growth (PG), X_2 = Rural-to-Urban Migration (RUM), X_3= Government Policy Changes (GPC), X_4= Economic Development (ED), and Y = Agricultural land cover change. The tables, graphs, and relationship between the agricultural land cover change and urbanization in the Kicukiro district were displayed to present data and results of the study. To discuss the study and provide an explanation for its conduct, the researcher organized an introductory meeting with pertinent local authorities in the study region. This was done to alleviate any fears that could arise during the study. During these interactions, the researcher answered potential respondents' questions, greatly increasing the response rate. The section on confidentiality that would be upheld during the study was added to the research questionnaire, and then Respondents were told in this section that their answers would be kept confidential.

RESULTS

Urbanization Analysis

Urbanization is the term used to describe the movement of people from rural to urban areas, which is typified by an increase in population

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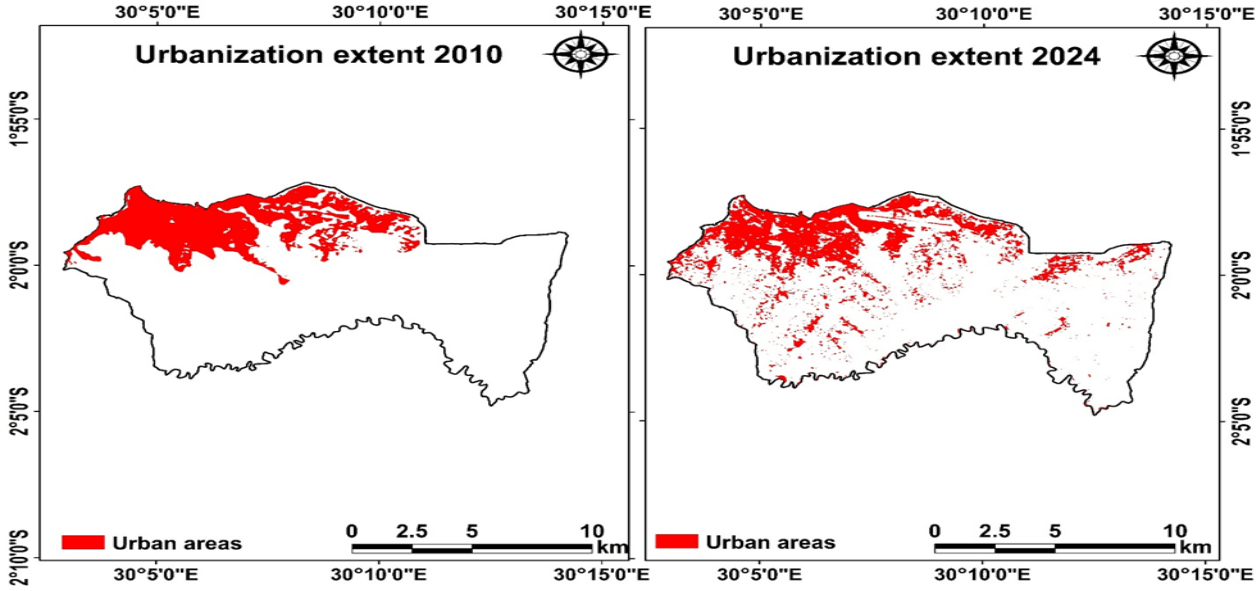
density and the construction of infrastructure. This process is influenced by a wide range of factors, including policy changes, industrial expansion, economic development, population growth, and rural-to-urban migration. The elements affecting urbanization are shown in Table 3.1

Table 2: Urbanization Enhances the Development of Kicukiro District.

Urbanization	Mean	Std
Urbanization increases urban concentration and the growth of large cities	4.13	0.62
Urbanization is the outcome of social, economic, and political developments	4.22	0.77
Urbanization status reduces agricultural land cover and farmers' income	4.40	0.61
Urbanization status improves economic development	4.42	0.73

The results showed that the respondents agreed that urbanization promotes urban concentration and the rise of major cities, with a mean score of 4.13 and a standard deviation of 0.62. The results suggest that urbanization is still growing in Kicukiro District. With a mean of 4.22 and a standard deviation of 0.77, the results demonstrate that social, economic, and political trends lead to urbanization. With a mean of 4.40 and a standard deviation of 0.61, the respondents likewise concurred, suggesting that Kicukiro District's level of urbanization lowers agricultural land cover and farmers' income. Economic growth is enhanced by urbanization status, according to the respondents' mean score of 4.42 and standard deviation of 0.73. This means that in Kicukiro, urbanization is driven by several factors, including population growth, economic development, industrialization, rural-to-urban migration, and policy changes.

Figure 2: Spatial Dynamics in Urbanization Extent 2010 - 2024



Source: *Arc Map, 2025.*

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Agricultural Land Cover Change Analysis

Table 3: Agricultural Land Cover Change and Modern Agriculture

Agricultural Land Cover Change	Mean	Std. Deviation
The growth of towns is responsible for new agricultural practices	4.24	0.75
Agricultural land cover change strategy increases agricultural productivity.	3.42	0.63
Agriculture-based activities lead, and the manufacturing and more services sectors contribute to urbanization	4.13	0.72
New agriculture practices increase rural farm households' income and food security	4.24	0.72

Source: *Field Data, 2025.*

The results showed a mean score of 4.24 and a standard deviation of 0.75, the respondents believed that new agricultural methods are a result of town expansion. With a mean score of 3.42 and a standard deviation of 0.63, the respondents also agreed that agricultural production is increased by agricultural land cover modification strategies. With a mean score of 4.13 and a standard deviation of 0.72, the respondents agreed that manufacturing is driven by agricultural activities, whereas urbanization is influenced by more service industries. With a mean score of 4.24 and a standard deviation of 0.72, the respondents agreed that modern agricultural techniques raise the income and food security of rural farm households.

Figure 3: Spatial Dynamics in LULC 2010 – 2024

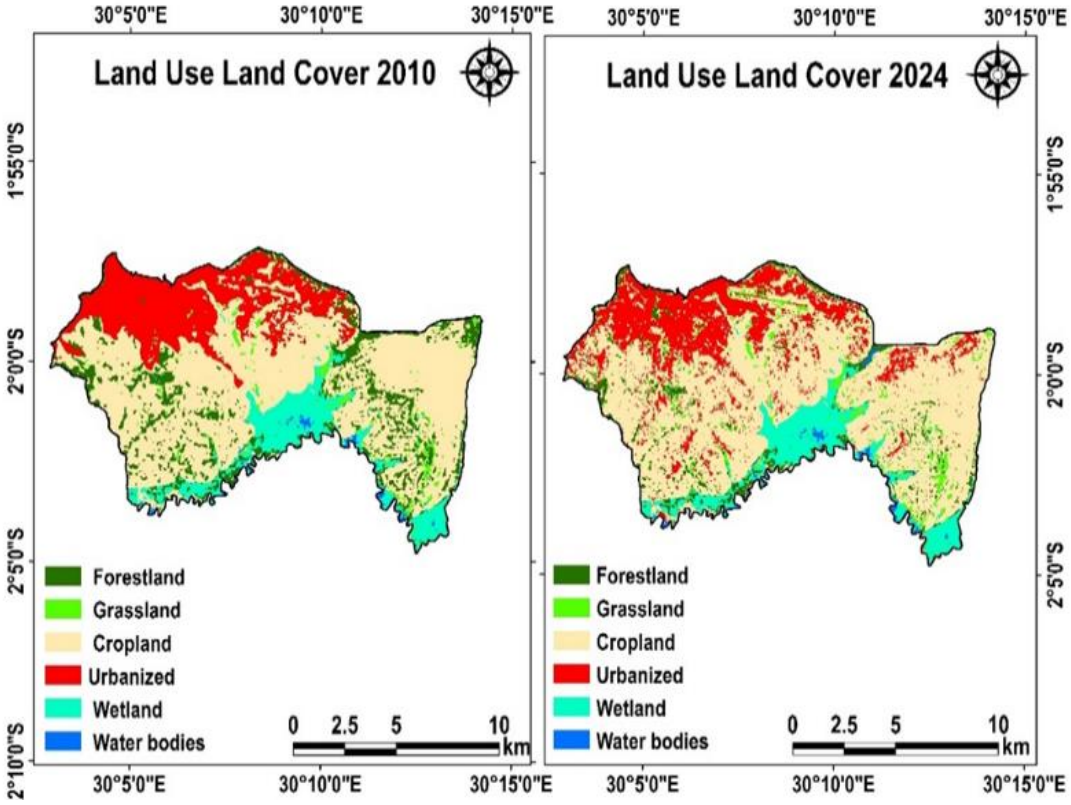

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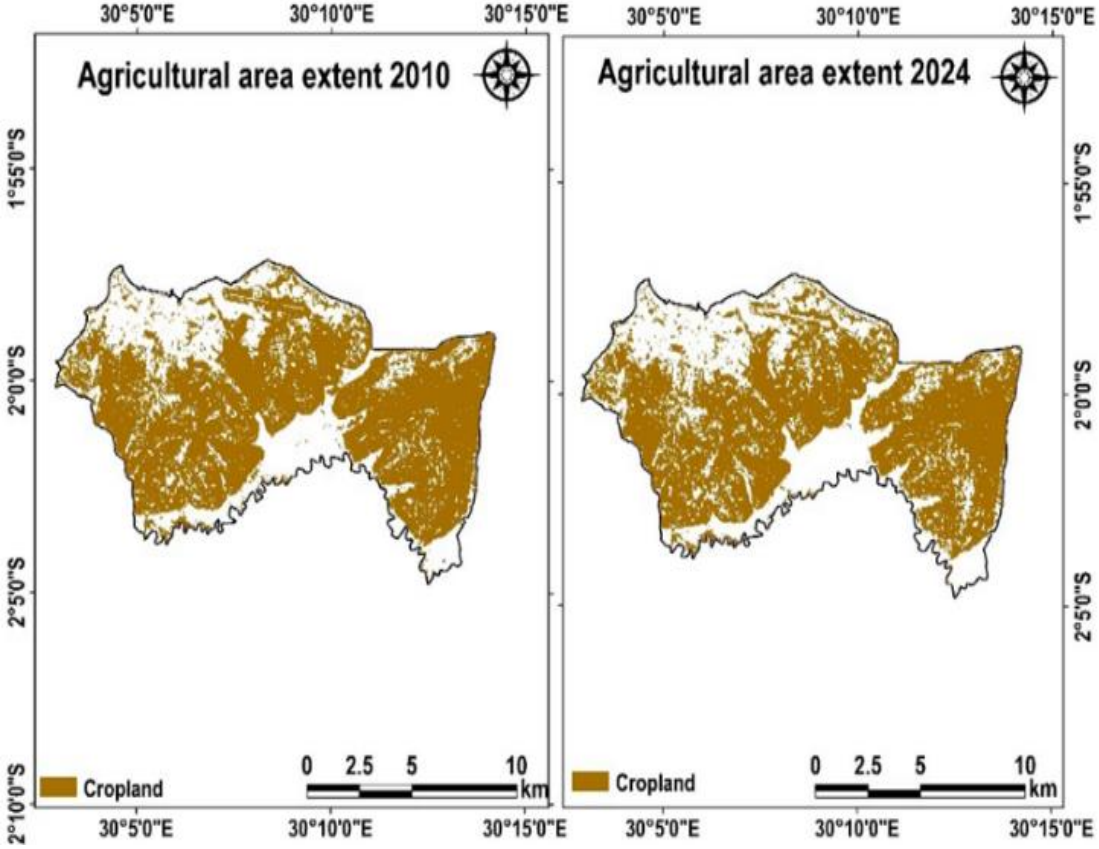
Figure 4: Spatial Dynamics in Agricultural Area Extent 2010 – 2024



The incomes of people directly involved in farming, especially those who depend on the land they cultivate for their livelihood, are surely impacted by changes in agricultural land cover. The consolidation of land use, changes in crop output, the conversion of agricultural land to urban or industrial purposes, and shifting market circumstances all increase the risk of income instability. Agriculture appears to have gained importance, especially in developing economies, basically because it has been discovered to be a viable intervention strategy to earn extra income and therefore reduce their reliance on cash income for food by growing their food.

Agriculture Practices for Farmers in the Kicukiro District

Agricultural practices refer to the various methods and techniques used in farming to cultivate crops and rear livestock, ensuring food production and sustainability. These practices include traditional methods, modern technologies, and sustainable approaches, all of which play a crucial role in shaping food systems and influencing environmental interactions. These methods are necessary to ensure sustainable farming systems and the production of food. The results of Figure 5 below show the dominant agricultural practices used by Kicukiro farmers. In Kicukiro district, 31.3% of respondents agreed that beans are heavily dominated, 26.3% agreed that cabbages are cash crops, 23.2% agreed that broccoli is also planted to help farmers increase their income, and 12.1% agreed that mangoes are a fruit crop that gives farmers income and food security.

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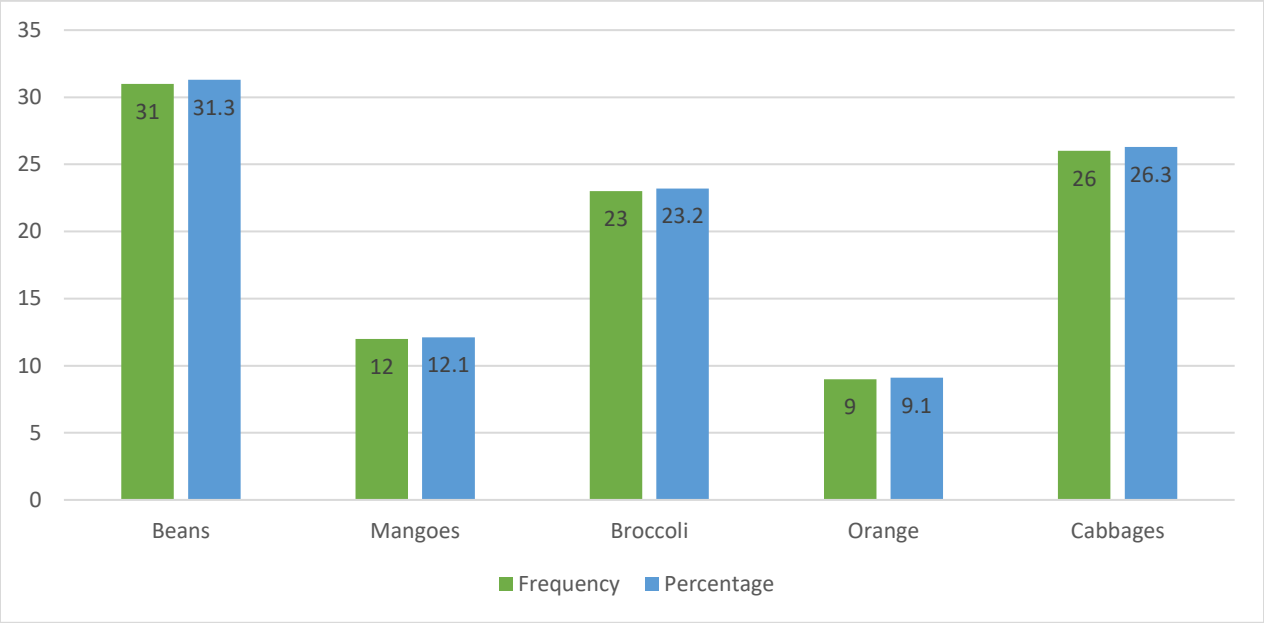
Figure 5: The Dominant Crop Practices for Farmers in Kicukiro District



Source: *Field Data, Kicukiro District, 2025*

The farmers enquired about how their revenue was impacted by agricultural land cover changes. The profits of people directly involved in farming, especially those who depend on the land they cultivate for their livelihood, are certainly impacted by changes in agricultural land use. Farmers do not make enough money. Crop production results from the loss of agricultural land brought on by urbanisation or industrialisation, and fluctuating market circumstances all raise the possibility of income instability for farmers. However, despite these obstacles, farmers who use varied or sustainable methods or who have access to metropolitan markets may be able to stabilise or grow their revenue. Due to limited land (46.5%) and the fact that some agricultural activities are more profitable in urban areas like Kicukiro district (29.3%), Figure 5 above demonstrates that most respondents engage in these practices. According to some, this is because there is more food available for farming (24.2%).

Analysis of the Impact of Urbanization on Agricultural Land Cover Change in Kicukiro District.

Table 4 indicated a mean score of 2.13 and a standard deviation of 0.63, The respondents agreed that the loss of fertile agricultural land and other socioeconomic variables might cause farm households close to urban areas to have lower incomes and be more vulnerable to poverty. With a mean of 4.53 and a standard deviation of 0.73, the respondents also concurred that the population increase brought on by urbanization brought on by better health facilities raises resource demand. With a mean of 3.91 and a standard deviation of 0.60, the respondents agreed. In Kicukiro district, urbanization brought in better living conditions, healthcare, education, and economic prospects.

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Table 4: Urbanization and Agricultural Land Cover Change

Urbanization and Agriculture	Mean	Std
The loss of productive agricultural land and other socioeconomic factors can result in reduced incomes and increased vulnerability to poverty in farm households near urban areas.	2.13	0.63
Urbanization due to improved health facilities leads to population growth, increasing the demand for resources	4.53	0.73
Economic opportunities, education, and healthcare, and improved living standards resulting from urbanization	3.91	0.70

Source: Field Data, 2025

Regression Analysis on Urbanization and Agricultural Land Cover Change

The researcher has performed the regression analysis to examine the connection between independent and dependent variables to comprehend how changes in one or more independent variables affect the dependent variable.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.793[a]	0.628	0.591	0.49898

a. Predictors: (Constant), population growth, economic development, rural-to-urban migration, and policy changes

Source: *Field Data, 2025.*

Table 5 indicates that the overall correlation coefficient R = 0.793, means that all independent variables (economic development, rural-to-urban migration, population growth, and policy changes) have a strong positive correlation with agricultural land cover change. The coefficient of determination, R^2 =0.628 or 62.8%, showed that the linear regression model fits to study data and indicated that all independent variables affect the dependent variable at 62.8% level, which indicates that 37.2% of the change in agricultural land cover in Kicukiro district is due to other factors not included in this study.

Table 6: Analysis of Variance (ANOVA)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.841	4	4.210	16.907	0.000[b]
	Residual	9.959	40	0.249		
	Total	26.800	44			

a. Dependent Variable: Agricultural land cover change

b. Predictors: (Constant), population growth, economic development, rural-to-urban migration, and policy changes

Since the p-value is 0.000, which is less than 0.05, the results showed that the model was statistically significant in predicting how policy changes, rural-to-urban migration, economic development, and population growth affect the change in agricultural land cover in Kicukiro District. At the 5% level of significance, the F critical was 4.210, and the F-statistic was 16.907, higher than the F-statistic, therefore, this confirms how the model is statistically significant and fits the data.

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Table 7: Regression Analysis
Coefficients [a]

Model		Unstandardized coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.135	0.421		0.320	0.049
	Population Growth	0.574	0.185	0.895	3.102	0.004
	Rural-to-Urban Migration	0.462	0.211	0.327	2.189	0.022
	Government Policy Changes	0.645	0.359	0.170	1.796	0.041
	Economic Development	0.806	0.323	0.273	2.495	0.031

a. *Dependent Variable: Agricultural land cover change*
Source: *Field Data, 2025.*

The findings presented that there is a positive and significant relationship between population growth and agricultural land cover change in Kicukiro, as shown by a coefficient of 0.574 (p-value = 0.004). This shows that a unit increase in population growth leads to a 0.574 agricultural land cover change in Kicukiro District. Rural-to-urban migration is positively related to agricultural land cover change as indicated with a positive coefficient. The statistical significance of rural-to-urban migration is p=0.022<0.05. The findings presented that a unit increase in Rural-to-urban migration will lead to 0.462 agricultural land cover change in Kicukiro District

Furthermore, a correlation of 0.645 (p-value=0.041) indicates a positive and significant association between changes in government policies and the change in Kicukiro's agricultural land cover. Kicukiro District's agricultural land cover varies by 0.645 for every unit rise in government policy changes. Additionally, there is a strong correlation between changes in Kicukiro District's agricultural land cover and changes in government policies. Additionally, there is a positive correlation (coefficient of 0.806; p-value = 0.031) between agricultural land cover change and economic development. Kicukiro District's agricultural land cover changes by 0.806 for every unit change in economic development. Thus, changes in agricultural land cover and economic growth are positively correlated in Kicukiro District. Urbanisation encourages farmers to use more sustainable practices, which might eventually lead to higher soil health, less reliance on costly inputs, and more resilience to climate change. These techniques can raise the quantity and quality of farmers' production while also improving their standard of living.

DISCUSSION AND CONCLUSIONS

The study's primary objective was to investigate the primary forces for urbanization in Kicukiro District, one of Rwanda's fastest-growing urban districts. Numerous important elements that contribute to urbanization in this district were discovered by this investigation, including population increase, which is a major driver of urbanization in Kicukiro and is mostly brought on by migration from rural areas and economic development. The urbanization development in Kicukiro District is influenced by several infrastructure, social, political, and economic variables. Rapid urbanization brings with it issues related to housing, infrastructure, and sustainability, but it also presents several opportunities for economic growth and improved living conditions. These findings are supported by Ziem et al., (2021) who argued that the effects of urbanization on rural farm households' well-being close to urban centres in developing countries are supported by empirical research; these effects extend beyond the total area of land involved and

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have a significant impact on agricultural output and food security.

The respondents stated that urbanization and infrastructure development are the two main elements affecting the changes in agricultural land cover that correlate with Kicukiro's growing urbanization where urbanized areas and more agricultural lands are being transformed into commercial, industrial, and residential purposes. This is supported by Huang & Du (2019), who ascertained that urbanization not only takes up vast amounts of farmland but also imposes financial restrictions that lower agricultural output, ultimately resulting in the marginalization of agriculture and significant difficulties with food security. The findings also showed that there is now less land accessible for farming, which hurts local food production and rural residents' means of subsistence. Furthermore, it was discovered that agricultural land use has been influenced by government land-use plans intended to promote urbanization, infrastructural development, and industrial expansion. Even though these policies promote economic growth, they typically result in the conversion of rural regions into urban areas, which puts food security and agricultural sustainability at risk.

These findings are supported by Farah *et al*. (2021), who argued that urbanization has made it possible to improve wages and non-farm earnings, even if it may also result in a rise in landlessness among rural households and a decline in agricultural revenue, but it hurts how farmland is used on the outskirts of cities, endangering small-scale farmers' access to food and financial stability. The study looked at how agricultural land cover changes are impacted by urbanization in Kicukiro District, Rwanda, and found that the urbanization, which has resulted in a decline and fragmentation of agriculture, has had a significant influence on Kicukiro's agricultural land cover. This result was supported by Gollin et al. (2016), who argued that the demand for agricultural products rises because of urbanization, which causes agricultural land to disappear.

RECOMMENDATION

To ensure that both urban and rural requirements are satisfied and that the district's agricultural potential is preserved for future generations, Kicukiro District will be able to achieve a balance between agricultural preservation and urban expansion by implementing the recommendations. The local government should implement comprehensive, sustainable urban development plans that take agricultural land preservation into account. One strategy to prevent unrestrained expansion into lucrative agricultural regions may be to impose limitations on urban growth. As Kicukiro's urbanisation continues, the development of urban agriculture must be prioritised. Small-scale urban agriculture, rooftop farming, communal gardens, vertical housing and farming development, and other initiatives can help alleviate the burden on rural agricultural regions and boost food production in urban areas. Additionally, this will give residents access to fresh vegetables and lessen the district's reliance on outside food sources. Kicukiro District needs to educate its residents, lawmakers, and urban planners on the need to preserve agricultural land. The government should host conferences, seminars, and awareness campaigns to inform the public about the advantages of agriculture for the economy and ecology. Involving the community in land use decision-making will ensure that urban expansion is planned to accommodate both environmental sustainability and population needs. Sustainable agricultural practices should be encouraged by the government through financial and legal incentives. This might include financial aid for the development of alternative revenue streams for farmers who are losing land due to urbanization, tax breaks for agricultural enterprises, and subsidies for farming supplies. Longitudinal evaluations that monitor changes in agricultural land usage over a long period of time may be the focus of future studies. By using this method, researchers will be

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able to identify long-term trends and more precisely evaluate the pace of agricultural land conversion in Kicukiro as well as its effects on the environment, economic activity, and food production of the area. Researchers may contrast Kicukiro with other Rwandan areas or other urbanizing locations to see whether the trends observed there are distinct or part of a larger national trend. Such comparative research might have broader implications for urban planning and policy and help clarify regional variations in the impact of urbanization on agricultural land. It is also important to look at how urbanization affects farmers' lives and the opportunities for making a living. A deeper understanding of the socioeconomic impacts would yield vital information for creating solutions to assist displaced farmers.

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REFERENCES

Alam M.J. (2018). Rapid urbanization and changing land values in megacities: implications for housing development projects in Dhaka, Bangladesh. Bandung, 5 (1), 1–19.

Ayele A., Tarekegn K. (2020). The impact of urbanization expansion on agricultural land in Ethiopia: A review. Environmental Socio-Economic Studies, 2 (8), 73–80.

Beauregard, S. (2014). Agricultural communities' livelihoods in developing countries. Journal of Agriculture, 21 (5), 632-690

Biłozor, A. I. (2021). Cie ´slak, Review of experience in recent studies on the dynamics of land urbanisation. New Delhi: Land Centre.

Cohen, B. (2006). Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability. Technology in Society, 28 (4), .63-80

Cohen, B. (2006). Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability. Technology in Society, 28.63-80

Coulibaly, B. & Li, S. (2020). Impact of agricultural land loss on rural livelihoods in peri-urban areas: empirical evidence from Sebougou. Mali, Land 9 (12) 1–20.

Darrouzet-Nardi, A.F. W.A. (2011). Masters, Urbanization, market development and malnutrition in farm households: Evidence from the demographic and health surveys. Food Security 7 (3), 521–533.

Djurfeldt, A. A. & M. Jirstr. (2020). Urbanization and changes in farm size in Sub-Saharan Africa and Asia from a geographical perspective. Review of the Literature, 2 (8), 123-156

Doan, P. C.Y. Oduro, 2012). Patterns of population growth in peri-urban Accra. Ghana, Int. J. Urban Reg. Res, 36 (6) 1306–1325

Farah, N. I.A. Khan, A.A. Abro, J.M. Cheema, M. Luqman, (2021). The nexus of land use changes and livelihood transformation of farmers at the rural-urban interface of Pakistan. Sarhad J. Agriculture, 38 (1) 46–59,

Fiveable (2024). Agricultural Practices – AP Human Geography. https://library.fiveable.me/key-terms/ap-hug/agricultural-practices.

Article DOI: https://doi.org/10.37284/eajenr.8.1.3040

Gollin, D. R. Jedwab, D. Vollrath, (2016). Urbanization with and without industrialization. J. Econ. Growth 21 (1) 35–70.

Gutu Sakketa, T. (2023). Urbanisation and rural development in sub-Saharan Africa: a review of pathways and impacts. Res. Glob, 6 (20). 100-133

Haberl, H. (2015). Competition for land: A sociometabolic perspective. Ecological Economics, 119, 424-431.

Huang, Z.., & X. Du. (2019). How does urbanization affect farmland protection? Evidence from China, Resour. Conserv. Recycl. 145, 139–147.

Ingabire, G. (2019). Land use plan implementation and associated environmental impacts. Kicukiro District, City of Kigali: Nunga Site.

Khan, A.A. S. Arshad, M. Mohsin, (2014). Population growth and its impact on urban expansion: a case study of Bahawalpur, Pakistan, Univers. J. Geosci. 2 (8), 229–241.

Kumasi, T.C. Antwi-Agyei, P. K. Obiri-Danso, (2019). Small-holder farmers' climate change adaptation practices in the upper east region of Ghana. Environ. Dev. Sustain, 21 (2), 745–762,

Liu, J. S. Zeng, Y. Chang, Y. Sun, F. Chen, (2022). The impacts of rapid urbanization on farmland marginalization: A Case Study of the Yangtze River, 2022.

Matagi, S. V. (2001). Some issues of environmental concern, the capital city. Environmental Monitoring and Assessment **77**: 121–138.

McDade TW, Adair LS. (2001). Defining the urban in urbanization and health: a factor analysis approach. Soc. Sci. Med. 2001 Jul, 53 (1), 55-70.

Mougeot, F. (2016). Urban agriculture definitions. Kampala: University of Makelele

Mougeut, L. J. A. (2010). Urban agriculture: definition, presence, potential and risks, main policy challenges. Ottawa: Cities Feeding People Report Series 31. IDRC.

Nahayo, T., & Nahayo, L. (2022). Impact analysis of settlement on land management in Kicukiro District, City of Kigali, Rwanda. Global Scientific Journal, 10 (5), 256-289

National Institute of Statistics of Rwanda (2022). RPHC5 - District profile. Kicukiro

Navarro, M. A. D'Agostino, L. Neri, (2022). The effect of urbanization on subjective well-being: explaining cross-regional differences. Socioecon. Plan. Sci. 71 (Sep. 2020),

Nduwayezu, G., Sliuzas, R., & Kuffer, M (2016). Modeling urban growth in Kigali city, Rwanda. Rwanda Journal, 1 (5), 23-56

Nelson, V. (2006). Saving and generating income and employment, and managing. Freshwater Resources and Effectively, 9 (1), 234-356.

NISR. (2014). The fourth population is a housing census. Rwanda, Kigali: National Institute of Statistics of Rwanda.

RLMA. (2017). Rwanda National Land Use Planning Guidelines. Kigali: Rwanda Land Management and Use Authority.

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson.

Sjoberg, G. (1960). The Preindustrial City: Past and Present, The Free Press, Illinois.

Stanny, M. Ł. Komorowski, A. (2021). Rosner, The socio-economic heterogeneity of rural areas: Towards a rural typology. Poland, Energies, 14 (16) (20-21).

Strech, M. (2023). Design for more equitable neighborhood adaptation: Climate Resiliency and Public Space Planning in U.S. Border

Article DOI: https://doi.org/10.37284/eajenr.8.1.3040

Colonias. Massachusetts: Massachusetts Institute of Technology

Stürck, J. (2018). Simulating and delineating future land change trajectories across Europe. Reg. Environ. Change, 18 (3), 733–749.

Sun, X. P., Xiang, K. (2023). Cong, research on early warning and control measures for arable land resource security. Land Use Pol. 128 106601,

Tabatabai, T. (2005). Cash income is a significant determinant of poverty reduction. Nairobi: University of Nairobi.

UN (2007). UN Land Degradation and Land Use/Cover Data Sources, ret. 26 June 2007.

United Nations Population Fund (2007). The state of the world report. Unleashing the potential of urban growth; United Nations Population Fund. New York: NY, USA.

Uwimbabazi, P. & Lawrence, R. (2011). Compelling Factors of Urbanization and Rural-Urban Migration in Rwanda. Rwanda Journal, 22, 9-26.

Walter, V., Reid, H. A. M., Angela C., & Doris, C. (2005). Ecosystems and human well-being. Millennium Ecosystem Assessment. A. W. Jose Sarukhan. Washington: World Resource Institute: 131.

Zhong, W. J. Song, W. Yang, K. Fang, X. Liu (2023). Evolving household consumption-driven industrial energy consumption under urbanization: A dynamic input-output analysis. J. Clean. Prod, 289 (21), 125-732,

Ziem, S. B, G. Yenglier Yiridomoh, E.K. Derbile, (2021). Urban expansion and agricultural land use change in Ghana: implications for peri-urban farmer household food security in Wa Municipality. Int. J. Urban Sustain. Dev. 13 (2), 383–399.

