
The Impact Of Urbanization On Water Resource In Uganda. A Case Study Of Makindye Division Kampala

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Abstract

The study assessed the impacts of urbanization on water resource in Makindye division. It answered three study objectives that included: To find out characteristics of urbanization, examine the impact of urbanization on water resources and possible ways of conserving and managing the existing water resources. The study used cross-sectional research design where both qualitative and quantitative were used and a total of 102 respondents was chosen as the sample size, this was determined using solvins formula. The study considered two types of data namely, primary and secondary data, which were obtained through, questionnaires, interviews and review of relevant literature of scholarly materials.

In Uganda, especially in Makindye division. Makindye division the impact of urbanization on the water resources has greatly increased in recent years due to uncontrolled and poorly managed human activities such as poor waste management, establishment of urban agriculture in wetlands and among others water resources that have been one of the environmental resources that have benefited Uganda in terms of development (urbanization) but however, this has affected their quality and the quantity hence leading to severe environment problems. The study findings were mainly presented using frequencies and percentages which were late presented inform of bar graphs, frequency distribution tables, the urbanization characteristics of the study area included settlement (residential) and commercial, Urban agriculture, trade and commerce, and among others, The dominant water resources that were outlined in the study area included; wetlands, streams, wells, aquifers and rivers. On the other hand, the impacts of urbanization on water resources included; pollution, total dry off decline in productivity and loss of biodiversity. Also the possible ways of conserving the existing water resources included proper urban planning, creating awareness, proper waste management, public education and protection laws and acts, findings indicated that there was a strong negative relationship between urbanization and water resources 111 the study area. The study has made recommendation including; increasing sensitization to the public, extending free waste storage facilities and services, advocacy of effective policies promoting greater transparency in response to public concerns and promoting proper urban planning.

Keywords: Urbanization On Water Resource

Background of the study

Urbanization was a process in which increasing numbers of people migrated from rural to urban areas (Jackline et al., 2023). Ultimately, this leads to horizontal or vertical growth of urban areas. A country is considered urbanized when more than 50 percent of its population lives in urban areas. Criteria used in cities may include population size, space, density and economic organization (Ramadhan et al., 2023).

The consequences of urbanization vary in different regions of the world. The United Nations estimates that by the

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end of 2008, half of the world's population will live in urban areas (Rashid et al., 2023). It is predicted that by 2050, 64.1% of the developing world and 85.9% of the developed world will constitute an urbanized interactive world (Tribune, 2008). Urbanization is not a new phenomenon; however, as the process of urbanization is ongoing, it is dynamic and multifaceted (Christopher et al., 2022). The relationship between land use change and water quality has been analyzed in several studies. Both of these factors have been influenced by human activity influenced by rapid urbanization, industrialization and rural land conversion (Nicholas et al., 2023). Unexpected population growth is associated with water quality degradation and causes large increases in nutrients and microbial load (Christopher & Felex, 2022). Therefore, urban areas have the potential to generate ecological and environmental impacts at different scales (Phionah et al., 2023). These special ecosystems provide solutions to challenges and problems for sustainable development in a rapidly urbanizing world (Ivan & Kazaara, 2023).

In addition, changes in land use due to urbanization have altered the flow patterns of sewage and storm water, which ultimately impacts aquatic life in the receiving water, i.e. rivers (Filstar, 2023). Urbanizations reflect more than demographic changes. It is not only controlled by the context and development processes, but also significantly influences it. It brings direct and indirect benefits to the fight for global sustainability and human development. Cities are the main cause of many environmental problems that are related to air and water pollution (Reddy, 2(04).

Problem statement

According to Makindye Division report, Makindye urban sector in 2016 is characterized by a wide range of commercialization (business) (Faridah, Kazaara, et al., 2023). As urban space continues to expand to accommodate a growing global population, there remains a real need to quantify and qualify the impacts of urban space on natural processes. The expansion of global urban areas has resulted in significant changes in natural processes, environmental quality, and natural resource consumption (Faridah, Kazaara, et al., 2023).

The urban landscape influences infiltration and evapotranspiration, complicating our ability to quantify their dynamics across heterogeneous landscapes at contrasting scales. Impervious surfaces exacerbate runoff processes, while runoff from permeable areas remains uncertain due to different infiltration dynamics (Turyatamba et al., 2022). Increasingly, the link between urbanization and water resources is being established, recognizing that leaky infrastructure contributes to recharge and runoff rates (Ashiraf et al., 2023).

As a result of increasing urbanization, water resources have been negatively affected as their quality and quantity have been degraded by the expansion of urban infrastructure into water resources. This motivated the researcher to investigate the impact of urbanization on water resources in Makindye Division.

Study Objectives

1. To find out the urbanization characteristics on water resource of Makindye division.
2. To assess the impacts of water resource in Makindye division
3. To find out the relationship between urbanization and water resource in Makindye division

Methodology

The study used cross-sectional research design. This approach were established clearly and objective orientation, a vigorous, disciplined and systematic procedure, and a reality bound methodology, which allows arriving at a reality, that should be distinguished from a social philosophy, abstract speculation and everyday assumptions.

The cross- sectional descriptive design is chosen because of its flexibility in data collection as it allows collection of both quantitative and qualitative data at the same time (Ahuja, 2005). Qualitative data is narrative and descriptive information that explains and gives deeper insight and understanding of the phenomena through intensive collection of narrative data. Quantitative data is numerical data that is collected and statistically analyzed so as to explain, predict phenomenon of interest, (Amin, 2005). Both qualitative and quantitative approaches were therefore used in the study. Due to the large population of Makindye division and the limited time frame for this study, the target population was obtained from Makindye east, which had the largest population of slum in Makindye division.

For the purpose of the study the researcher was target the population that included different stakeholders of division, political leaders, business representatives and individual persons Makindye division; the total population includes 310 respondents

Table 1: Sample size and selection

Category	Population	Sample size	Sample technique	Response %
LC1V executive	5	5	Census	80%
Municipality top management	5	5	Census	60%
LC11I executive	5	5	Census	40%
Northern division management	5	5	Census	60%
Heads of Households	1242	320	Simple random	90.9%
Total	1262	340		94.6%

Source: Primary data(

Morgan)

According to Makindye Council, three-year development Plan (2007/208-2009/2010), the population of Makindye was estimated at 49,335 while the population of Northern Division will be estimated at 21,800 with 4360

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Households and east ward alone will be estimated to have a population of 7456 with about 1242 Households. The respondents included 320 Household heads, 5 LC1V executive members, 5 of the municipality top management team, 5 LCIII executives, and 5 Northern division management members. A sample size of 340 out of the accessible population of 1262 will be selected. This will be done by use of Morgan's table for determining sample size after This included 5 LCV executive, 5 municipality top management, 5 LCIII executive, 5 Makindye division management and 320 household heads from western ward. Questionnaires were used for the collection of primary data because they are convenient particularly if used to collect data from vast population, Bell 1984. The questionnaire saves time, gets maximum data from literate class and exhibits high levels of privacy that motivates one to answer candidly. Bryman, (2001) observes that open-ended questions give unconditioned views, which increase accuracy during data analysis like in measures of central tendencies and regression analysis. The data collected from respondents using questionnaires was edited, coded and cleaned. Data presentation was done in form of tables and figures (Nelson et al., 2023). The SPSS data analyst was used to compute the frequencies, percentages and to establish the degree of relationship between the variables, correlations was computed (Nelson et al., 2022). The data collected from interviews and reviewed documents was categorized into meaningful themes based on objectives for ease of analysis. The sub themes were identified and put into meaningful patterns to make sense of the study findings. Verbatim quotations were used upon permission to enrich the discussions.

Results

Table 1: Responses on the relationship between poverty and the growth of water resources in Makindye division

Statements on Urban poverty	Responses in Percentages (%)				
	SA (%)	A (%)	N (%)	D (%)	SD (%)
There is rampant poverty in Makindye municipality	48.4	37.3	2.8	5.6	5.9
Slums are an indication of poverty among urban dwellers	51.9	35.7	2.8	4.9	5.6
The people in this area have low incomes	48.1	26.8	6.3	13.2	5.6
People in this area cannot afford formal housing	49.5	34.5	6.6	4.9	4.5
There is informal production in this area	36.2	27.2	10.5	15.7	10.5
There are inadequate housing responses in this area.	33.1	27.5	6.6	23.0	9.8

There is limited access to land to the low-income migrants in eastern ward	30.3	21.3	11.1	20.9	16.4
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Source: Primary data

From table 1 above, 51.9% of the respondents strongly agreed that the growth of urbanization in Makindye division is an indication of the poverty among urban dwellers and in ability of people staying there to afford formal housing in other planned areas of the town as evidenced by 49.5 response (Shamim et al., 2023), 48.1% did agree that the growth of water resource in the municipality can be attributed to the rampant poverty in the area., while on the other hand 13.2% disagree and 5.6% strongly disagree that urbanization have naturally developed due to the low incomes of the people staying there (Christopher & Micheal, 2022). This is further evidenced by what the District Lands Officer says that the means to put up apartment construction is far beyond the reach of the urban dwellers, leading to the use of all sorts of materials for construction, like tins, grass and the like. This has led to the growth of slums since the poor cannot afford to develop the land they are clinging on (Faridah, Jacob, et al., 2023).

Examining the relationship between water resource and the growth of Makindye division**Table 2: The relationship between land tenure and growth of slums**

Statements on Land tenure	Responses in Percentages (%)				
	SA (%)	A (%)	N (%)	D (%)	SD (%)
There is failure of policies in Makindye division	28.2	18.1	10.8	23.3	19.5
There is lack of security of tenure in this place	17.1	26.1	9.8	27.2	19.9
The government has failed to provide formal settlements in Makindye division	26.5	40.1	4.5	10.8	18.1
There is private land ownership Makindye	22.3	27.9	9.4	23.3	17.1

Key: SA= Strongly Agree A= Agree N= Neutral D= Disagree SA= Strongly Disagree

The table shows that 46.3% of the respondents agreed to the statement that growth of makindye division is attributed to failed policies, while 42.8% of the respondents disagreed. On whether lack of security has led to slum development, 43.2% agreed, while 47.1% disagreed. Forty-six-point six percent agreed that failure to provide formal settlement by the government has led to the growth of Makindye, 50.2% agreed that private land ownership has led to growth of water resources, while 55.7% agreed that the rampant evictions have contributed to water

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resource urbanization. This implies that the majority of the respondents recognized the system of land tenure and growth of Makindye. These findings are in agreement with what the division survey engineer on water transportation.

Regarding the same issue of the water resources, the District Land Officer also adds that; the land tenure especially in the outskirts is very problematic. The major evictions that occur have to do with the opening of water transporting pipes on land to increase on water supply where people who have built on taps and water reserves.

Table 3: The correlation between water resource and urbanization of Makindye division Correlations

		water	urbanization
Water resource	<i>Pearson</i>	1	.452**
	<i>Sig. (2-tailed)</i>		.000
	<i>N</i>	287	287

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Primary data

The table shows that there is a moderate and significant correlation ($r=.452^{**}$) between water resource and urbanization in Makindye division, with a significance of .000 at the level of

0.01(2-tailed). This means that the private and customary urbanization system in Makindye division is likely to increase the growth of water resources and in order to reduce the rate of water shortage in Makindye division, the negative factors that feed into that, such as the system of urbanization, need to be addressed. A further analysis was carried out in order to determine the impact of urbanization on water resources in Makindye division.

This was done by computing the Coefficient of determination ($R^2 \times 100$). Thus, $452^2 \times .452^2 = 0.204$, implying that the Land tenure system as a dimension of the independent variable accounts for 20.4% of the variations in the dependent variable (Nelson et al., 2023).

Table 4: Correlation between urban planning and growth of water resources in Makindye division

		Urban Planning	Growth of water sources
	Urban planning Pearson Correlation	1	.572**

Sig. (2-tailed)		.000
N	287	287

****.** Correlation is significant at the 0.01 level (2-tailed).

The table shows a moderate but significant positive relationship between Urban planning and the growth of water resources in Makindye division, with a correlation (r) of .573** and the significance of .000 at the level of 0.01(2tailed). This therefore means that urban planning has a significant contribution to growth of water resources in Makindye division, and therefore, in order to reduce the rate of water growth in Makindye division, negative factors that feed into it, like ineffective urban planning systems, need to be addressed. A coefficient of determination was computed to find out the effect of urban planning on the growth of water resources in Makindye division (Nelson et al., 2022). The Mayor Makindye division had this to say in respect to community involvement in planning. In some cases even when the communities are involved at the planning and Implementation stage, some individuals come in and oppose the plans. Whereas the community is involved in the planning process, the level of involvement leaves a lot to be desired. Some community leaders are involved but they do not disseminate the information to the masses, leaving them ignorant of the development procedures and thus leading to urbanization

Regression analysis showing the effect of urban poverty, urban planning and water system on the growth of Makindye division

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.593 ^a	.352	.345	.82718

a. Predictors: (Constant), planning, urban poverty, water system

From the model summary, all the dimensions of the independent variable had R squared (R^2) of 0.352 (R^2 tells how a set of independent variables explains variations of a dependent variable). This means that the independent variables; urban planning, urban poverty and Land tenure system account for 35.7% of the variations in growth of water resources in Makindye division. The findings suggest that the independent variable is positively related to the dependent variable by 35.7 percent (Nelson et al., 2023).

Table 6: Analysis of Variance (ANOVA)

Model	Sum of Squares	Df	Mean Square	F	Sig.
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1	Regression	105.117	3	35.039	51.209	.000 ^a
	Residual					
	Total	193.638	283	.684		

a. Predictors: (Constant), planning, urban poverty, land tenure

b. Dependent Variable: slums

Since the "R-Square" is quite small, "0.352" as seen in table 8, the analysis of variance was used to confirm the quality of the model. The analysis of variance "F" as shown in table 9 is

51.209 with a significance of 0.000. This shows that "F" is statistically significant and implies that the factors; urban poverty, land tenure and urban planning have a statistically significant effect on the growth of water resource in Makindye division.

Conclusions

It was concluded that poverty significantly influence the growth of water resource Makindye division. This was drawn from the findings that a significant number of slum dwellers in eastern had low incomes and they went to settle there because of free water, low house rent and cheap land that was affordable to them than in other planned parts of the town.

It is further concluded that there was rampant poverty in Makindye and that shortage of water are an indication of poverty, among slum dwellers and that most people in Makindye have low incomes and settled there due to cheap accommodation and land that they can afford compared to other parts of the town.

From the study, the researcher found out that Private and customary land tenure systems influence the growth of water resource Makindye division since the owners think that they are free to do what they wish on their land without any planning and guidance from the authorities which is opposite of what happens in public water systems where planning is carried out and development approval done by the division authorities. It is therefore concluded that development control is quiet difficult to attain on privately owned land than in public land and since the former is more predominant in east ward, it is not surprising that slums are equally more predominant there than anywhere else in the Municipality.

From the study findings, it emerged that ineffective urban planning framework contributes to the growth of water resource Makindye division. This was evidenced by limited resource base for urban planning. The Municipality lacks the necessary personnel to meet the ever-increasing demand for urban planning services in the division. Makindye division also lacks a clear urban planning strategy which explains the occurrence of water shortage in the division.

Further, it is concluded that failure to involve communities in various urban planning initiatives makes them uncooperative during the implementation process of physical development plans that eventually leads to the shortage of water . Therefore involvement of communities in urban planning and development control initiatives is

key to orderly urban development and avoidance of slums.

Recommendations

Government should provide more funding to SACCOS and deliberately introduce the housing component in their framework to enable the urban poor save for water development, this should be coupled with the establishment of housing and water finance institutions with affordable interest rates.

Emphasis should be put on infrastructure development and employment creation in both rural and urban areas of the country to improve on the livelihoods of the citizens and to reduce on the number of people flocking the urban areas for better lives.

Government should put in place and implement deliberate strategies for improving security of water and enhance the water access rights for the urban poor.

Government should carry out more legal reforms especially on urban land in order to put all land within gazetted urban centers under public ownership and management through leasehold tenure so as to improve on development control which is currently made difficult by multiple land tenure systems prevailing in the urban areas.

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