Climate-Related Urban Migration- Case Study of Kisumu City

2025

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Disclaimer

ACKNOWLEDGEMENTS

We would like to thank the Kisumu Research Project fieldwork support team which included Victoria Odhiambo who offered valuable GIS expertise and skills in map making and modelling as well as tremendous support in data analysis and reporting, Nixshon Otieno and Sheilla Anyago who together helped in notetaking and keeping field notes which has later supported the report writing process. Special thanks to the LPI team led by Saron Hirpa and Rose Alulu for their presence in the field and invaluable coordination skills and synergy that contributed to the success of the data collection process. More importantly, we thank the community participants for their loyalty and resilience, enduring long hours of the whole day's engagement exercises, we sincerely acknowledge their passion, dedication, and commitment to freely share information, and their rich knowledge of local issues and historical events which have immensely shaped the report.

We also acknowledge the support of key stakeholders that joined through KII interviews and consultation including representatives of county and national government, who altogether spiced the entire experience by providing valuable insights into the topical issues around Kisumu. The successful revision of the report, incorporating further updates in analysis, contextual findings, and recommendations following the validation workshop held in Kisumu in November 2025, would not have been possible without the support of Martha Bakwesegha (LPI Program Manager) and Caroline Katuma (LPI Senior Programme Officer – Climate Peace and Security).

Finally, we would like to express our utmost gratitude to the Life & Peace Institute (LPI) and its donor, the Swedish International Development Cooperation Agency (Sida), for funding and supporting this project to address the knowledge gap and scale-up understanding of the nexus between urban migration and climate change and environment as well as security dynamics. This valuable study is truly an eye opener to enthusiastic research and policy practitioners.

ABBREVIATIONS

AfriWatSan	Africa Water and Sanitation
AMCOW	African Ministers' Council on Water
GoK	Government of Kenya
GIS	Geographic Information Systems
KUAP	Kisumu Urban Apostolate Programme
LPI	Life &Peace Institute
LVSWSB	Lake Victoria South Water Services Board
LVSWWDA	Lake Victoria South Water Works Development Agency
NGO	Non-Governmental Organization
SANA	Sustainable Aid in Africa International
SDG	Sustainable Development Goals
SUSWATCH	Sustainable Environmental Development Watch
SWAP	Safe Water & AIDS Project
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children Education Fund
WHO	World Health Organization
WSB	Water Service Board
WSP	Water Service Providers

DEFINITION OF TERMS

Adaptation	Adaptation means adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities
Climate Change	Climate change means a change in the climate system which is caused by significant changes in the concentration of greenhouse gases because of human activities and which is in addition to natural climate change that has been observed during a considerable period.
Eutrophication	Eutrophication is the process in which a water body becomes overly enriched with nutrients, leading to plentiful growth of simple plant life. The excessive growth (or bloom) of algae and plankton in a water body result in excessive oxygen consumption leading to anoxic conditions and often death of other aquatic organisms.
Global Warming	Global warming refers to the gradual increase, observed or projected, in global surface temperature, as one of the consequences of climate change
Hygiene	The term refers to the set of practices associated with the preservation of good health and healthy living. It consists of behaviors related to the safe management of human excreta, such as hand washing with soap or the safe disposal of children's faces
Mitigation	Mitigation means human interventions that seek to prevent or slow down the increase of atmospheric greenhouse gas concentrations by limiting current or future emissions and enhancing potential sinks for greenhouse gases.
Resilience	Resilience refers to the capacity of social, economic and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation
Slum	A slum household is defined as a group of individuals living under the same roof lacking one or more of the following conditions: access to improved water; access to

	improved sanitation facilities; sufficient living area –not more than three people sharing the same room-; structural quality and durability of dwellings; and security of tenure
Vulnerability	Vulnerability refers to the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

EXECUTIVE SUMMARY

In recent years, the complex relationship between climate change, peace, and security has garnered increasing attention. both from policy and science perspectives. This study explored the complex interplay between climate change, peace, security, and urban migration in Kisumu City, Kenya. Situated within the Lake Victoria Basin, Kisumu is increasingly vulnerable to climate-induced challenges such as rising temperatures, intensified rainfall, and biodiversity loss. These challenges are compounded by urban migration, socioeconomic inequalities, and competition over limited natural resources, which collectively pose risks to peace, stability, and urban sustainability. The report presents a comprehensive analysis of migration dynamics, insecurity, and environmental changes in Kisumu City, Kenya, based on surveys, Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), and spatial assessments in the light of the changing urban demographic factors. Conducted in settlements like Manyatta, Nyalenda, Obunga, and Mlimani, the study highlights interconnections between climate change, urban migration, and security challenges. The report concludes by presenting targeted recommendations aimed at fostering safety, environmental sustainability, and effective migration management to build a resilient community.

Key Findings

Migration: The study established that migration drives Kisumu's growth, fueled by economic opportunities in business, fishing, education, and manufacturing. About 43% of residents were born outside Kisumu, mainly from rural Kisumu County like Muhoroni, Nyakach and, Seme and neighboring counties such as Siaya and Homa Bay. Cross-border migrants from Uganda, Burundi, Rwanda, and DRC engage in vending, fishing, and jewelry trade, often undocumented via beaches. Environmental factors like flooding and lake level rise like the one observed recently in 2021 displace rural populations, exacerbating overpopulation, unemployment, and informal settlements. Positive impacts include new skills (e.g., new fishing nets making skills) and economic boosts, but negative cultural impacts also predominate including gender-based violence, crime and transactional sex popularly known as "sex-for-fish" or Jaboya system" whose ultimate outcomes are skewed business opportunities for women.

Insecurity: There is a clear connection between migration and insecurity. Respondents highlighted the correlation between increased population in informal settlements and rising insecurity, attributing this to factors such as youth unemployment, the expanding boda boda sector, poverty, the high cost of living, drug availability, peer pressure, and a

conducive environment for criminal hideout. Migration is significantly responsible for the new cases of insecurity reported in Kisumu city especially along the beaches where migrant movements is difficult to monitor and document.

Climate and environmental changes: The climate and environmental change particularly increased flooding, lake level rise, and land degradation are key drivers of rural-to-urban migration. Environmental shocks displace communities, especially from low-lying and riparian areas, pushing them into the city in search of safety and livelihoods. This influx intensifies urban pressures, leading to overcrowded informal settlements, strained resources, and heightened unemployment.The result is a reinforcing cycle where environmental stress prompts migration, migration intensifies urban insecurity, and insecurity deepens socio-economic vulnerabilities, making residents more susceptible to climate impacts. This complex interlinkage highlights the need for integrated policies that address environmental management, sustainable urban planning, livelihood creation, and community-based security to build resilience in Kisumu.

Recommendations

This study makes the following recommendation

RECOMMENDATIONS ON INSECURITY

- Deliberate efforts to enhance Urban Safety & Insecurity Prevention Policy include the creation of permanent police posts in all high-density informal settlements and at major beaches such as Dunga beach with 24-hour patrols. Encouragement of community-police collaboration and regular meetings.
- Economic empowerment for vulnerable groups, especially women and youth to reduce reliance on stigmatized livelihoods like transactional sex and mitigate insecurity driven by idle youth and economic desperation, and finally fostering Education, Spiritual, and Institutional Interventions to Build Social Cohesion among host and migrant communities

RECOMMENDATIONS ON ENVIRONMENTAL AND CLIMATE CHANGE

- Operationalize the Kisumu County Disaster Management Policy and its comprehensive recommendations including the proposed catchment-level interventions with upstream counties to mitigate flooding and environmental extremes in Kisumu while at the same time enhancing an early-warning system and eenforcement of Riparian Protection and Relocate Flood-Prone Settlements

- The county government of Kisumu to strictly Enforce the 30-metre riparian reserve along all rivers and Lake Victoria shoreline (strictly implement EMCA 1999 and Physical and Land Use Planning Act 2019) with immediate eviction and relocation support for structures in flood plains (especially Kapuothe, Nyalenda B, Obunga, Nyamasaria).

RECOMMENDATIONS ON MIGRATION CHALLENGES

- To manage the negative impacts of rapid migration such as increased crime, undocumented arrivals (e.g., at beaches), and population pressure in slums like Nyalenda and Obunga, enforcement of Nyumba Kumi initiatives are recommended to verify newcomers' origins and regularize activities like fishing. This includes regularization of beach and lake-front settlements by issuing temporary occupation licenses, registration of all boats and fishermen (including migrant fishermen), and phase out illegal fishing nets introduced by cross-border migrants.
- The county Government of Kisumu to form a Kisumu Climate-Migration-Security Taskforce chaired by the Governor and including national government, NEMA, NDMA, Kenya Police, immigration department, Lake Region Economic Bloc (LREB), and community representatives.

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CHAPTER 1: INTRODUCTION

1.1 Background and context

In recent years, the complex relationship between climate change, peace, and security has garnered increasing attention. both from policy and science perspectives (Parrish et al., 2020; Ibrahim & Mensah, 2022; Barrios et al., 2006). A particular emphasis has been placed on the urgent need to better understand the role of climate change as a 'threat multiplier' with the potential to intensify food, water, and energy insecurity while propelling competition over natural resources, exacerbating social inequalities, and driving displacement. While climate change does not necessarily directly cause violent conflict, there is growing evidence that the complex interaction between a changing climate and pre-existing dynamics across social, political, and economic factors intensifies conflict drivers by creating new and exacerbating existing fault lines between and within states and societies. (Delazeri et al., 2022). Recent research has observed that climate change has a unique correlation and loop to food security and societal disruptions and changes (Richards et al., 2021)

This complex relationship between climate change and security is compounded by the fact that in settings where violent conflict already exists, climate hazards have often aggravated or prolonged instability, rendering it more difficult to reach and sustain peace (Ibrahim & Mensah, 2022). By the same token, violent conflicts have been shown to disrupt and impede climate action, as countries grappling with extreme political instability often have fewer institutional capacities and resources to adapt to climate change. While debates concerning the precise nature and direction of the links between climate change, peace and stability continue to evolve, they have fostered a growing consensus that the sustainability of conflict prevention and peace building programming will hinge on the extent to which it is sensitive to the context-specific impacts of the changing climate.

Internal and external migration have been an important coping mechanism for communities that experience combinations of climatic and environmental changes and conflict. Migration to cities and other emerging urban areas is increasing and is expected to continue due to various factors. such as declining rural livelihoods owing to reduced agricultural profitability in rural areas and the alure of potential urban opportunities (Mercandalli & Losch, (2017). Nonetheless, urban migration has spurred concerns about urban conflict, social cohesion, and urban access to resources. (Duda et al., 2018). In addition, urban migration creates unique links to rural areas that have both peace and

conflict implications through socio-economic means. Linkages. In the horn of Africa, especially countries like Sudan, Somalia and South Sudan, migration has intensified due, in part, to conflict and climatic conditions, understanding creating increased human suffering and enhanced vulnerability (Regan & Young, 2024). Understanding the peace and security dynamics is essential to providing relevant and reliable policy and programming. This paper explores the situation of Kisumu city and the nexus between climate, security and urban migration within the city of Kisumu.

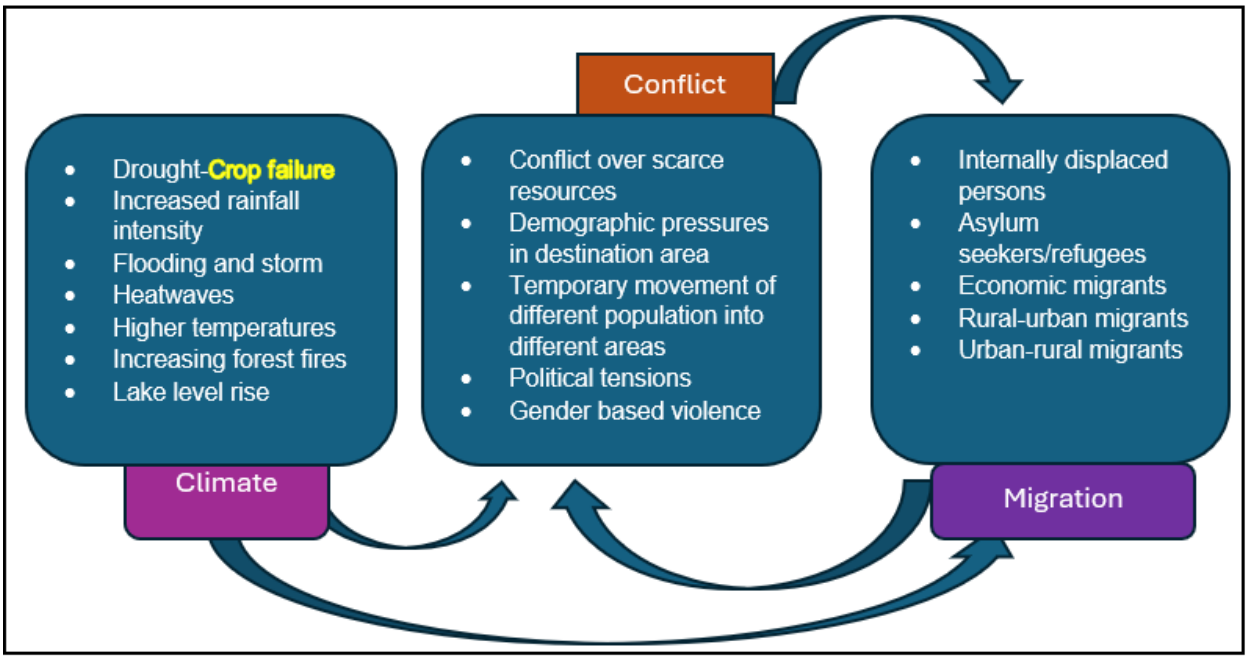


Figure 1: Diagram showing Interconnections of climate, Conflict and Migration Dynamics

1.2 Objectives and Overarching questions

- ❑ To what extent does Kisumu experience rural-urban migration (or any other form of migration – particularly due to climate change) and how does the migration affect the peace and security situation in your settlement? If these trends continue, what are the projected issues?
- ❑ What are the main drivers of environmental degradation and change affecting Kisumu and its environs, and their linkages to climate change, what are the linkages to existing security situation in the city as well as potential mitigation measures locally and at catchment level?

- ❑ What are the inherent linkages between cultural practices of communities within Kisumu city and any potential linkages to security and peace within the city.
- ❑ How does climate change vulnerability affect the livelihoods of communities living in fragile settlements and ecosystems in Kisumu

1.3 Theoretical Framework and Study Context

This section examines Kisumu city's complex urban dynamics through multiple theoretical lenses, focusing on four interconnected domains: environmental systems and settlement patterns, migration flows, security dynamics, and policy frameworks.

1.3.1 Kisumu geographic and social context

Kisumu city is situated on the shores of Lake Victoria (at about 1,131 m.a.s.l[1]), Africa's largest and the world's second largest freshwater lake. The city has a population of around 600,000 (KNBS, 2024) and is the third largest city in Kenya as well as the principal city of western Kenya.

[1] m.s.l- mean sea level

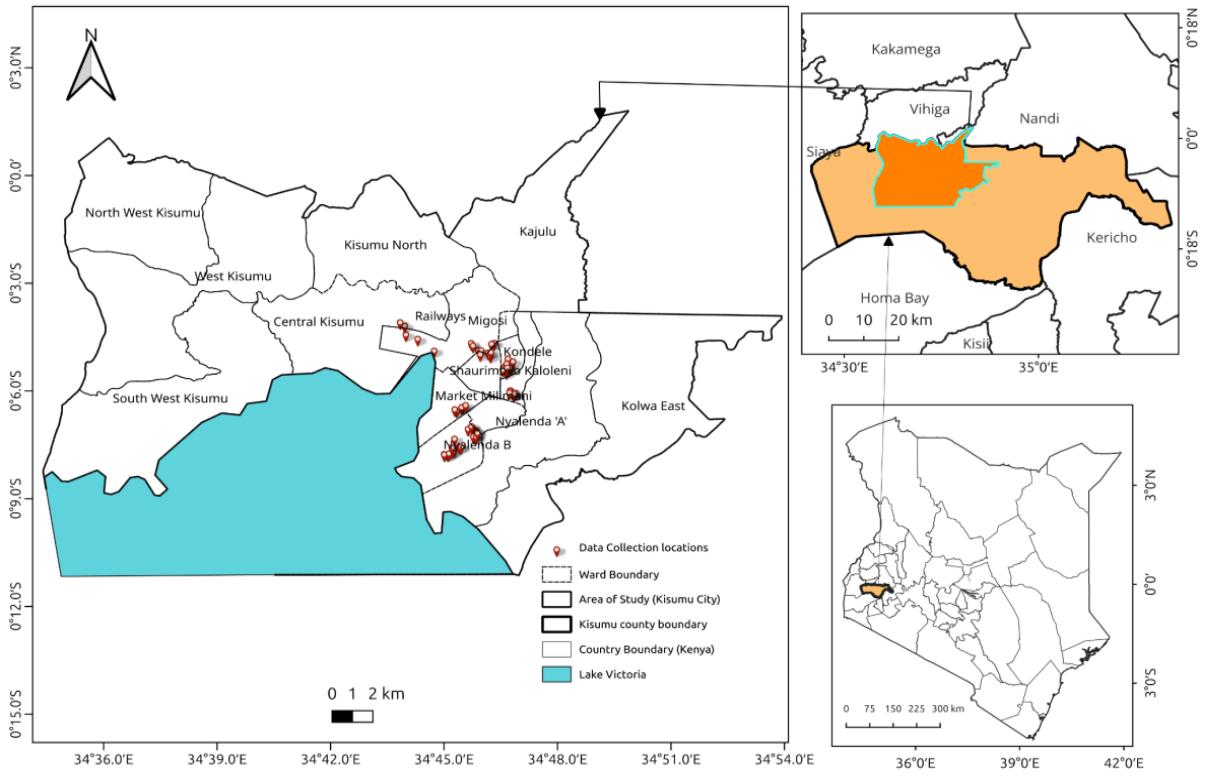


Figure 2: Study Area - Kisumu City

Kisumu was a center for trade and commerce during the peak of the east African Community trading block; during this period, the railway terminus and lake port were active and transport in the lake vibrant and a key determent of economic activities in the city (CoGOK, 2018). However, the economic potential of Kisumu dwindled considerably after the fall of the East African Community block and during the economic decline in the 1980's and 1990's (Bard & Lennmalm, 2015). As a result of this, the railway industry deteriorated, and many industries shut down. Today, more than half of the population in Kisumu are struggling with many residents employed in the informal sector. The decline of industries has affected the regional economy with the official unemployment rate standing at 30% (Furlong, 2016). However, markets play a key economic role in Kisumu sustaining significant amount of people by supplying daily basic goods and household income (Furlong, 2016).

Nevertheless, Kisumu is on the recovery path with a current population growth of about 3.4% per annum and is currently undergoing intensive economic transformation as has been seen in infrastructure, building and construction, hospitality, among others (Okotto *et al.,* 2015). Housing and real estate industry has flourished in the recent past especially on

the steep slopes of Riat and Kisian hills, which has become an attraction of many investors (or newcomers) for the panoramic views of the lake and the city (CoGOK, 2018). Despite this transformation, majority of the city's residents continue to live in poor informal settlements (approximately 60%) (Were *et al*, 2022). Given this scenario, Kisumu is poised to suffer from extreme challenges arising from factors associated with low-income and unemployment such as insecurity and increased informal[2] settlements due to continued urban expansion. Besides, informal settlements commonly referred to as slums are characterized by lack of adequate access to basic services and infrastructure (Odote & Olale, 2021). In Kisumu most informal settlements exist in high-risk areas such as low-lying flood plains and riparian areas. This situation is aggravated by inadequate planned housing settlements to meet the growing demands of urban populations (Wagah & Mwehe, 2019). Despite the challenges, Kisumu remains an important hub and a trading route within the great northern corridor between Kenya and Uganda. Over the years, rural urban migration has contributed to the population explosion in Kisumu, and this has been amplified by the promise of growing employment opportunities.

[2] Informal settlements commonly referred to as slums are characterized by lack of adequate access to basic services and infrastructure. https://unhabitat.org/sites/default/files/2025/08/definitions_-_informal_settlements_-annex_14.08.2025.pdf

Figure 3: Informal settlement in Kisumu County

1.3.2 Climate trends and observed patterns

In terms of weather and climate, Kisumu has an annual precipitation between 1111mm - 1407 mm received in two major rainy seasons; March, April and May (467- 477 mm) and October, November and December (370 mm) and a subdued rainfall peak in August (150 mm). Temperature varies seasonally with a maximum annual temperature range from 25°C to 30°C while the mean annual temperature ranges from 18°C to 20°. In general, temperature has been on the rise and is projected to maintain a steady rise into the future, similarly, precipitation has shown increasing trends and variability with some recurrent extremes in recent years (World Bank, 2021). Consequently, flooding events have been on the increase in recent past due the extreme yet hard-to-predict rainfall event in the lake basin areas. According to the government of Kenya (MoALF. 2017), Kisumu County has a climate risk vulnerability index of 0.4481against a national vulnerability index of 0.4317[3] which signifies a region of high intense vulnerability, and this is largely attributed to flooding events. In the same report, Kisumu County, including the city, records more than 5,000 people affected annually by floods (particularly in the months of April to June and October

3

The Climate Vulnerability Index (CVI), also referred to as Climate Change Vulnerability Index (CCVI), is a tool that identifies places that are susceptible to floods and heat-related effects of climate change by combining built, social, and ecological elements – see The national climate vulnerability index average is 0.4317.http://hdr.undp.org/sites/default/files/knhd_report_2013.pdf

to November). In the Kano plains, where Kisumu sits, yearly flood-related losses are estimated at US$ 850,000 (Masese et al, 2016), while relief needs amount to US$ 600,000 (MoALF, 2017). According to the Kisumu CIDP 2023- 2027, flood was identified as a high-risk disaster hazard in the county including the City of Kisumu. Moreover, future climate change projections show an increase both in intensity of rainfall and risk to flooding (Lyon et al., 2017), and some recent studies indicated that more runoff water is expected in Kisumu city, especially on the eastern looking slum areas (Othoo eta al., 2021) with predictions to the effect that frequency of storm return periods may rise too. Fundamentally, increased rainfall would lead to increased incidences of flooding further compromising sanitation and ground water quality (Azage et al., 2017; Furlong, 2016). In recent years, emerging trends of lake level rises have been added into the list of Kisumu's climate vulnerability. In 2020 the lake water rose to an alarming level of 13.32m with the 2023/2024 *El nino* period recording a rise of about 14 m, according to Eastern Africa Consortium for Clinical Research, consequently leading to mass displacement in locations such as Dunga beach and Usoma among other beaches. The climate related vulnerabilities in Kisumu can however be understood in the wider catchment context. Neighboring counties such as Nandi, Kericho, Vihiga among others have direct contribution to the climate and drainage dynamics of Kisumu, most rivers flow into the lake basin from the highlands areas and as such they have direct influence to the flooding as well as pollution draining into the lake.

Figure 4: Typical flooding situation in Kisumu recent flood recorded in May 2024 (Source Kenya News Agency[4])

1.3.3 Security situational analysis

The security dynamic of Kisumu is somewhat seasonal and historical and often attributed to the city's triple burden of poverty and informality and political activities but just like many emerging cities across the world of its ilk. However, the security. For instance, in the history of Kenya, Kisumu has, for the longest time served as the bedrock of opposition politics in Kenya, and in many areas suffered marginalization which has impacted investment and economic fortunes of the city over the years. Accordingly, political and electoral circles have often led to insecurity and destruction of property and loss of lives, and investors' fear"[5]. In another report from the Lake Belt Bulletin of March 2023,[6] the Kisumu Central Deputy County Commissioner, said that, as opposed to other parts of the country where other forms of voices operate largely, politics remain the main source of violent extremism in Kisumu city". However, the economic fortune of Kisumu is believed to remain largely untapped.

Concerning acts of violent extremism, various forms have been reported, especially during political seasons. Some notable gangs have executed extortionary behaviours and violence in Kisumu in the past.[7] According to the Kenya Countering Violent Extremism (CVE)

[4] https://www.kenyanews.go.ke/floods-ravage-kisumu-county-as-homes-businesses-submerged/
[5] *https://www.mistraurbanfutures.org/en/lip/kisumu*
[6] *https://lakeregionbulletin.co.ke/2023/03/15/former-hardliners-take-lead-in-taming-violent-extremism-in-kisumu/*
[7] *https://www.researchgate.net/publication/311591818_Spatio-Temporal_Contexts_of_Orphan_Migration_in_Kisumu_District_Kenya*

Observatory (2021),[8] and the CHRIPS[9] Conflict Assessment Report (2016-2020), Kisumu is regarded as a target spot (city or region with potential risk of violent extremism) having been listed as targeted urban spaces in the duration 2017-2021. Outside the city environs, Kisumu County has also experienced skirmishes along its borders with neighbouring counties such as Kericho and Nandi pitting the Luo and the Kalenjin communities, due in part to, resource competition and boundary disputes and political tensions. Sometimes there also exists clan tensions among the different Luo clans within the city and the county resulting sometimes in disquiet among residents, for instance, while there are three main clans, the Seme, Kajulu, Kano and Nyakach, some clans perceive that others are unfairly dominating the county government, and therefore, skewed resource allocation decisions (Safer world[10], 2015).

1.3.4 Environmental degradation and change

Environmental degradation, catalysed by rapid urbanization, and exacerbated by climate change, pollution and human encroachment continue to count among Kisumu city's pressing challenges. Consequently, natural ecosystems have suffered significant transformation and loss of biodiversity has been rampant, while waste management mechanisms are overwhelmed. As the city grows, so does the demand for natural resources and construction materials such as sand, that has led to a steady increase in environmentally unfriendly activities on the rivers and shores of Lake Victoria. In Kisumu sand harvesting is rampant in Kibos and Nyamasaria and along the beaches of Kisumu. Water and sanitation remain a huge challenge to Kisumu city, especially in the informal settlements where residents are continuously exposed to risky livelihoods and unhygienic conditions due to lack of adequate and clean water (Okaka & Odhiambo, 2019; UNISDR, 2017; Sakijege *et al.* 2014). On waste collection, Kisumu City is estimated to achieve between 20 and 35%, meaning more than 60% remain uncollected or dumped in informal settlements (Sibanda et al., 2017). There are diverse waste streams from Kisumu but according to latest reports, the use of dumpsites and open burning of the waste piles remains the most common waste disposal methods in Kisumu (CIDP, 2023). Waste scavenging has in the past been a source of insecurity in settlements near dumping sites such as Kachok before its transfer.

[8] *file:///C:/Users/admin/Downloads/Trends_of_Violent_Extremist_Attacks_and_Arrests_in_Kenya_2023.pdf*
[9] *https://www.chrips.or.ke/wp-content/uploads/2017/07/Conflict-Assessment-Report.pdf*
[10] *Kisumu County conflict analysis- https://www.files.ethz.ch/isn/191934/kisumu-conflict-analysis.pdf*

1.3.4 Analysis of policies and existing gaps relevant to the study

Analysis of policies was undertaken to assess the existence to which existing policies are aligned to the targeted thematic areas of migration, security, climate change and environment. In Table 1.1 below, a detailed synthesis of the key policies is undertaken.

Table 1: Policy Frameworks and Implementation Gaps in Kisumu City

Theme	Kisumu County Policies	National and global policies	Known ongoing actions	Comments on any gaps in existing policy or perspectives
Environment	✓ Kisumu County Environmental Policy 2019 ✓ Kisumu County Solid Waste Management Policy 2020 ✓ Kisumu County Environmental Sanitation and Hygiene Policy (draft) (2018)	• Kenya National Environment Policy 2013 • Environmental Sanitation and Hygiene Strategic Framework (KESSF) (2016-2030). • Environmental Sanitation and Hygiene Policy (KESHP) (2016-2030). • County Environmental Health and Sanitation Bill (2016) • National Slum Upgrading and Prevention Policy, Sessional paper No. 2, 2016 • National Climate Change Action Plan (NCCAP) 2023-2027	• Kenya in the process of developing a national Slum upgrading and prevention strategy • Kisumu county sanitation and hygiene bill under public participation • Plans to increase extent and quality of recreational spaces and green spaces in the city under the Urban development programs • Plans to safeguard and protect lake riparian beaches and biodiversity	• Lack of city specific Informal settlement plans/bylaws to coordinate and prevent slum infringement into riparian areas and biodiversity hotspots • Kisumu city and its surroundings are dotted by rich biodiversity and rich riparian ecosystems. Soe of these biodiversity hotspots are facing extreme threats due to the city's expansion and climate change • Flooding is a frequent problem in Kisumu city and the wider Kano plans which describe the major parts of the county. Usually results in displacements[11] • Increasing climate change vulnerability pose significant threats to already fragile ecosystems within the city and surrounding areas

[11] Othoo,C., Dulo,S., & Olago,D. (2021). Flood-risk vulnerabilities of sanitation facilities in urban informal settlements: Lessons from Kisumu city, Kenya.*East African Journal of Science, Technology and Innovation*,*2*(4).https://doi.org/10.37425/eajsti.v2i4.371
Simiyu, S., Cairncross, S., & Swilling, M. (2019). Understanding living conditions and deprivation in informal settlements of Kisumu, Kenya. In *Urban Forum* (Vol. 30, pp. 223-241). Springer Netherlands.

		• National Climate Change Response Strategy (NCCRS) 2010 • National Climate Change Act 2016, amended 2023 • Disaster preparedness and Mitigation Guidelines 2013 • Agricultural sector Development Strategy • Environmental Management and Coordination Act (EMCA) 199, Revised, 2012 • Sustainable Development (SDG) • Environmental Management and Co-Ordination (Wetlands, Riverbanks, • Lake Shores And Sea Shore Management) Regulations, 2009 • Water Resources Management Rules, 2007		
Culture and History	No policy found	• The National Policy on Culture and Heritage, 2009, • Kenya Protection of Traditional Knowledge and Traditional Cultural Expressions Act (2016)	• The national policy framework provides guidelines on the exploitation of culture and heritage for the good of society and the economy of the country • Scientific lit exist[12]	• While Kisumu has significant history that informs its present existence and attributes, there is no policy document that speaks to this reality. • Kisumu's settlements patterns, pace of development and immigration follow after its history and geological influence dating back to colonial times.

[12] *https://www.africancentreforcities.net/wp-content/uploads/2021/11/INC-102395-WHM-Kisumu-Report-V4.pdf*

				• Major informal settlements are situated in flood prone zones characterized by shallow water table resulting to frequent flooding and displacements. Africans labor forces were settled in these margins as buffers against intrusions from the massive wetlands during colonial times. The settlements ringfence the former while settlement within the central white settler zones. • Meanwhile the dominant local community (luo) is a fishing community, thus living within the margins of water is one of their innovative adaptations.
Migration and unemployment[13]	No county focused laws/policies found	• Kenya Micro and Small Enterprise (MSE) Act, 2012 • Kenya Youth Development Policy (2019) • Kenya Youth Agribusiness Strategy 2018 -2022 • The Employment Act, 2007	• The policies provide for the revitalization of youth and younger generations in productive age to fully engage in the economic recovery of Kenya and realization of vision 2030.	• Kisumu county programs on promotion of social and economic fortunes of the less fortunate in the county
Unplanned settlements	• Kisumu Integrated Strategic Urban Development Plan, 2014. • Kisumu city lakefront development Initiative • Kisumu County Economic and social Council 2019 Act.	• Urban Areas and Cities Act of 2011 (Revised Edition 2012) • National Spatial Plan (2015-2045 • Kenya's Vision 2030 • County Government Act (2012) • National Urban Development Policy (2013) • Physical and Land Use Planning Act (2019)	• Provides for the classification, governance, and management of urban areas and cities; the criteria of establishing urban areas; and the principle of governance and participation of residents. • Parking, traffic control, public transport, and street lighting are listed as requirements for classification of an area to be a city or a municipality	• A long-term plan aimed at guiding the development of Kisumu up to 2030. The ISUD acknowledges that sprawled and unplanned urban development have induced the demand for private car use. • Informality sprung due to colonial reasons and later thrived due to bulging rural-urban migration • Settlements thrived due to existing old land tenure issues, land in the flood prone zones were largely unregulated and unplanned. • Some of the unplanned settlements are not planned since they are not captured in the

[13] *http://ir.jooust.ac.ke/bitstream/handle/123456789/12109/Onditi_Rural-Urban%20Migration%20for%20Employment%20in%20Kisumu.pdf?sequence=1&isAllowed=y*

	• Kisumu County Urban Institutional Development Strategy (CUIDS) 2018-19. • KISIP 1 & 2[14]. • KUP[15]		• Aims to achieve organized, integrated, sustainable and balanced development. • NSP discussed the principles of public participation and compact cities	city planning acts, owing to ambiguous land use codes. • Informal settlements are fast encroaching biodiversity hotspots like the Dunga Beach wetlands and bird sanctuary
Violent Extremism	• Kisumu Gender Mainstreaming Policy 2021 • Sexual and Gender Based Violence Policy (SGBV) Framework 2019	• Counter Trafficking in Persons Act 2010 • Citizenship and Immigration Act, 2011	• National Strategy to Counter Violent Extremism, 2016	• Some reports report Kisumu as a hotspot for violent extremism. • Reports indicate few incidences of attachedattacks during 2014/15 • Heightened Political seasons execrateexacerbate this situation • Community clashes and border disputes are frequent in Kisumu County • s

[14] https://www.kisip.go.ke/second-kenya-informal-settlements-improvement-project-kisip-2

[15] Kisumu Urban Project (KUP): https://city.kisumu.go.ke/kisumu-urban-projects-kup/

CHAPTER 2: STUDY APPROACH & METHODOLOGY

This study adopted a mixed-methods research design to examine the complex intersections between climate-related migration, environmental change, and security dynamics in Kisumu city. The research framework integrated qualitative and quantitative approaches through individual interviews, focus group discussions, key informant interviews, GPS surveys, spatial modeling, and photovoice recording. The study area encompasses diverse settlements within Kisumu city, ranging from informal settlements like Nyalenda A, Nyalenda B, Manyatta A, Manyatta B, and Obunga to middle and high-income areas, as well as peri-urban zones from where participants for the individual interviews, FGDs and photovoice participants were drawn. This geographical spread enabled comprehensive analysis across different socio-economic contexts, environmental conditions, migration patterns, and security challenges. The key informants were drawn from key experts and leaders of relevant organisations including government and, non-governmental organisations, community and youth-based organisations as well as independent experts, researchers and activists

Data collections tools were formulated, reviewed, digitized where possible and pretested before the actual data collection while proper data screening was done during data collection as a way of validation and quality control. The project gathered extensive amount of data ranging from qualitative and quantitative data from KIIs, FGDs, spatial model data and climate data, as well as individual interviews and photovoice records. To supplement the data collection methods, a ground truthing tour was organized to observe and contextualize the reality on the ground, and to validate some model findings while at the same time providing a realistic feel of the reports provided by the communities during the FDG sessions. For detailed methodology, approaches ad tools used, see Annex I.

Table 2: Distribution of participants from Individual Interview and FGDs in the settlements

Team	Individual interviews			FGD participants			Approximate population (Source KNBS)
	Male	Female	Total	Male	Female	Total	
Nyalenda A	5	5	10	5	5	10	35000
Nyalenda B	5	7	12	6	6	12	32800
Manyatta B	3	5	8	5	7	12	31000

Manyatta A	5	5	10	6	6	12	24700
Obunga	2	3	5	3	4	7	20000
Nyawitta	3	2	5	4	3	6	18500
Mlimani	2	3	5	2	3	5	7000
Kogony	3	2	5	2	2	4	18000
Women only FGD group	None	None			12	12	
Total	28	32	60	33	47	80	162000

Figure 5: Ongoing Focus Group Discussion led by community member

Figure 6: Example of Community-Generated Map generated during community mapping with FGD participants

To validate the findings and ensure accuracy and transparency, feedback workshops were done with key national and local stakeholders. Important policy recommendations and action points were distilled and incorporated in the report. The validation workshops involved about 80 participants drawn from diverse sectors, community groups and the under-represented persons.

CHAPTER 3: RESULTS

3.0 Demographic Analysis

This section analyses the demographic composition of the study participants and their key livelihoods and settlements within Kisumu, the study was balanced in terms of gender representation with 55% of participants being women while 45% being men, perhaps a reflection of a likely higher number of women-headed households in the study area going by the observation that about 26% of the respondents were single (about 71% married).).). On education, the majority (37.8%) had college or university education, followed by 36.7% with secondary education, 1.5% postgraduate education while the rest either had primary education or none. Analysis of the livelihoods show that the majority engage in business activities (52%), this is closely trailed by those in casual labor and formal employment who together account for 14% of the population. About 8% were engaged in farming activities while the rest engaged in other activities such as self-employment, volunteering and students in various colleges. Other important livelihoods were also mentioned during the study especially from the FGD including commercial sex work, fishing, gambling, street preaching, begging and tourism. When asked about why they engage in some activities such as gambling and commercial sex workers, some FGDs confirmed that these industries, while stigmatized and looked down upon, do employ a significant number of people, including migrants who just come to the city to engage in such livelihoods. The beaches were reported to thrive on such industries. In one FGD, participants reported that some ladies engage in commercial sex work because the "society does not offer financial freedom for ladies and therefore they opt to engage in commercial sex work". Gambling was reported to be common among the youth and sport lovers who see it as a way of getting quick and sweat-free money. Activities such as street preaching were found to give spiritual nourishment to believers and as well as hope to those seeking it, for example, a preacher could comfort a street-bystander by asking out for small offerings in the promise that "God will Bless them' and people do so as a way of living in hope. Some livelihoods were interestingly found to be popular with migrants from particular countries, for instance, door-to-door vending was an economic activity reported to be introduced by migrants from neighboring countries such as Uganda and Burundi, who sell jewelry, snacks and drinks on the streets and even within settlements.

The study assessed the socioeconomic status of the respondents based on their income status and range (Table 3.1) across the different settlements, using different categories from a range of less than 5000 KES to 100,000KES. The study generally established that

majority of the population earn below 5000 KES per month across the whole population, about 33% have income in the range of 10,000- 20,000KES per month, only about 15% have income in the range of 20,000-50,000KES and the number even becomes narrower with only about 2% earning between 50,000- 100000 KES. Observably, some settlements such as Manyatta A, Obunga and Nyalenda B, slums have considerably higher populations earning less than 5000 KES per month or none earning above 20,000KES confirming that slum areas are indeed socially and economically poor. Mlimani has the highest number of people earning at least some income above 50,000KES. Mlimani accounts among the high-income and high-class estates in Kisumu. In the later section, it emerges that some of the socially poor settlements are also the most vulnerable to environmental extremes as well as insecurity.

Table 3: *Income Status*

Income Range	Kogony	Manyatta A	Manyatta B	Mlimani	Nyalenda A	Nyalenda B	Nyawita	Obunga
Less than 5000 KES	nd	20%	13%	nd	17%	40%	20%	nd
5,000 - 10,000 KES	30%	60%	13%	nd	50%	40%	20%	60%
10,001 - 20,000 KES	50%	20%	50%	40%	25%	10%	20%	40%
20001 - 50,000 KES	20%	nd	25%	40%	8%	10%	40%	0%
50000 - 100,000 KES	nd	nd	nd	20%	nd	nd	nd	nd

Note: nd – denotes lack of data o where no numbers were reported

Figure 7: *Door-to-Door Vending by a Migrant Vendor, an Economic Activity Introduced by Migrants in Kisumu.*

Figure 8: Tree Nursery Enterprise as a sustainable activity in Kisunu county.

3.1 MIGRATION

Migration was identified as an important factor in Kisumu's city's development with participants noting that individuals come to the city to take advantage of growing sectors like business, fishing, education and the growing manufacturing, real estate and industrial sector. However, migration was also fuelled by other factors such as displacement due to environmental challenge like flooding and lake water level rise, urban development, and the city's appeal as a hub for cultural and spiritual activities. While migration has undoubtedly contributed to economic growth, the community expressed concerns about its downsides. The influx of people has led to overpopulation, placing significant pressure on local resources such as housing, food, and public services. A key challenge noted by the community is the decline in fish production and catch from the lake, which has worsened due to overfishing, pollution, and other changing water conditions and the export of fish to neighbouring countries. This shortage has driven up food costs, making it difficult for locals to access affordable fish, a staple in their diet and a major source of livelihood. The growing population has also strained transport systems. Public vehicles frequently carry more passengers than they are designed to accommodate, with operators using the 'sambaza' system, where passengers squeeze into overcrowded vehicles. Similarly, boda-boda (motorcycle taxi) operators often carry up to three passengers at a time to allow them to cost-share, resulting in unsafe rides with four people on a single motorcycle.

The economic benefits of migration were not entirely dismissed. Many community members acknowledged that the arrival of migrants has injected new business ideas and job opportunities into the local economy. For instance, the introduction of skills like weaving fishing nets has created employment opportunities for both men and women,

while door-to-door businesses such as selling coffee, snacks, and other goods have also thrived. Additionally, migration has contributed to the growth of businesses operating 24 hours, particularly in areas with high demand for services, boosting the local economy further.

Besides employment opportunities, educational activities have also attracted migrants. Kisumu city has seen a growth in the number of tertiary and higher educational institutions with newly established branches of major learning institutions like university towers at the heart of Kisumu, Great Lakes University, Catholic University, Mt. Kenya University, Thika school of medical studies (TSMS), among others. The city has therefore seen an influx in the population of students in the recent past. Reports from some FGDs such as Nyalenda B highlighted that most of these students generally end up becoming permanent residents in the city even after finishing their education either because they get job opportunities or have established their own businesses.

Kisumu city has an airport and a port which attract most people who eventually settle in the city as they associate these two assets with present and anticipated growth in the business environment and opportunities. The city has also been attracting high-end investment from investors who see Kisumu as a potential future city. Kisumu city has hosted significant investor conferences that have presented Kisumu in a positive light and have served as opportunities for more investors and other migrants who see economic opportunities in the future. Some of the notable conference include the "1st Nyanza International Investment Conference held in June 28-29, 2024, in Kisumu", and the anticipated "African Sub-Sovereign Governments Network (AfSNET) Investment Conference" that was under planning by the time of this study but was later actualized on the 25 -26th November 2024 – the two conferences being officially attended by the Head of State of Kenya. A detour around the city confirms the existence of investor inflow into Kisumu.

In addition, some migrants come to Kisumu city for leisure and tourism and end up finding permanent residence. It was reported that "sometimes you find people coming to Kisumu for adventure purposes then after deciding to relocate to the city and establish permanent settlements of their own and becoming full residents of the city". In most scenarios, these migrants attract their families into the city. One other driver of migration was intermarriage. For example, a lady from another region may get married to a man from Kisumu city and therefore choose to stay in Kisumu. Other reasons for migration were also reported including spiritual activities such as visits to evangelistic missions and worship conferences like the ones offered by Prophet Owuor.

3.1.1 Migration analysis from FGDs

Majority of the FGD participants expressed that most migrants come from within Kisumu County and neighbouring counties of Kenya pointing to rural -urban migration factor. The FGDs also identified neighbouring countries of Uganda, Burundi, DRC Congo, Rwanda, Tanzania and South Sudan as an important source of migrants into Kisumu. An in-depth probe into the FGD groups explained that many immigrants from other countries come in the name of doing small trade and businesses within the city such as hawking and selling jewelry, however many end up staying and not returning to their countries. A comment from one FGD participant indicated that Kisumu "has become a safe home - likened to a safe haven" for many communities from Uganda and Burundi who have now taken over small businesses in the streets. When asked the reason and causes for migration, the majority of the FGDS participants indicated that the migration into Kisumu is due to the rural urban movements in search of better opportunities and business. Other reasons mentioned included movement because of family reasons, marriages, search for education and search for better health care facilities.

On the question of the impacts of migrants the following were pointed as outstanding impacts on Kisumu, first, the Nyalenda A FGD expressed that because of migration the population in the city has been growing at a rate greater than the growth of opportunities, this has contributed to heightened population pressure exacerbating the worsening unemployment, poverty, and crime situation, and other criminal activities,. Most of these migrants were reported to leave their original homes due to dwindling agricultural potential and declining productivity in the hope that the city would present better opportunities for them, however, the turn of events is unexpectedly negative and hopeless. The sad consequence is the temptation to indulge in illegal and criminal activities. Some migrants were reported to find Kisumu a safe place to hide especially in the beaches where documentation and identification of new commers is almost lacking, so criminals who have committed evils from other areas, masquerading as fishermen, arrive and settle among the fishing communities without notice, with intent to commit other crimes. Nyalenda B and Manyatta A and Manyatta B FGDS concurred with the report from Nyalenda A, and further emphasized that migrants are responsible for the growth of informal settlements and informality. They asserted that most migrants have little means when they arrive and as such they will end up staying in the very low-cost housing facilities which are only found in the slums. Another unique outcome about migration was reported from the Mlimani/Kogony FGD, an FGDS which reported that migration results in joblessness, social tensions and increased competition for resources, contributing to higher crime rates in the community, especially now, when Kisumu is reporting heightened insecurity. This report painted an

interesting picture, especially coming from an FGD that was somewhat labelled as 'elite and exposed FGD" as it was constituted by the Mlimani and Kogony participants who are from the middle-income and high-income earning areas, this constituency of participants are somehow more self-aware of the business environments and pros-and cons of migration.

Further on, Obunga FGD singled out that communities from Kisii, Kuria, Luhya compose most non-Luo migrants in Kisumu while Ugandans and Congolese make most cross-border immigrants. In terms of counties of Origin, most FGDs affirmed that Siaya Homa-Bay, Busia, Migori, Western Kenya counties (Kakamega and Vihiga) constitute leading intercounty migration into Kisumu respectively. The rural areas of Kisumu County like Seme, Kano, Awasi, Muhoroni and Nyakach contribute to the leading in-county immigrants. There was a general agreement across all FGDs that migrants may be responsible for the spike in insecurity and crime in Kisumu, especially from the Women-only FGD and Manyatta B and Nyalenda B FGDs.

Nonetheless, some FGDs agreed that migration has also contributed significant benefits to Kisumu city and its people. Reports from the Manyatta B and Manyatta A and some participants from the Women-only FGDs revealed that many migrants have contributed significantly to economic awakening in Kisumu city. It was reported that many immigrants have brought unique business ideas such as ice machine making, new technologies in fishnet making which have significantly promoted fish value chain and business. The same migrants were also noted to build the local economy by either investing in business of promoting demand in housing among other opportunities. It is worth noting that this positive perception is an important factor in peacebuilding and promotion of cohesion while also enhancing job creation and employment.

3.1.3. Perspectives on migration and transactional Sex in the Fishing Industry

Transactional sex accounted among the negative social challenges highlighted by the study and borderline gender-based problems in the city as reported by the women-only FGDs and confirmed by significant number of KIIs. It emerged that owing to the physically demanding nature of fishing, many women are unable to directly engage in fishing activities and instead rely on hired fishermen (jakambi) who venture into the lake using their boats, as the women who largely engage in the fish-retail business, wait for the catch in the morning at the beaches. However, this arrangement has led to exploitative local practices, where transactional sex plays a central role in determining access to the best fish.

Under these informal agreements, fishermen (Jaboya) often prioritize selling the highest-quality fish to women who agree to engage in transactional sex, while female boat owners who do not participate in such exchanges are left with leftover or less desirable fish.

Women in the FGD highlighted that this practice is particularly prevalent among fish traders, as it provides a competitive advantage in the business. Those who refuse to engage in transactional sex often face marginalization, being either sidelined in the trade or forced to pay significantly higher prices to access good-quality fish.

This arrangement not only exacerbates economic inequality but also contributes to a range of social and health challenges. Women noted that transactional sex is indiscriminate, involving both married and unmarried fishermen and women, which has led to increased incidences of sexually transmitted infections (STIs), including HIV/AIDS, within these communities. The prevalence of transactional sex highlights the vulnerabilities faced by women in fishing-dependent livelihoods, driven by limited economic options and entrenched gender inequalities.

3.1.4 Migration analysis from KII

On the question of migration, KIIs had varied, and convergent reports based on our analysis. Majority of the KIIs confirmed that Kisumu is a hub for migrants with most reported to come from the peri-urban and rural areas of Kisumu, or from the fishing communities around Lake Victoria - mostly Luos from Kisumu, Siaya, Migori, Homabay and Busia counties - while some come from other counties such as Kisii, Nyamira, Kuria, Kakamega, Nandi and Bungoma. Cross-border migration was reported to be active and somewhat on the rise with cross-border migrations pointed to come from Uganda, Rwanda and DRC Congo. Cross-border migration is reported to occur through the popular Busia border post or through the lake. It was pointed out that "some migrants are responsible for increased gender-based violence at the beaches" and many have contributed to insecurity and crime at the beach. The KIIs further pointed out that immigrants arriving through the beaches are undocumented and without IDs, posing a challenge of traceability. Many arrive for fishing expeditions and to sell new fishing skills. For instance, a story was told of some Ugandan fishermen who have brought new fishing-net making skills in the beaches, although it is known that such nets have been declared illegal in Uganda since they promote indiscriminate fishing activities. But regulating these practices hasn't been easy since the said promoters (immigrants) are undocumented. It was reported that undocumented migrants can conceal their criminal habits. Gender-based injustices were reported; in many cases undocumented people at the beaches exploit unsuspecting women and girls leading to the increased cases of GBV in the beaches. One interesting outcome from the county government informant recorded that some migrants from the cities such as Nairobi, Nakuru and even Mombasa, consider Kisumu a retirement destination after spending "years in other cities". This interesting finding was corroborated by another storyline from some KII and FGDs where it was established that during the post-election violence of 2007/2008, many people left Nairobi and other cities and settled in Kisumu to never to

go back. It is important to note that, like the FGDs, some KIIs confirmed that migrants have also contributed positively to the growth of Kisumu in general. Many pointed to, for example, the Indian community, who in the opinion of locals, are not considered migrants as they have lived, integrated, and contributed immensely to the economic fortunes of Kisumu and to the Luo community from colonial days to date.

Analysis summary from KII on migration dynamics in Kisumu

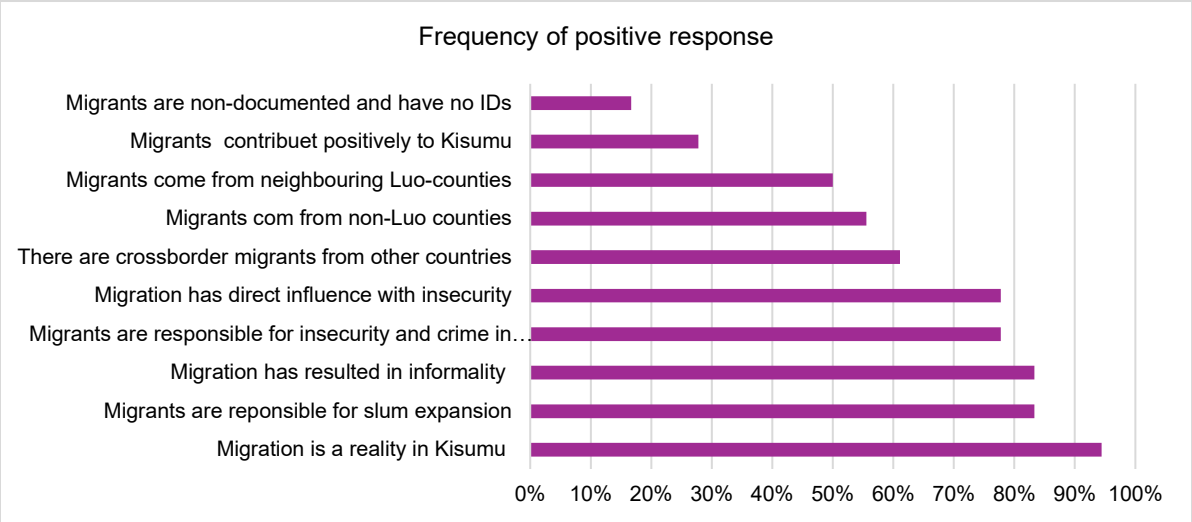


Figure 9: Showing the impacts of migrants in Kisumu County

3.1.5 Migration analysis from Individual Interview

Analysis of individual surveys revealed insights into migration dynamics in Kisumu in terms of reasons and types of migrants. About 43% confirmed to be born outside Kisumu but moved in later (Figure 10). This is a significant number of the sampled populations which may indicate that a significant number of people living in Kisumu have come from other regions and localities and even countries. Moreover, the II analysis similar to the FGD and KIIs, confirmed that Kisumu County remains the leading source of migrants into Kisumu, these migrants are largely coming from other sub counties outside the city of Kisumu and its environs such as Nyando, Nyakach, Seme and Muhoroni sub counties.

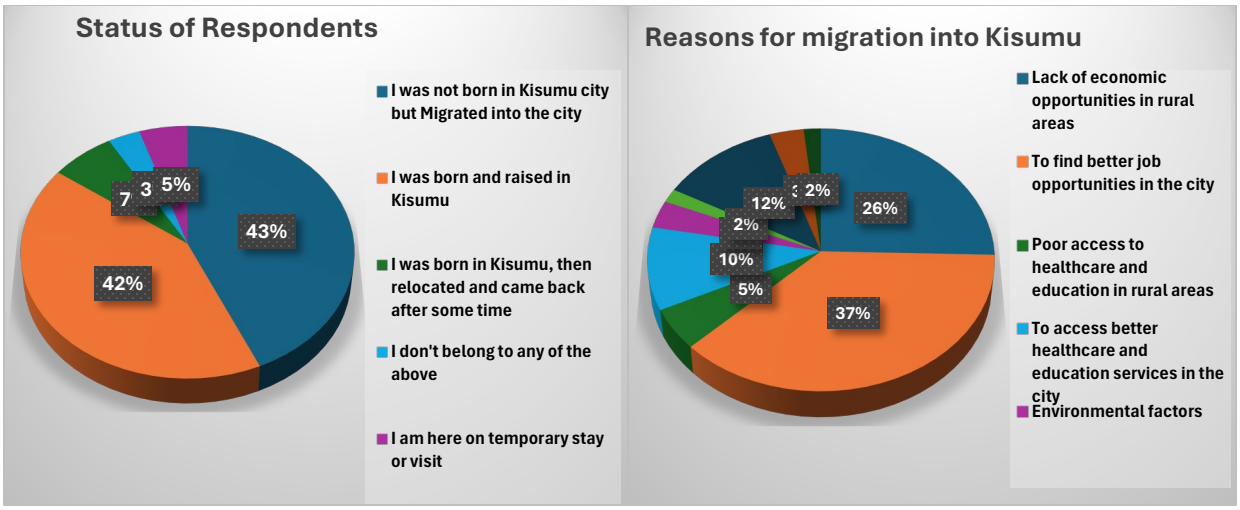


Figure 10: Residency status of respondents in Kisumu city and the reasons of migration, environmental factors mentioned included flood displacements, diminishing land and agricultural productivity and climate changes

Analysis of newcomers' (read migrant) relationship with original localities (Figure 11) showed that a significant number of respondents had attachments to their original homes. Newcomers' relationships with their homes of origin were mapped across the following key areas; firstly, marriage; many migrants have maintained ties through marriage. This has led to inter-cultural unions that have strengthened the relationships between communities. These spouses send remittances back home to support their families and enhance their statuses. Secondly, through employment, migrants have often sent remittances that support their families back at home where they have left, especially old parents, this has often fostered economic ties. Again, some immigrants have often prioritized education for their children by supporting schools back at home for example by funding their feeding programs or by sending children to study in local good schools as a way of promoting education at the grassroots. Some of the immigrants who came into Kisumu city in pursuit of education often return with new skills and perspectives that contribute to economic development in their home communities. Lastly, some came to Kisumu with the intention of making economic breakthroughs which when succeeded they plough-back in form of businesses investments in their rural areas thus fostering economic ties, job creation and stimulating local economies.

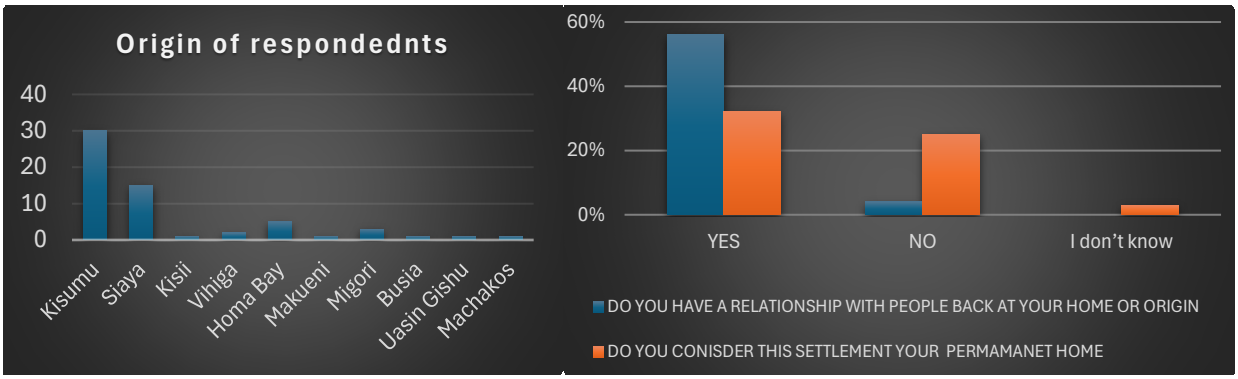


Figure 11: Distribution of respondents by county of origin and their relationship with original localities.

3.1.6 Cross border migration

Key observations were analyzed about cross-border migration (Table 4). For instance, responses indicated that there are increasing levels of migrants from Uganda, Rwanda who come to do small businesses like street vending, hawking and nanny jobs (house helps) while others are also known for jewelry. Some do small jobs like selling Chapatis and hot Coffee business in the evening and at night. However, the report shows that most of these cross-border migrants may not be documented and often no one knows what they have done in their countries, some like Ugandans are accused of introducing illegal fishing behaviours in Kisumu beaches and moral degradation along the beaches including transactional sex activities already mentioned in 3.1.3. Again, some respondents reported that some migrants prefer slum areas due to their porosity and lack of rigid surveillance so they can cohabit and live for some time without being noticed or identified by authorities. Majority of cross border immigrants were found to be of Burundi or Uganda origin.

Table 4: Cross-Border Migration and Economic Contribution in Kisumu

Originality	What brings them to Kisumu
Ugandans	House helps and jewelry, some come as fishermen to do fishing with their Kenyan counterparts and sell new fishing skills. Ugandans are accused of introducing non-approved small grade fishing-nets which net even fingerlings
Rwandese	Jewelry, believed to be smuggled from DRC as well
Sudanese	Refugees and running away from way, they consider Luo their distant cousins

Burundians	Hawking groundnuts and coffee
Congolese	Jewelry business, Kisumu acts as transit corridor to Nairobi
Others	Ethiopians, Somalis, Tanzanians, Europeans etc

3.1.4 Spatial analysis on migration

Spatial analysis of migration origins revealed that while a portion of migrants originated from within Kisumu County itself, the majority came from neighbouring counties.

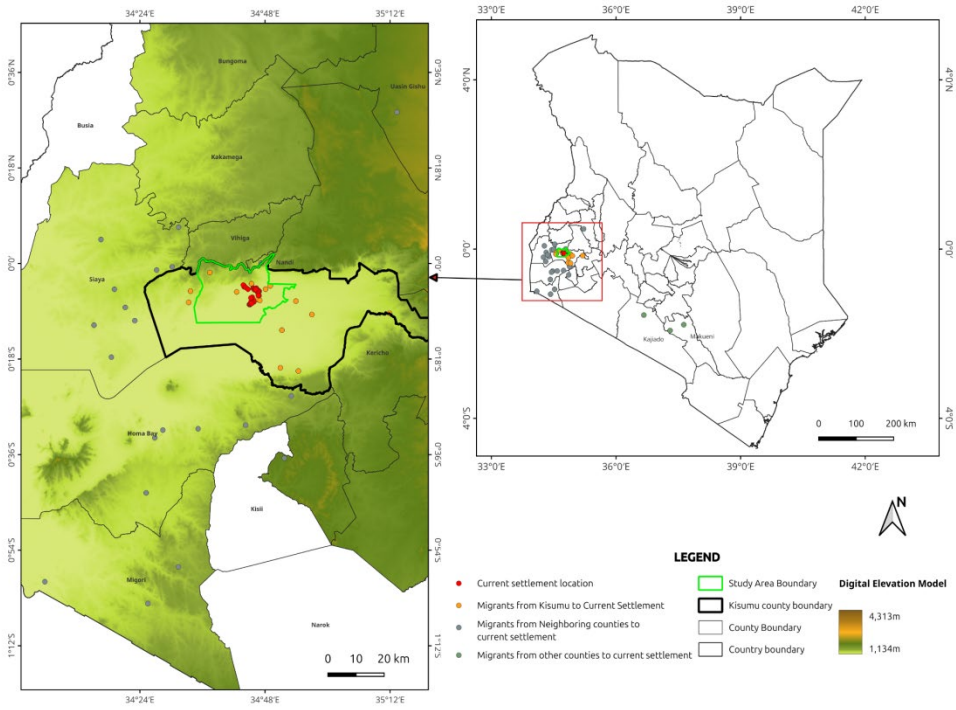


Figure 3.6: Migration patterns in relation to elevation

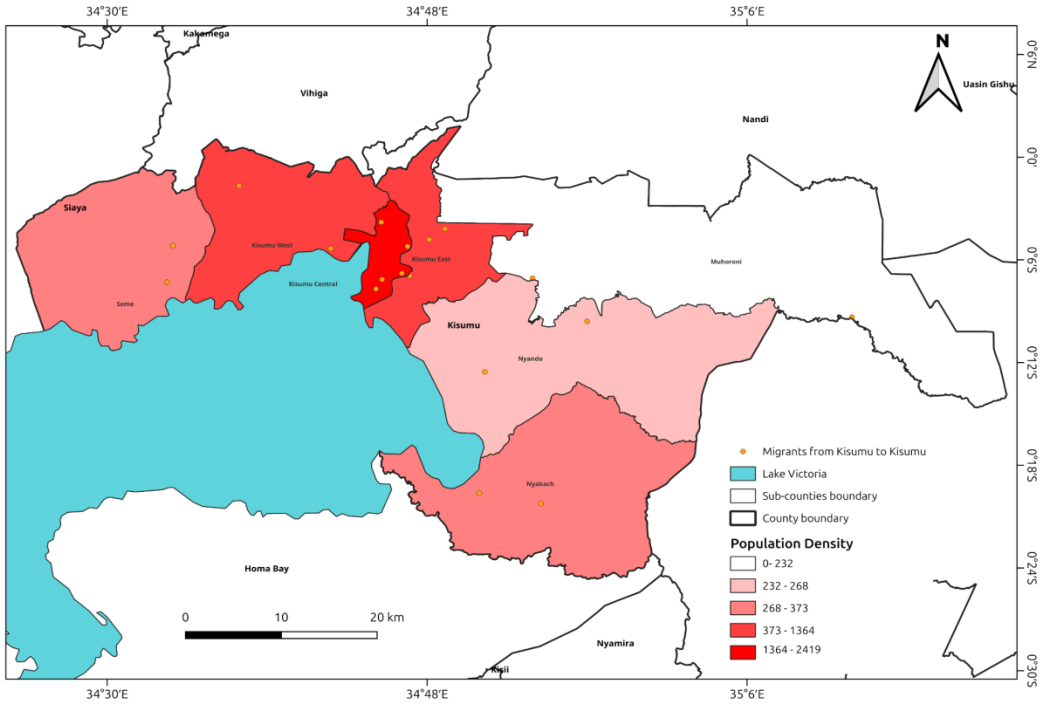


Figure 3.7: Movement of migrants within Kisumu in relation to population density

Migration motivations varied by demographic characteristics. While economic opportunities remained a primary driver across all groups, age groups showed distinct secondary priorities with those aged 26-35 balanced environmental factors with infrastructure needs, while those above 46 emphasized family reasons alongside healthcare access (Figure 3.8). Gender differences emerged in these secondary considerations, with males citing environmental factors such as flood displacements, diminishing land and agricultural productivity and climate change and infrastructure needs more frequently, while females prioritized healthcare access and family reasons (Figure 12). Marital status added another layer. Widowed individuals focused on healthcare access and family support, married migrants considered environmental and infrastructure aspects (Figure 13). Education levels influenced the complexity of decision-making, with college/university graduates weighing multiple factors including infrastructure and environmental concerns, while those with primary and secondary education prioritized economic opportunities. Livelihood patterns also shaped choices with business owners considering varied factors from environmental to infrastructure needs, while farmers concentrated primarily on economic opportunities.

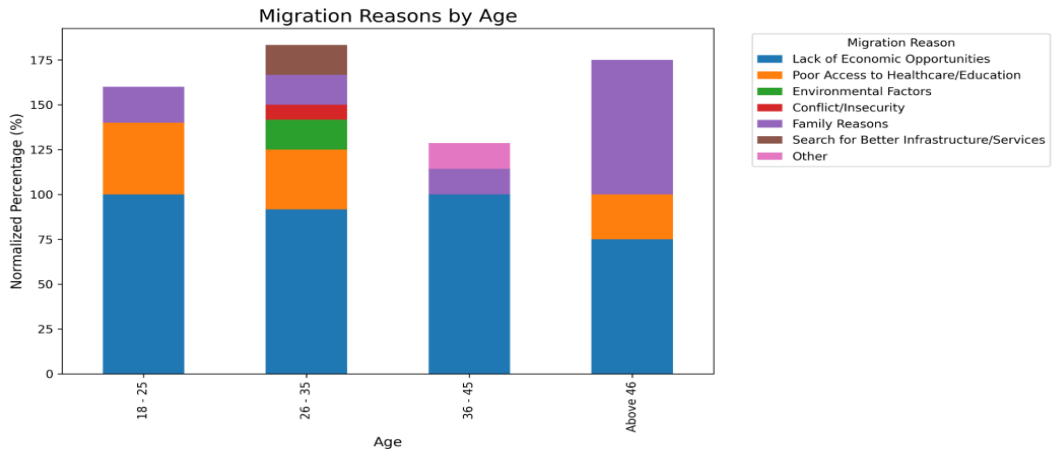


Figure 12: Migration Reasons by Age

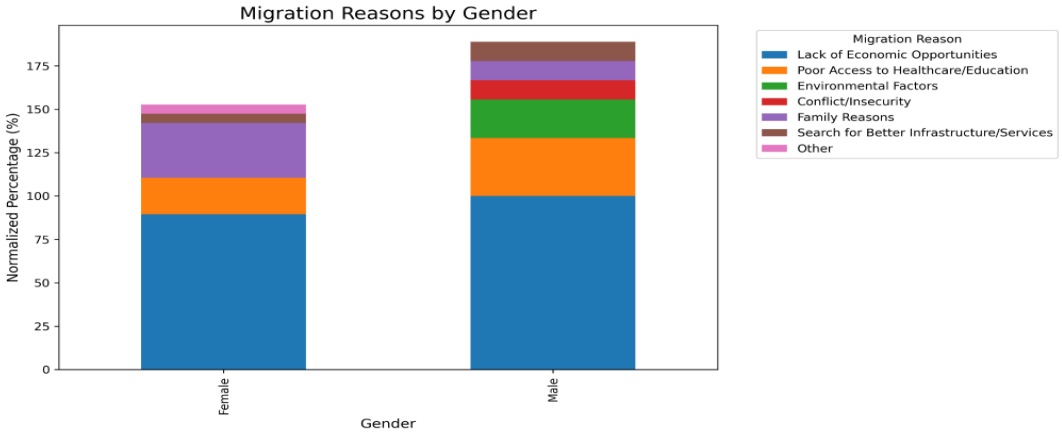


Figure 13: Migration reasons by Gender

The reasons for migration also varied by residential area (Figure 14). Obunga showed the most diverse mix, with significant proportions of residents citing healthcare access, environmental factors, and security considerations. Areas such as Manyatta B and Nyalenda A attracted migrants primarily through economic opportunities, while Manyatta A balanced economic draws with access to services. Nyalenda B residents often cited a combination of economic opportunities and access to healthcare facilities.

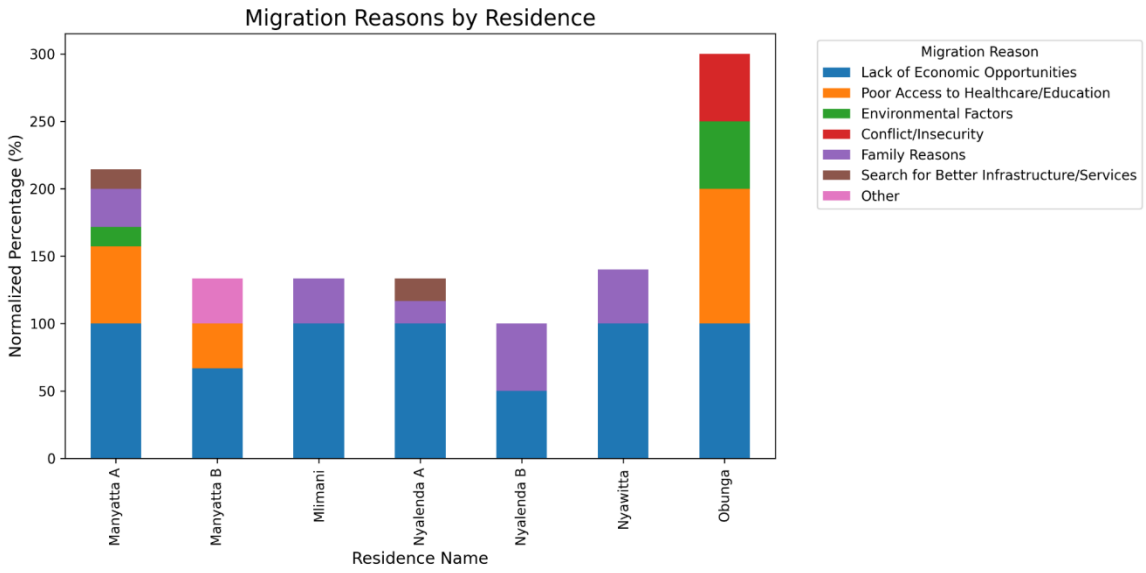


Figure 14: Migration Reasons by Residence

The implications of migration manifest differently across residential areas as shown in Figure 15 bellow.

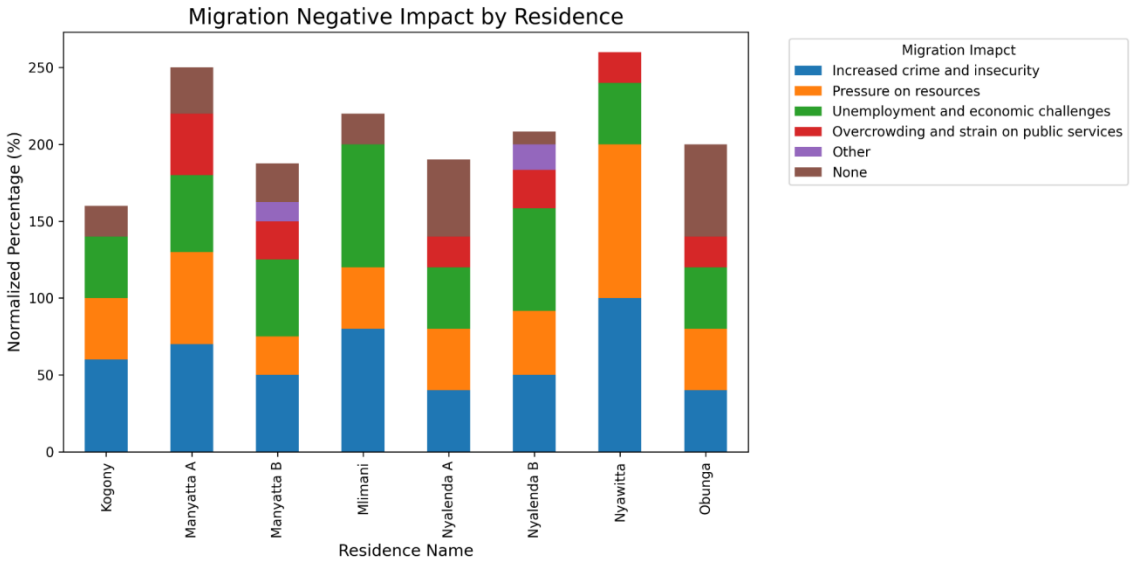


Figure 15: Migration Negative Impacts Across Residential Areas

An assessment of migration outcomes reveals mixed results in achieving migrants' objectives. Analysis shows that 73.1% of migrants reported achieving better economic opportunities in their new locations (Figure 16), while an even higher percentage (87.5%)

indicated improved access to services (Figure 3.14). However, 11.1% of migrants reported no perceived improvement in their conditions (Figure 3.15).

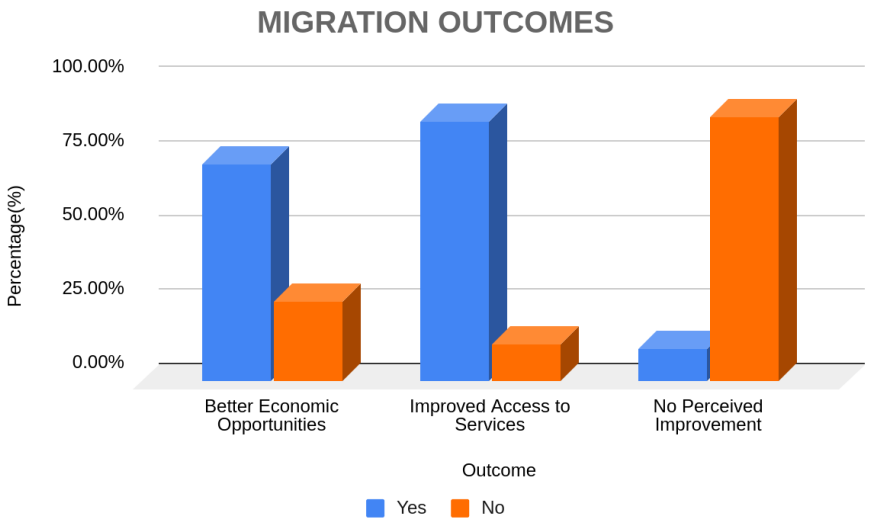


Figure 16: Migration Outcomes

3.1.7 How migration into Kisumu City affects men and women differently

Migration into Kisumu City affects men and women differently, both in the city and in rural areas. In the case of migrants seeking economic opportunities, especially married, it was observed that men leave first to come to the city while women are left in the rural areas. For women left in rural areas, the absence of male family members increases their workload, as they take on additional responsibilities like farming, household chores and caring for children and the elderly. This leads to emotional and financial stress, especially as they rely on remittances that may be irregular. In contrast, women who migrate to the city face different challenges. They often experience gender-based violence or exploitation in their workplaces, particularly in informal jobs with little protection. A considerable number of these women end up in casual employment along the beach, predominantly working in bars and the hotel industry, where vulnerability to such exploitation is heightened. Access to housing, sanitation, and healthcare in the city is also more difficult for them, especially the single mothers who live in vulnerable conditions. Additionally, the reported increased temperatures due to climate change have increasingly affected women, with poor sanitation during flooding becoming a major cause of health and hygiene issues. Rising floodwaters often lead to overflowing latrines, further exacerbating health challenges such as waterborne diseases and exposing women and their families to unsanitary living

conditions. However, urban migration offers women better opportunities for employment and education, potentially improving their financial independence.

For men, whether they stay in the rural areas or migrate into the city, the challenges are often tied to economic pressures. In the city, they may find work, but it's often in low-paying, informal sectors, which leads to frustration, job insecurity and involvement in criminal activities. Meanwhile, men who remain in rural areas experience a decline in traditional livelihoods like farming and economic opportunities, further straining family finances.

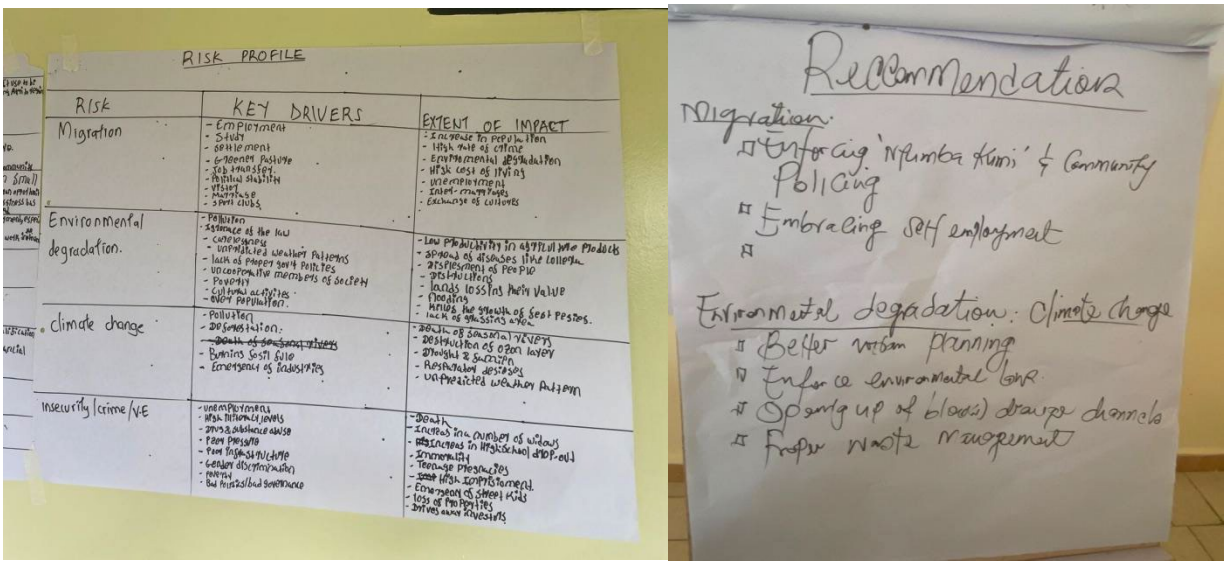


Figure 3.16: Risk profile & Recommendations

3.2 INSECURITY

Insecurity became a recurring theme in the discussions, with community members attributing the rise in crime to a combination of unemployment, poverty, and substance abuse. The economic hardship faced by many young people has driven them into criminal activities, particularly theft, burglary, and robbery with violence. Participants frequently mentioned the connection between illicit brew joints and the prevalence of violent crime, as these locations tend to attract idle individuals who engage in excessive alcohol consumption and drug abuse. The use of bhang (marijuana) was specifically highlighted as fueling aggressive behavior and increasing the rate of criminal incidents. The fact that drug abuse is an ingredient for violence was incredibly observed during a random tour by the team; a particular area near an alcohol joint in the slum area of Obunga turned chaotic, with visible signs of unrest. At one such location, a fight nearly broke out when a drunken individual refused to pay for food and began threatening the vendor, stating that she

couldn't do anything and that he would beat everyone present. This further emphasized the level of disorder and insecurity prevalent around these establishments, which contribute to the overall sense of danger in these neighborhoods. The rise in boda-boda (motorcycle taxi) activity was noted to also contribute to insecurity with operators accused of sometimes colluding with and facilitating criminal activities such as transporting stolen goods or acting as lookouts for criminals. This has contributed to a general sense of unease among the residents, who reported that walking at night in certain areas has become dangerous. The far-reaching impacts of insecurity were narrated by community members. Daytime robberies and deaths have been recently reported in Kisumu with the media highlights sometimes headlined "the criminal gangs of Kisumu" (Nation Media group, Sunday November 24th 2024)[16] . Curfews have been imposed by the regional authorities in some neighbourhoods to curb the rise in violent crime, restricting residents' movement and disrupting daily life. The fear of being attacked has led to reduced economic activity, as businesses close earlier to avoid darkness, further limiting income generation opportunities. Vulnerable groups, especially the elderly and women, are particularly affected by insecurity, with reports of assault and sexual violence, being common in some areas. Further analysis of these implications reveals a relationship between population density and the occurrence of insecurity and environmental degradation in Kisumu city where comprehensive primary data collection through community mapping and interviews provided reliable data for examining the population-insecurity relationship (see figure 3.10).The analysis demonstrates a relationship between higher population density and the frequency of insecurity incidents, as prominently illustrated in the densely populated sub-counties further visualized in the map below.

3.2.1 Security Analysis from FGDs

The matter of insecurity was discussed with intense interest and passion, often eliciting emotions among the FGD participants who overwhelmingly reported that the security situation in Kisumu was at an all-time low. The recurrent story among most FGD groups was the present revelation that youth and young school-going children (teenagers) are significantly implicated in crime in Kisumu, and often in cahoots with the law enforcing authorities, a phenomenon that has rendered many fearful and curfews declared in some pockets of Kisumu settlements. Reports from most FGDs show that reports of theft, robbery, murder, gender-based violence, and robbery with violence are the main forms of

[16] https://nation.africa/kenya/counties/kisumu/gangs-of-kisumu-260-attack-victims-five-deaths-fear-curfews-4833220#story

crime on the rise. The areas listed as insecure hotspots in Kisumu show widespread geographic coverage affecting nearly all settlements including high-income areas of Mlimanai, Riat, city centre and CBD, and informal settlements area alike. Areas such as Nyalenda, Milimani, Mamboleo, Victoria Park, Swan Centre, Nyamasaria, Mowlem and Manyata were all listed as insecure areas. This outline speaks to a more widespread problem of insecurity. A report from the Women only FGD, which was corroborated by other FGDs highlights even a chilling account of gender-based attacks. An extract from the Women-only FGDs best describes the situation in the beaches:

> "*Gender based violence and rape cases are also high in the beach areas- the beach chair is aware of the issue however the corruption issue affects handling of the cases. Infact, in the past 5 months, a participant reported, hearing 3 rape cases, that were not solved because the perpetrator solved it with money. Domestic violence/Conflict between men and women within the beach area is high, prostitution and transactional sex activities as well as related immoral behaviours r.. Also, there is an increase in substance and drug abuse (chang'a, shisha, hard drugs, Nyasore, bhang,) are sold openly to the community, especially by women as they are rarely suspected by the authorities*".

The foregoing discussion points to some differential level of insecurity in different parts of Kisumu, for instance along the beaches, most reported insecurity issues were GBV and sexual exploitation and rape, as well as general moral degradation and cultural shocks which have consequently led to cases of early pregnancies and school dropout. On the other hand, crimes related to the notorious youth gangs were more rampant in the rest of the settlements and CBD areas. There was general agreement among different FGDs that insecurity like theft, and murder have increased in Kisumu city because of joblessness so "*the young people particularly the jobless, engage in broad daylight robberies and murder because they see that as the only way of survival since as humans, they all at the end of the day want to have food on their tables*".

During the FGD discussion, the community mapped and identified areas they considered as insecurity hotspots through their community map sketches such as the one shown in Figure 17 below. These maps were later corroborated by the GIS expert who used the sketches to develop spatial analysis of the insecurity in the study area.

Analysis of these spatial insecurity hotspots reveals a relationship between population distribution and the occurrence of insecurity and environmental degradation hotspots in

Kisumu Central and East Sub-counties (Figure 17). The analysis demonstrates a relationship between higher population density and the frequency of insecurity incidents, as prominently illustrated in the densely populated sub-counties further visualized in the map below. Nyawita reports the highest levels of increased crime and insecurity, while Obunga faces significant pressure on resources. Manyatta A experiences notable unemployment and economic challenges alongside overcrowding issues. Often leading to delays in accessing the water (Figure 18 & 19)

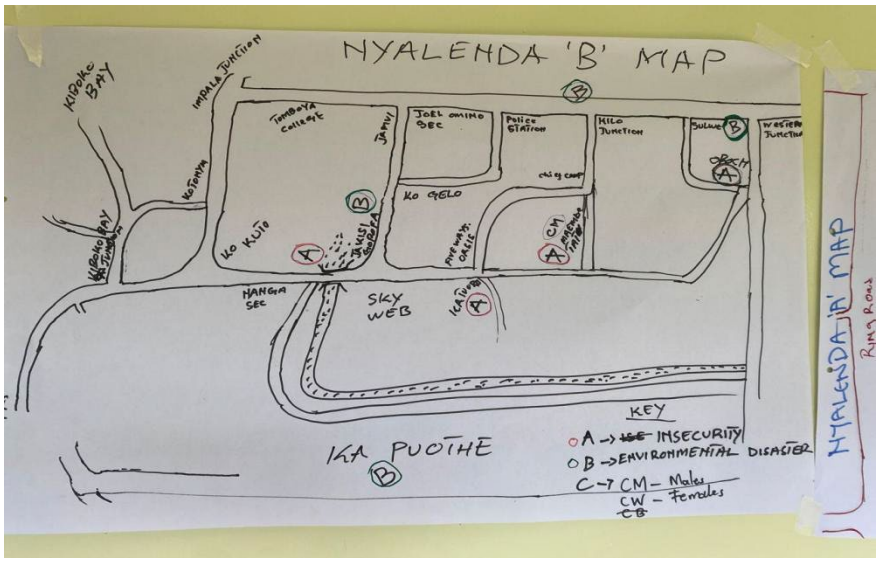


Figure 17: Example of Community-Generated Map from Nyalenda 'B' Settlement

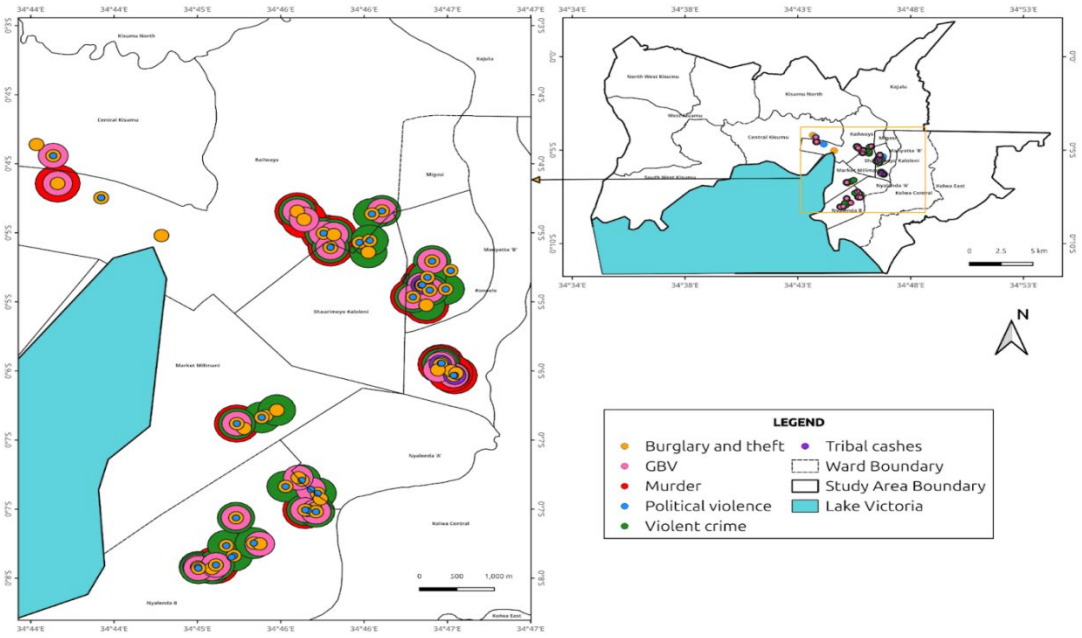


Figure 18: Spatial distribution of different types of insecurity that are prevalent in Kisumu city

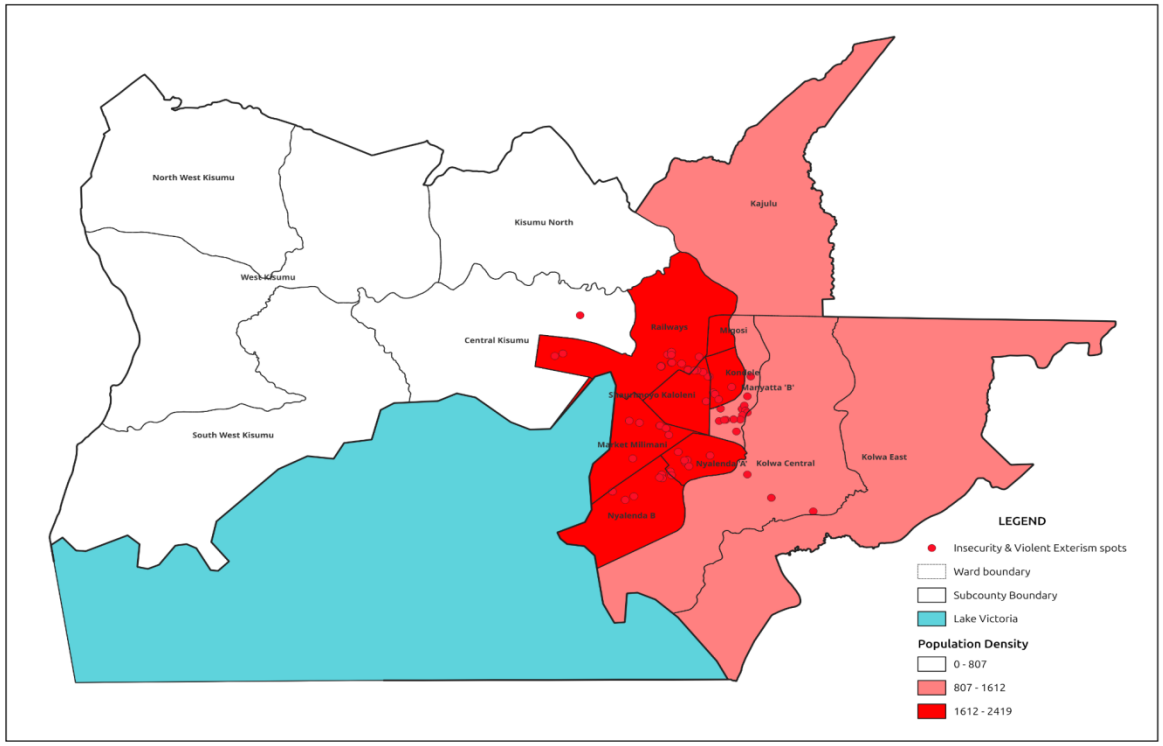


Figure 19:: Spatial Distribution of Insecurity Incidents prevalent in the study area in relation to Population Density

3.2.2 Security Analysis from KIIs

Like the FGD outcomes, an overwhelming proportion of the KII reported agreed with the forms of insecurity in Kisumu as well as the areas affected. Generally, the majority of KII also felt that the majority of the city and its environs are affected by insecurity. In addition, some KII analysis revealed that some forms of insecurity in Kisumu have connections to political seasons.

It was reported that Kisumu is politically quite volatile and has been the seat of opposition in Kenya for the longest time. During political seasons, Kisumu generally drags into tension and often, even when nothing serious is happening, people would develop fear, and a bit of apprehension in going to Kisumu, this essentially is not good for business and the city's economy. violence instigated through politics. Nevertheless, some KIIs mentioned that "people fear Kisumu for obvious reasons since it's the homebase of Kenya's senior opposition leader, that Kisumu always stays calm until it reaches election period where the opposition leader always has a say and huge following, and so whenever he declares anti-government demonstration insecurity really spikes. Therefore, during heightened political times, there is huge uncertainty on how things will turn out, so people, non-native communities and investors fear are scared away, while businesses remain closed down and people returning to their home counties or countries – an aspect of emigration or urban-to -rural or urban -to urban migration - like the one seen during post-election violence of 2007. It was noted however by one KII, that in recent elections, Kisumu has experienced relative peace from political violence since the "regional political leader" has formed dalliance and alliances with the governments of the day subsequently making their people "happy and calm".

Some KIIs cited the occasional cross-border tribal clashes that have been witnessed inter-tribal classes between Kisumu County and its neighbouring counties and among different communities as responsible somehow for insecurity and tensions in Kisumu city and its environs. For instance, the recent conflicts near the border town of Sondu between Luos and the Kalenjin community of Kericho county, in such a case, a community from Kericho may feel unsafe while in Kisumu city and its environs. All KIIs except one indicated that immigration and insecurity have strong connections in Kisumu, and that immigrants are believed to be behind some forms of insecurity in Kisumu. It was established that some migrants as illustrated earlier do find Kisumu a save hideout after committing criminal activities in other areas, especially where their identities and origins are not known.

3.2.3 Security Analysis from Individual Interviews

Analysis of insecurity at the community level revealed interesting perspectives for Kisumu city, for instance, the proportion of the responses who rated their settlements as "insecure" and "very insecure" was 51% and 20% respectively, making it the strongest statement to the issues of insecurity Kisumu. This therefore indicates that less than 30% of Kisumu residents feel safe in the city. When asked how often they have experienced or witnessed insecurity, an overwhelming majority of about 90% respondents indicated occasionally or very often (Figure 20). Analysis of the types of forms of insecurity in Kisumu, burglary, violent crime and GBV were among the top three rates of insecurity in Kisumu, a finding which is like the records from both FGDs and KIIs. It is interesting to note that about 30% of respondents strongly agree that migration is responsible for insecurity in Kisumu, while 40% agree that they are, in total about 70% feel that immigrants cause insecurity in Kisumu (Figure 21). This finding is similar to what was reported by the majority of KII who also linked some amount of insecurity to undocumented immigrants and rural-urban migration into Kisumu.

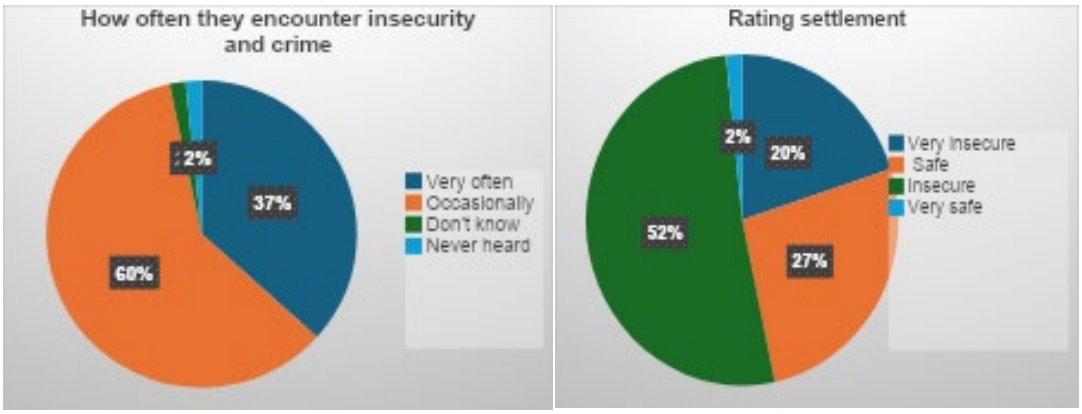


Figure 20: Frequency of encounter of insecurity and crime and the rating of their settlements.

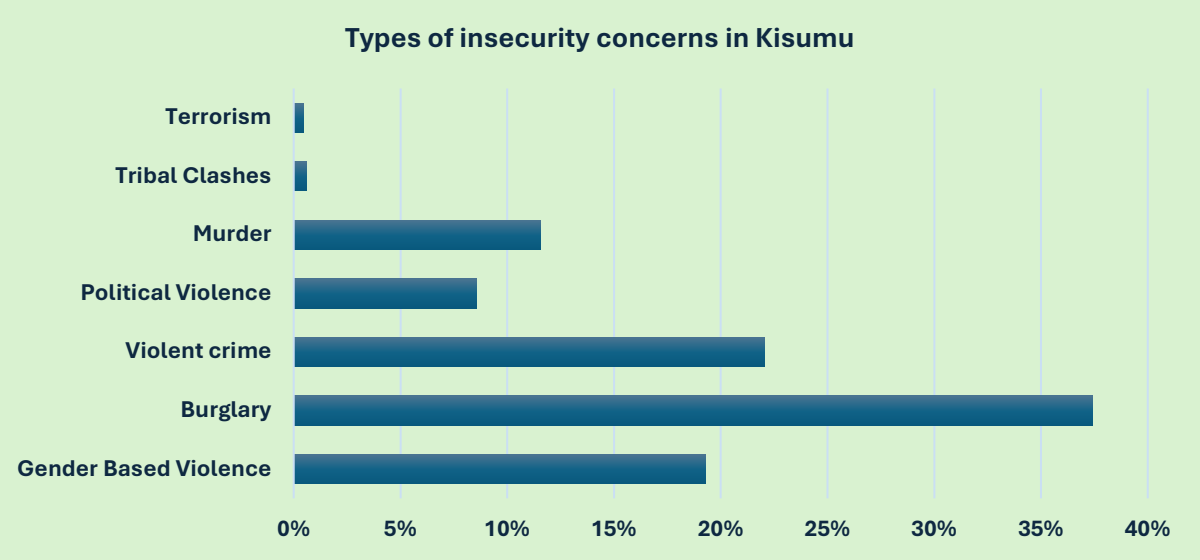


Figure 21: Types of insecurity concerns in Kisumu.

A closer analysis of the main causes of insecurity may link it to aspects of poverty and lack of cohesion and a spirit of tolerance for diversity (Figure 22). It is therefore imperative on responsible authorities and agencies with interest to intervene on the aspect of building community cohesion and respect for people's diversity and well uplifting the welfare and livelihoods of city residents as the most urgent need of Kisumu city. Organizations willing to enforce intervention programs may therefore target these two key weakest links in the security of Kisumu. Prioritizing mitigation of the causative factor to insecurity is fundamental to the realization of lasting peace, prosperity and security of Kisumu which is central to investor confidence and more business opportunities. Otherwise, most residents remain hopeless, looking at the future with uncertainties and negativity on matters of insecurity.

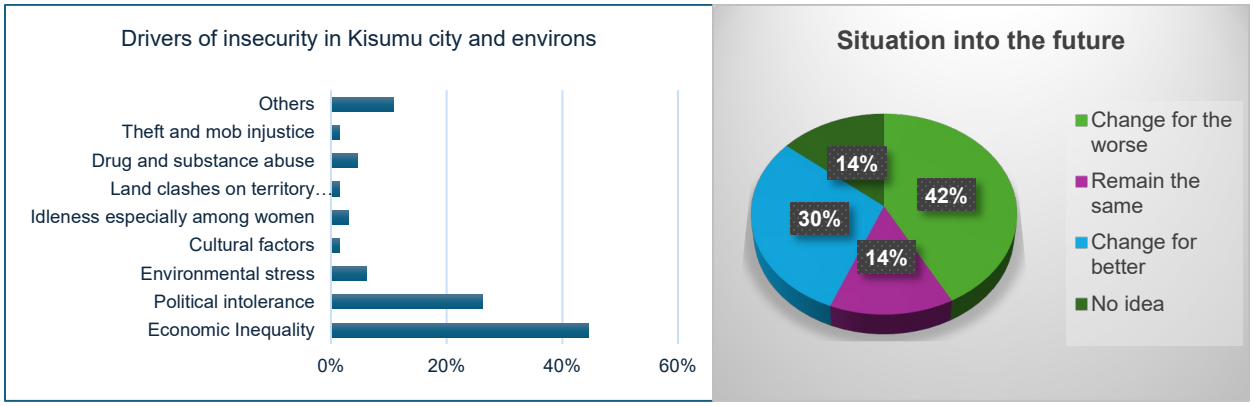


Figure 22: Drivers of insecurity and people's opinions on what this might look like in the future

3.2.5 How insecurity into Kisumu City affects men and women differently

In rural areas, women who are left behind become more vulnerable to gender-based violence (GBV) due to the absence of male family members who traditionally offer protection. They also face increased insecurity related to theft or exploitation, as managing households and farms alone makes them easier targets for criminals.

In Kisumu city, women migrants usually experience workplace exploitation and domestic violence, particularly in the informal settlements (Manyatta) where safety measures are limited. Lack of proper housing and security forces these women to live in vulnerable conditions, often exposing them to theft, assault or harassment. For men, the influx into urban areas leads to joblessness and frustration, sometimes pushing them into criminal activities like robbery or gang-related violence, further escalating Kisumu City's insecurity.

This dual impact of migration on insecurity deepens the challenges for both men and women, with women facing more personal safety risks and men encountering economic pressures leading to involvement in crime.

3.3 ENVIRONMENTAL DEGRADATION AND CLIMATE CHANGE

This section discusses key outcomes from the community mapping, FGDs, KIIs and IIs as well as ground observations and model analysis of the key drivers of environmental changes in Kisumu and the inter-linkages to climate change, migration and security dynamics in Kisumu city. One noticeable outcome of this analysis was the overwhelming convergence between the various information sources and analysis approaches, where the most common forms of environmental challenges facing were identified to include flooding, pollution, destruction of riparian areas as well poor waste management. There was a clear revelation that significant linkages exist between environmental degradation and displacement of communities leading to migration into the city that further increases pressure on the city exacerbating unemployment and crime. The discussions highlighted the community's deep concerns about environmental degradation, which they directly linked to both migration and urban development. The clearing of land to accommodate new settlements has resulted in widespread deforestation, soil erosion, and the degradation of local ecosystems. Additionally, poor waste management practices, particularly in informal settlements, have led to pollution in rivers and lakes, which has severely impacted fishing activities - a key source of livelihood for many residents.

Adding to these concerns is the impact of climate change. The community has observed significant shifts in weather patterns, noting more frequent flooding, rising temperatures,

and unpredictable rainfall. Floods have displaced many residents, especially in informal settlements, where drainage systems are inadequate or non-existent. These environmental challenges have had a devastating effect on local agriculture, with reduced crop yields and soil fertility, leading to food insecurity and loss of livelihoods for many families. Flooding in areas such as Kano, Nyalenda, and Kapuothe significantly contributes to migration and the growth of informal settlements. The displacement patterns caused by floods are evident, with the most severe flooding recorded in 1997 and 2024, leading to rising water levels in the lake that have rendered some areas uninhabitable. The swelling of water bodies like rivers and lakes, coupled with rising water levels, has also displaced people from lakeside areas, further complicating migration patterns and straining already limited resources.

Industrial pollution, coupled with domestic waste dumping, has led to the contamination of major water sources. River Wigwa was reported as the most polluted river within Kisumu city through improper waste disposal, some coming from factories upstream like Kibos, further contributing to the degradation of the local environment as well as adding to the pollution chock in Lake Victoria leading further to declining fish populations and death.

The effects of environmental degradation are felt not just economically but also in terms of health, with communities experiencing higher rates of waterborne diseases such as cholera and respiratory infections caused by poor sanitation and polluted air.

To fully experience the state of environmental degradation within the study area, the team undertook a ground truthing exercise to identify and map key environmental hot spot areas in Kisumu. This exercise was complemented by GIS analysis later presented at the end of this section. While visiting several spots, the team observed several hot-spots that the community had flagged during the mapping sessions. Poor sanitation, open sewage, scattered garbage, and clogged drainage channels were widespread, creating health risks for the residents. In areas like Nyalenda and Manyatta (Figure 23 & Figure 24), poor sanitation and exposure to unhygienic conditions were observed including illegal waste dumping that find their way into the waterways which are also sometimes used by residents for cleaning and even cooking.

Figure 23: Poor Sanitation Conditions in Kisumu city

Figure 24: Poor Sanitation Conditions in Nyawita, Kisumu, with Clogged Drainage and Improper Waste Disposal Next to a Cooking Area.

In River Kisat near Obunga, the team observed significant pollution caused by improper waste disposal, which was consistent with the concerns raised by community members.

Figure 25: River Kisat, Obunga_Nyawitta,Kisumu

Similarly, at a former quarry site in Obunga, where murram excavation once took place, the team found a somewhat large water-filled hole created by the excavation, which posed a significant danger. During periods of heavy rainfall, the water levels rise, attracting children from the neighborhood to swim there. Sadly, this has led to several instances of drowning, and when the team visited, they witnessed children swimming in the hazardous area.

Figure 26: Water-filled former excavation sites,Obunga,Kisumu

Additionally, sand harvesting was observed taking place at River Nyamasaria, while at River Wigwa, where it meets Lake Victoria, the team observed fishing activity despite the noticeable pollution in the area. Near Hippo Point, the team saw water hyacinth, algae growth, and other signs of water pollution along the lake's shores.

Figure 27: Shores of L.Victoria at Hippo point

More significant was the observations made at Kapuothe where multiple effects of flooding and displacement were observed. In this area flooding has displaced a significant number of residents. The area is low-lying, and borderline to Lake Victoria while also sitting along the riparian plains of River Wigwa, making it particularly vulnerable to rising water levels during the rainy season. Flooding has also led to widespread destruction of homes and farms. The inadequate drainage systems have worsened the situation, leaving many families exposed to future floods. One notable example is a newly built home for orphans, which has never been used because the area became inaccessible due to flooding (see fig. below).

Figure 28: Flooded Orphanage in Kapuothe, Kisumu, Rendered Inaccessible Due to Rising Water Levels.

In the following sections we explore key findings from FGDs, KII, II and other analyses undertaken to evaluate the impacts of environmental change in Kisumu.

3.3.1 Environment and climate change analysis from KIIs

Key informants identified various environmental challenges affecting Kisumu including flooding, pollution, encroachment and deforestation, unsustainable sand harvesting, invasive species among the key environmental problems affecting Kisumu. The study established that notable linkages, similar to that demonstrated in Figure 1, exist between environmental degradation and challenges and climate change and even security. Many KIIs noted that uncontrolled environmental degradation leads to displacement, increased poverty, stress, economic hardship and loss of livelihoods as floods and environmental destruction destroy homes and farmlands forcing communities to move. A KII from Jijenge Youth group particularly identified that "extreme weather events are long term results of environmental degradation i.e. cutting down of trees, destruction of wetlands", the results then are floods and siltation in the lake. This was also confirmed by other KIIs who also argued that "environmental degradation and climate change are intertwined" in that the effects of one lead to rise in impacts of the other.

Flooding emerged as the most common environmental change facing Kisumu according to KII analysis. Areas such as Manyatta, Nayalenda and Obunga, which account for the largest slum populations. Some of the notable historical severe flooding was recorded in 1997 and 2024. Floods were found to displace communities and destroy homes and livelihood of people who then move into the city to seek refuge and shelter. This in effect results in more pressure in the city, increased informality and habitat destruction, with some even resorting to crime. Some KIIs reports agreed climate change impacts such as floods

have contributed to migration by displacing people from the rural and peri-urban areas of Kisumu County into the city. Some reports revealed that when the roads and streets are flooded vehicles tend to move slowly providing opportunities for thugs to steal. Flood induced impacts such as lake level rise have led to displacement of people as well as reduction in freshwater availability. Flood/ heavy rains were mentioned as a contributing factor to crime, because affected communities have to abandon their houses to seek refuge while others take advantage to rob and steal. Also mentioned was the fact that the rising lake levels have caused permanent closure of some schools and displacement of learners.

Poor waste management was also widely reported as a key environment issue in Kisumu caused by inappropriate waste disposal in the informal settlements. Most KIIs reported the lack of awareness and sensitization on waste management resulted in establishment of illegal waste dumping sites throughout the settlements and even the city centre. Some pointed out that waste is also responsible for blocked drainages that results in flooding on the streets during heavy rainy seasons. Various industries like the Sugar millers and Coca-Cola company were mentioned to be discharging waste into rivers which find its way into the lake resulting in the worrying trends of pollution and death of fish.

Poor sanitation remains a key environmental challenge in Kisumu mentioned from the FGDs, KIIs and from the community interviews. It was noted that majority of Kisumu residents do not have access to improved sanitation facilities, leaving majority to rely on traditional pit latrines which are often shared by many households, and many are occasionally washed during floods. The result has always been incessant outbreaks of waterborne diseases such as cholera.

Unplanned urban growth was reported to result in clearing of vegetation cover to create space development, and sometimes residents' clear sensitive natural spaces and habitats such as riparian areas which results in losses in biodiversity and natural buffers. Important Kisumu based organizations like such as SUSWATCH observed that encroachment in wetlands and riparian areas, deforestation and unregulated sand harvesting such as the one happening near Obunga and Uzima University, have directly contributed to the ongoing environmental degradation experienced in Kisumu and environs.

At last the community identified extreme temperatures and heat waves as additional impactful environmental challenge in Kisumu. It is reported that extreme heat events are increasingly becoming common with effects on agriculture and human health. Many KII noted the intricate relationship and implication of climate change and matters of nutrition and health, school dropouts, limited job opportunities, Increased Poverty and Strain on the limited resources such as water.

3.3.3 Environment and climate change analysis from Individual Interviews

Analysis of environmental change from community interviews was consistent with the data obtained from the FGDs and KIIs with the majority expressing that the environment of Kisumu is facing critical challenges ranging from pollution, poor waste management and more importantly, climate change. About 47% of the IIs respondents consider the state of environment as critical and in urgent need of attention especially on the aspects of pollution of major waterways including the lake as well as urban expansion that has resulted in encroachment into biodiversity areas such as wetlands and riparian areas. Some IIs reported that many residents have been pushed to live within very close proximities to flooded rivers which further increases their vulnerability to flooding. The study sought opinions on the state of climate change in the city as a way of assessing the impacts; about 44% indicated an increasing severity of climate change, a confirmation that climate change is a reality in Kisumu and already impacting communities. However, a significant population (26%) reported they "can't tell" any changes in climate, perhaps pointing reality to either a lack of awareness or appropriate information on climate change phenomenon. In such a case, there may be a need to undertake targeted sensitization on this segment of the community that may be unaware of the impacts of climate change. About 19% and 11% reported a decline in severity, and no change, respectively, based on their observations on climate change. When asked about their preparedness to cope with future climate shocks such as floods, an overwhelming 70% indicated that they are not well prepared to cope (Figure 29). Moreover, the study evaluated the sources of climate and disaster related information among the study participations, as this was found to play an important role in the levels of knowledge and sensitization on the issues of climate change, apparently, the traditional platforms such as radio, community meetings and mobile phone alerts remain the dominant methods of information dissemination and early warning systems for the community.

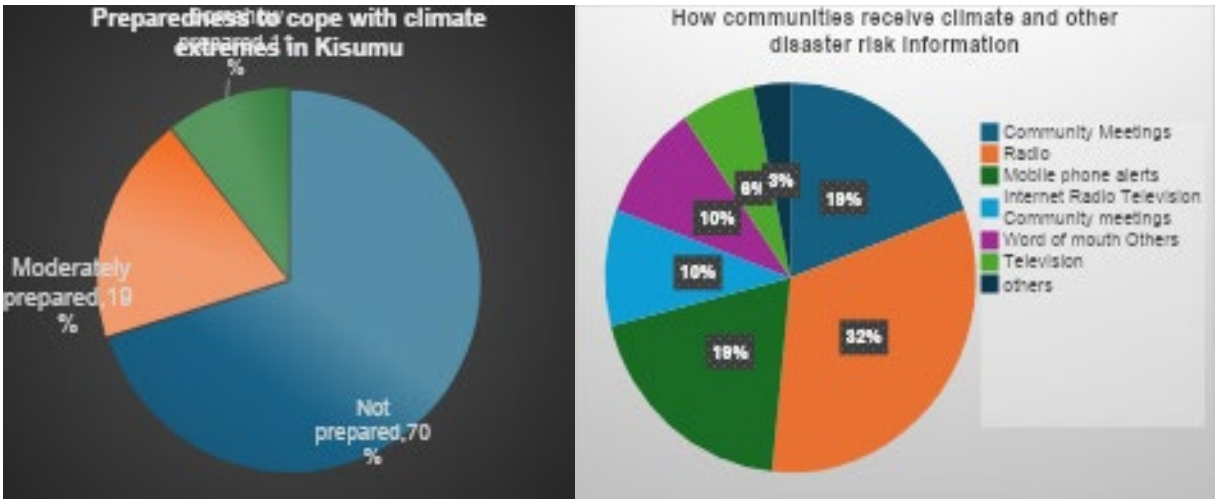


Figure 29: Showing the Preparedness to cope with Climate Extremes by the respondents in Kisumu

The environmental situation in Kisumu can be better understood from a catchment approach, for instance, most times, the flooding experienced in Kisumu originate from borderline counties such as Kericho and Vihiga. It is also important to note that Kisumu draws its waters from key rivers that drains from the neighbouring catchment, for instance, River Kajulu provides nearly half of Kisumu's waste needs supplementing the intake from the Lake, river Kajulu drains from the Nandi hills catchment. Degradation and mismanagement of the highlands have had significant impacts to Kisumu. For instance, poor agricultural practices, deforestation and excessive use of fertilizers in the highlands neighbouring Kisumu, have contributed to siltation in the rivers and the lake causing eutrophication (enrichment of water bodies with nutrients such as nitrates and phosphates) resulting in algal blooms and increased growth water weeds such as hyacinth. The community reported of instances where lake waters appear green. On the basin level, Kisumu belongs to the Lake Victoria South basin which is a catchment area covering a total area of 26 906 km2 and is the supplier of water and drainage within Kisumu and its environs, this basin is one of Kenya's most densely populated regions with an approximate density of about 250 people per km^2, and presently standing as Kenya's second highest rainfall region. Despite its environmental significance, the Lake Victoria south basin continues to face unprecedented environmental threats discussed in this report.

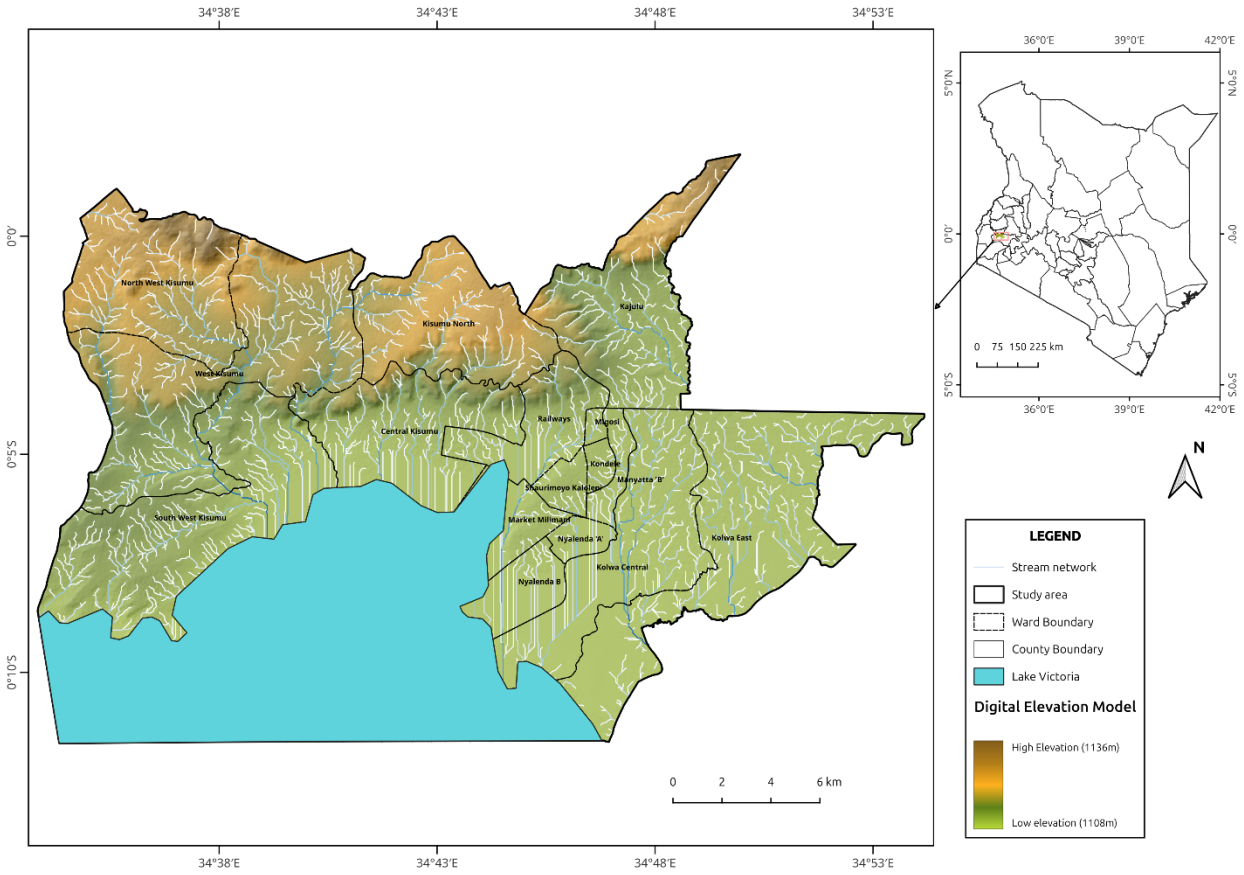
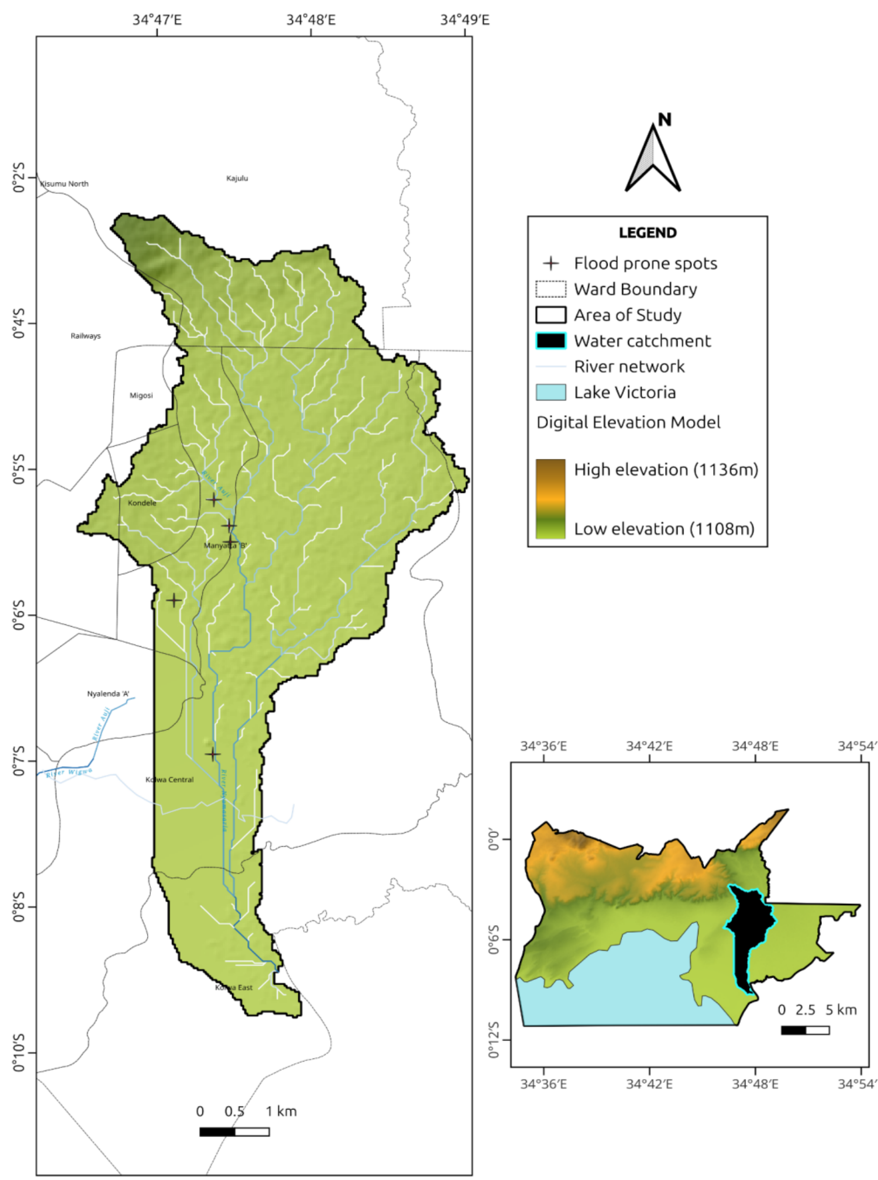


Figure 30: Digital elevation model and stream network of Kisumu Metropolitan Area

3.3.4 Assessment of environmental changes

3.3.4.1 Flood vulnerability Assessment and Risk Patterns

The topographical analysis of Kisumu City (Figure 31) shows an elevation gradient from 1136m in the northern regions while the central and southern areas, particularly near Lake Victoria, sit at lower elevations (1108m). This elevation difference creates a natural network of rivers and streams that channel runoff downhill. The relatively flat terrain of Kisumu city's low-lying regions amplifies the risk of flooding, particularly during periods of heavy rainfall, as water accumulates with limited natural drainage intersects with human settlement.


34°47′E
34°48′E
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0°2′S
0°4′S
0°5′S
0°6′S
0°7′S
0°8′S
0°10′S
0 0.5 1 km
N
LEGEND
Flood prone spots
Ward Boundary
Area of Study
Water catchment
River network
Lake Victoria
Digital Elevation Model
High elevation (1136m)
Low elevation (1108m)
34°36′E
34°42′E
34°48′E
34°54′
0°0′
0°6′S
0°12′S
0 2.5 5 km

Figure 31: *River Auji Catchment Delineation*

A key aspect of this flood vulnerability is captured through the watershed delineation of the River Auji catchment (Figure 32), which drains into River Wigwa. Heavy rainfall upstream results in increased runoff downstream, overwhelming areas like Kapuothe in Nyalenda B ward. River Wigwa, historically a smaller stream, now struggles to manage the growing water volumes due to climate variability. Additional stressors such as waste disposal and the unchecked growth of aquatic weeds obstruct the river's flow, leading to stagnant water and reduced drainage capacity.

The demographic analysis of these flood-prone areas reveals that approximately 65% of residents earn between 5,000-20,000 KES monthly, indicating a concentration of low-income households in high-risk zones. This economic vulnerability is further evidenced by the spatial distribution of affected populations, with Nyalenda A and B wards together hosting 50% of flood-prone 64 residents. From primary data collection, respondents identified critical infrastructure at risk, with 50% reporting schools as vulnerable to flooding, followed by health facilities (31.6%) and water sources (18.4%). This perception aligns with the flood inundation map (Figure 32) documenting flood occurrence during the heavy rainfall that occurred in Kenya, March-June 2024, which shows multiple schools and healthcare facilities located within or adjacent to flood-prone zones.

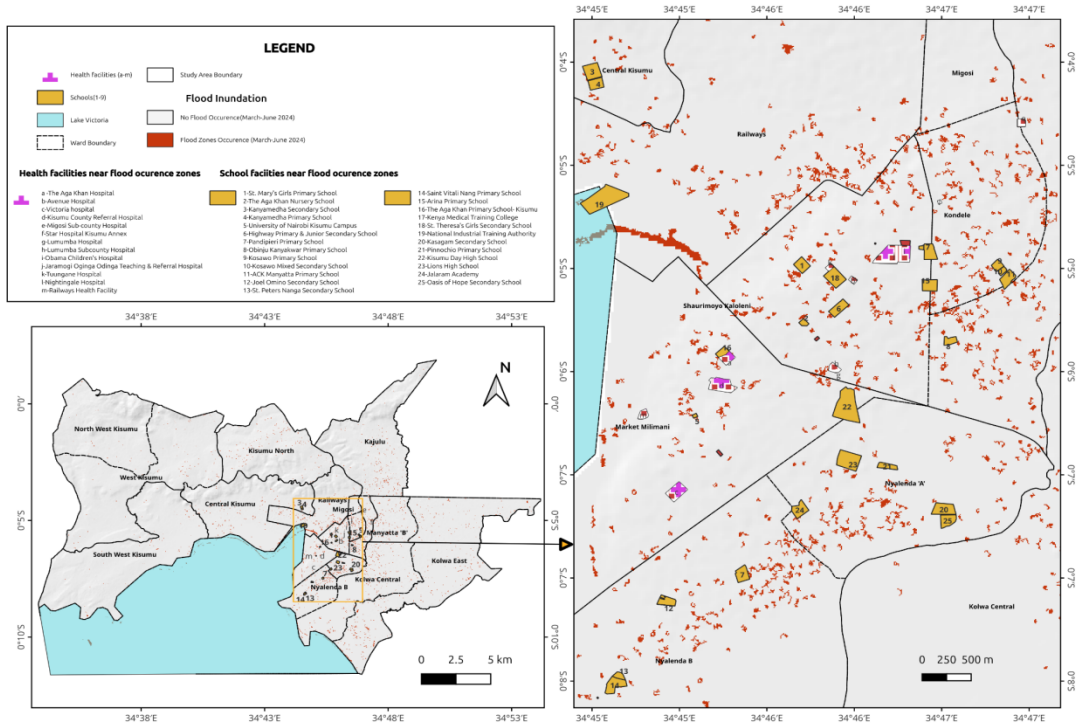

Figure 32: Spatial distribution of vulnerable facilities near flood occurrence zones from May-June 2024

A detailed case study of the Kapuothe area in Nyalenda B ward exemplifies these interconnected issues between climate change and population pressure which drives housing demand and eventually changes in settlement patterns. The area demonstrates a significant violation of environmental regulations, with settlements encroaching on the 30-meter riparian buffer zone of River Wigwa (see Figure 33 and 34 below), contrary to EMCA 1999 and the Physical and Land Use Planning Act 2019.

Figure 33: Settlements right next to River Wigwa

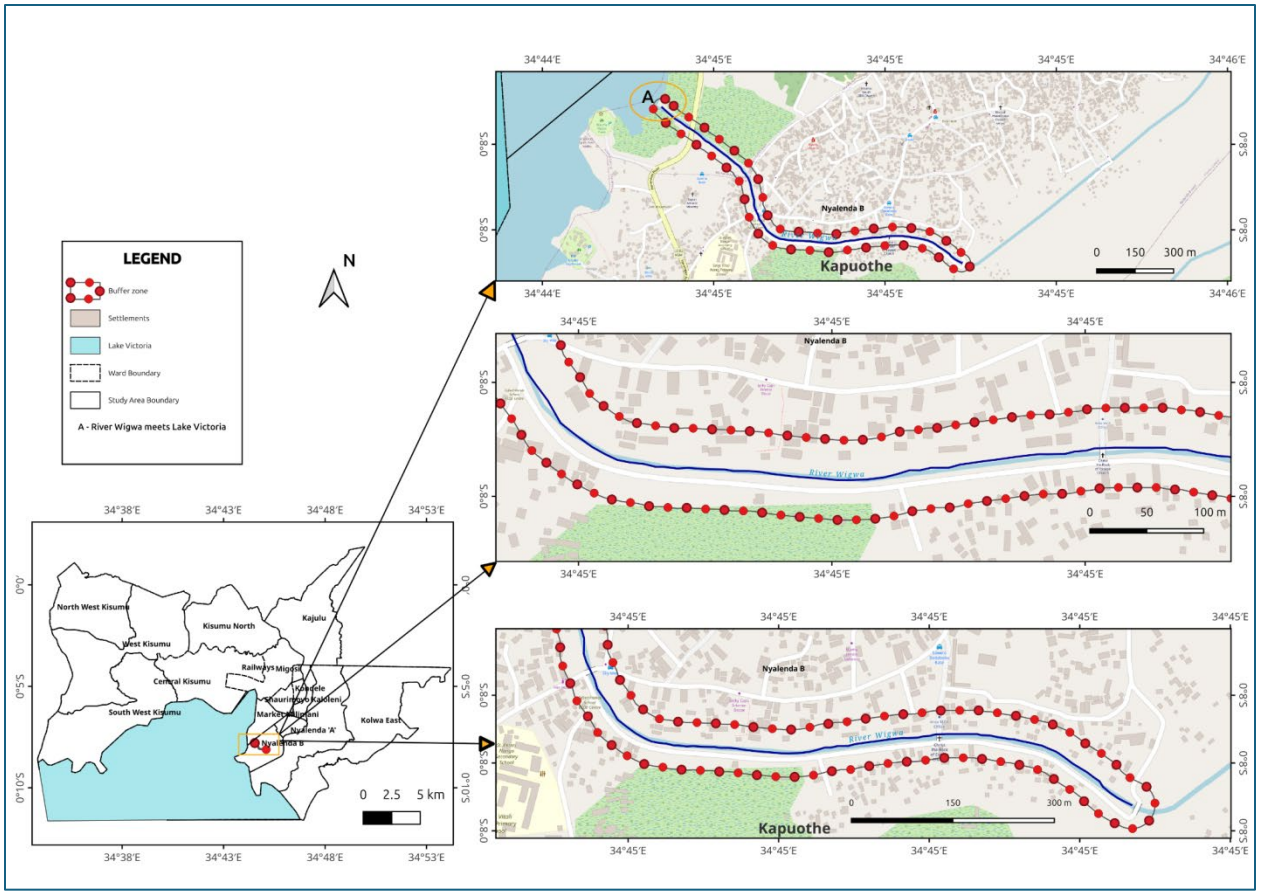

Figure 34: River Wigwa Buffer Zone and the sprawling settlements in the buffer zone

This urban expansion encroachment results in a settlement pattern characterized by poor drainage infrastructure and improper waste disposal, transforming natural flood buffers into hazard zones (see figure 35 below). This situation holds particular significance as River Wigwa feeds into Lake Victoria, linking local environmental degradation to broader ecosystem impacts. The visible encroachment along riverbanks highlights settlement patterns shaped by rapid urban expansion. Accumulation of garbage along riverbanks not only diminishes the river's capacity to channel water but also contributes to

water pollution. Many of the residents are original landowners whose ties to ancestral land prevent them from relocating, despite the recurring risks. Historically, flooding may have been less severe, as River Wigwa was likely smaller and easier to manage. However, changing rainfall patterns, driven in part by climate variability, have led to an increase in extreme rainfall events that overwhelm the river's capacity.

In response to the rising water levels, local authorities have attempted to dig trenches to divert the excess water in order to mitigate flooding. Field observations and community narratives reveal that during heavy rains, long-term residents are temporarily displaced but return once floodwaters recede owing to inability to afford alternative housing and their unwillingness to sever ties with ancestral land.

Figure 35: Trench dug by the County Government in Kapuothe to redirect overflow from River Wigwa

At the same time, population growth has intensified pressure on Kapuothe's limited land resources. The demand for affordable housing has resulted in a cyclical pattern of displacement. Long-term landowners, aware of the seasonal flooding, rent out

properties during dry periods to new settlers unaware of the risks. When the rains arrive, these tenants are displaced, only for the cycle to repeat itself as new renters move in. Meanwhile, population growth has intensified settlement pressures in Kapuothe. The influx of new residents seeking affordable housing has led to a cyclical displacement pattern. Landowners, aware of the seasonal flooding, rent houses to new settlers during the dry season. However, when heavy rains arrive, these residents are displaced, only for the process to repeat itself. This cycle of temporary settlement and displacement highlights both the economic vulnerability of residents and the lack of proper land-use planning and flood mitigation infrastructure.

3.3.4.2 Land Use and Land Cover

Land is an important factor of production and agriculture as well as urbanization. Kisumu city in an area where land ownership is both communal, private as well public. As the city expands, land ownership sometimes shifts from one form to the other. Land use and land cover analysis spanning 1999-2024 reveal a rapid urban transformation in Kisumu City from 1999 to 2024 (Figure 36). The built-up area increased from 188.8 hectares in 1999 to 2760.1 hectares in 2024, most notably in Nyalenda, Manyatta, and central wards. This expansion occurred alongside a significant decrease in vegetation cover from 23,767.8 to 4,603.9 hectares, while farmland increased from 3,262.1 to 28,767.2 hectares (Figure 37). This growth may be attributed to a rise in urban agriculture as residents adapt to food security challenges, particularly in informal settlements. Additionally, peri-urban areas may have witnessed intensified agricultural activities due to population pressure and the need for sustainable livelihoods. Tree cover showed notable fluctuations, reaching its peak in 2019 before declining in 2024. The classification achieved high accuracy across all periods, with overall accuracy ranging from 86.25% to 93.55% and Kappa coefficients from 81.6 to 91.3, indicating reliable detection of these land use changes.

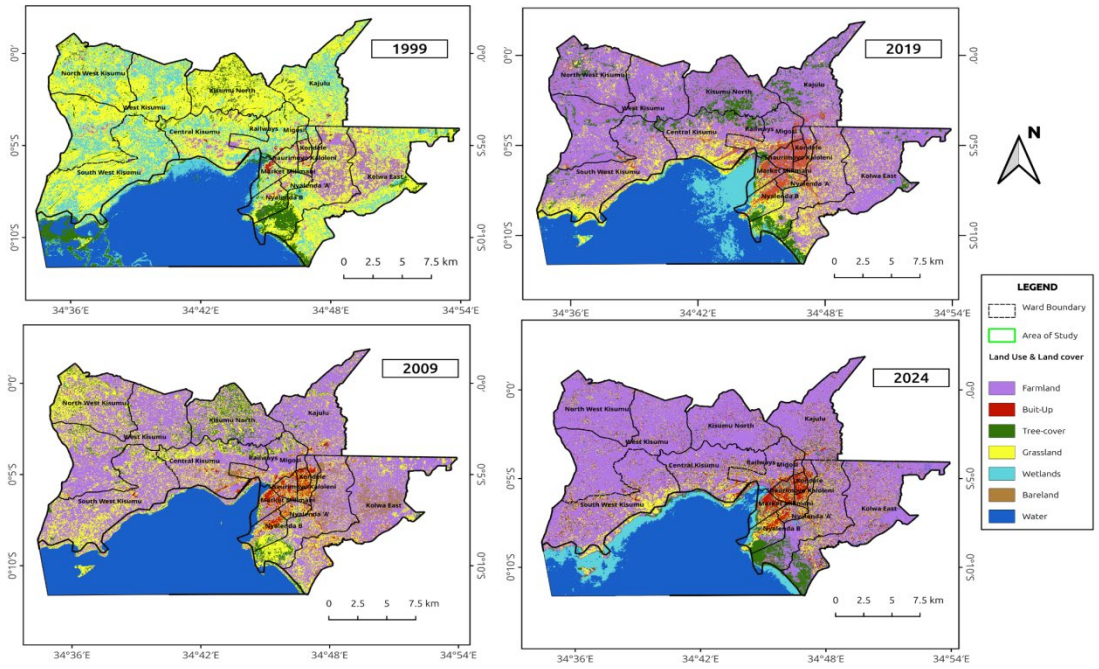

Figure 36: Land use and land cover in Kisumu City 1999-2024

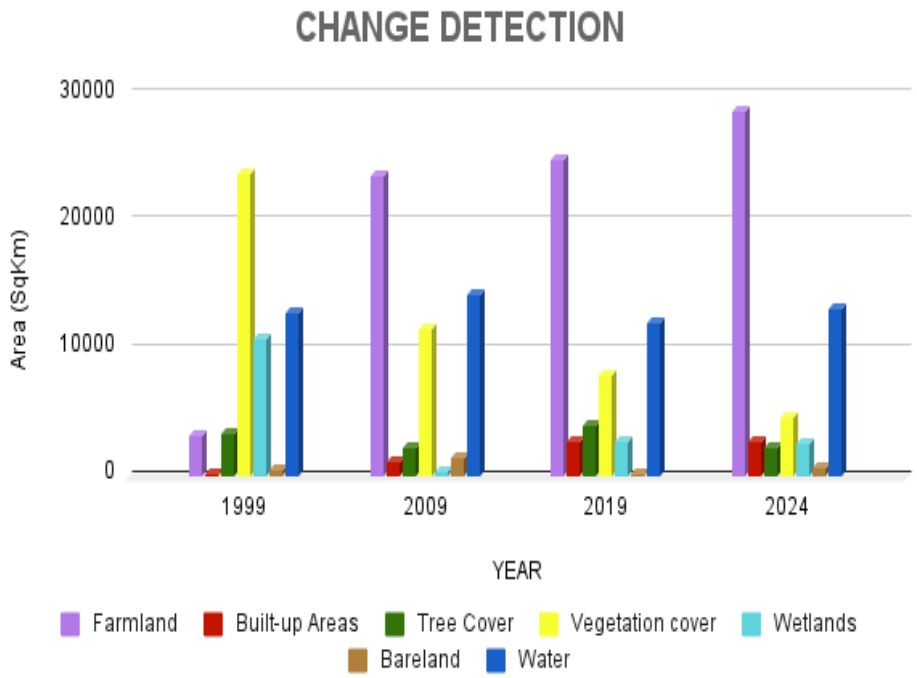

Figure 37: Land use and land cover changes in Kisumu City 1999-2024

To better visualize urban expansion patterns, the LULC classes were reclassified into built-up and non-built-up areas. This binary classification clearly shows the spatial progression of urban development, with initial concentrated settlements in 1999 primarily in Manyatta B and surrounding areas. By 2019 and 2024 showed intensification of urban development, particularly in Railways, Shauri Moyo Kaloleni, and spreading into previously non-built areas.

Urban expansion is often intricately linked to population growth, with increasing population densities driving the need for more residential, commercial, and infrastructural development. The results confirm the intertwined nature of population dynamics and urban development. Initially, in the early 2000s, the population density was relatively low, and built-up areas

constituted a small proportion of the total land area. However, as time progressed, particularly between 2010 and 2025, both population density and the percentage of built-up areas surged significantly. The sharper rise in built-up areas compared to population density in the later years suggests an intensification of urban expansion, potentially outpacing population growth. This could be attributed to the densification of urban areas, infrastructure development, and the conversion of non-built-up areas to accommodate the growing urban population.

3.3.4.3 Urban Heat Islands (UHI)

The consistent urban expansion highlighted not only influences land use but also has significant implications for the urban microclimate, as evidenced by the Land Surface Temperature (LST) analysis. The analysis provides insight into the urban heat island (UHI) effect and its temporal evolution across Kisumu City. LST patterns show notable changes from 1988 to 2024, with high-temperature zones becoming more pronounced in densely built areas such as Manyatta and Nyalenda. While 2024 shows generally lower temperatures compared to 2019 across much of the study area, the most urbanized zones maintain elevated temperature levels (Figure 38).

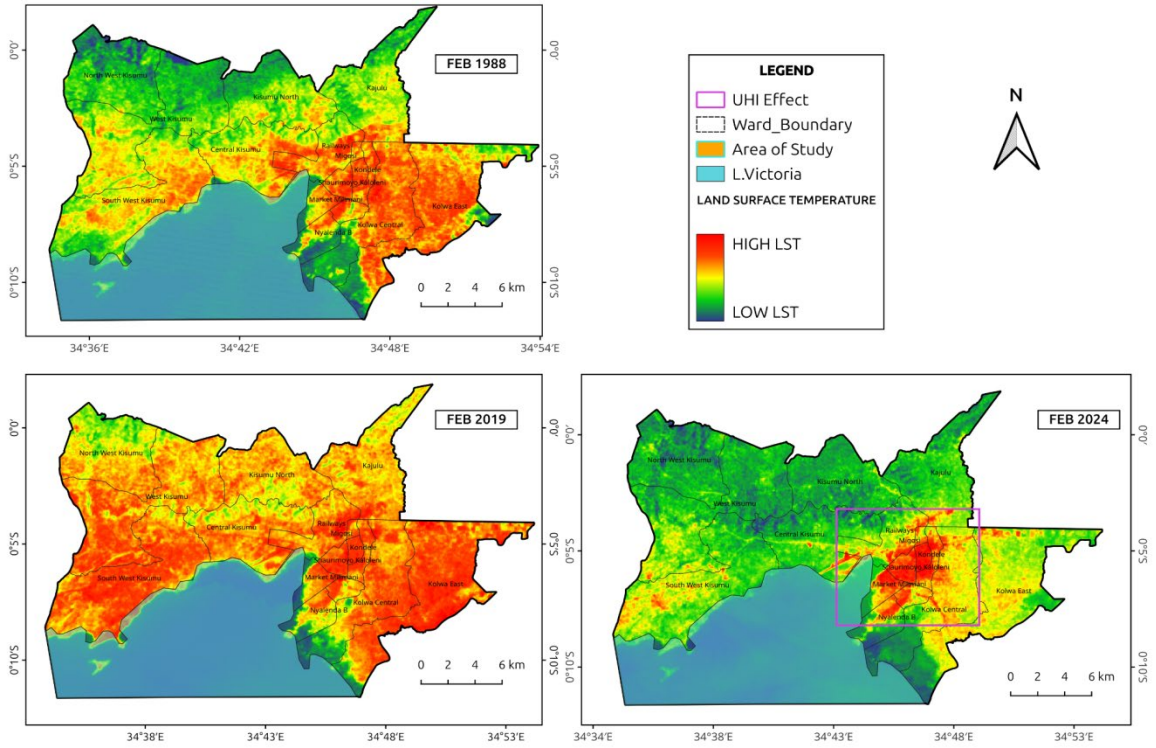

Figure 38: Land Surface Temperature (LST)

3.3.4.4 Baseline and projected Rainfall and Temperature changes

Analysis of temperature and rainfall patterns in the future suggest a general increasing trend in the past 30 years for Kisumu. there was a slight increase in both temperature and rainfall. As can be seen in figure 3.40, both T_{min} and T_{max} have increased from about 16.8˚C and 29.6˚C in 1990, to peak at about 17.1˚C and 31.2˚C in 2020 respectively, showing a significant temperature rise (Figure 39). For rainfall, there is a slight increase from about 1250mm annual precipitation in 1990 to peak at about 1400mm annual totals in 2020, an increase of about 150 mm annual average within the 30-year period. From this analysis, there is an indication that both temperature and rainfall may intensify within the lake basin and Kisumu in general. It

is noteworthy to say that increased rainfall around the lake basin has been pointed out in various literature including in the IPCC report that identify the lake basin of regions one of those that may experience intense rainfalls going into the future (Lyon *et al.,* 2017). Perhaps, this may be a sounding call and a clear communication on the need to plan for and prepare adequately for worse scenarios besides boosting community adaptation and resilience programs.

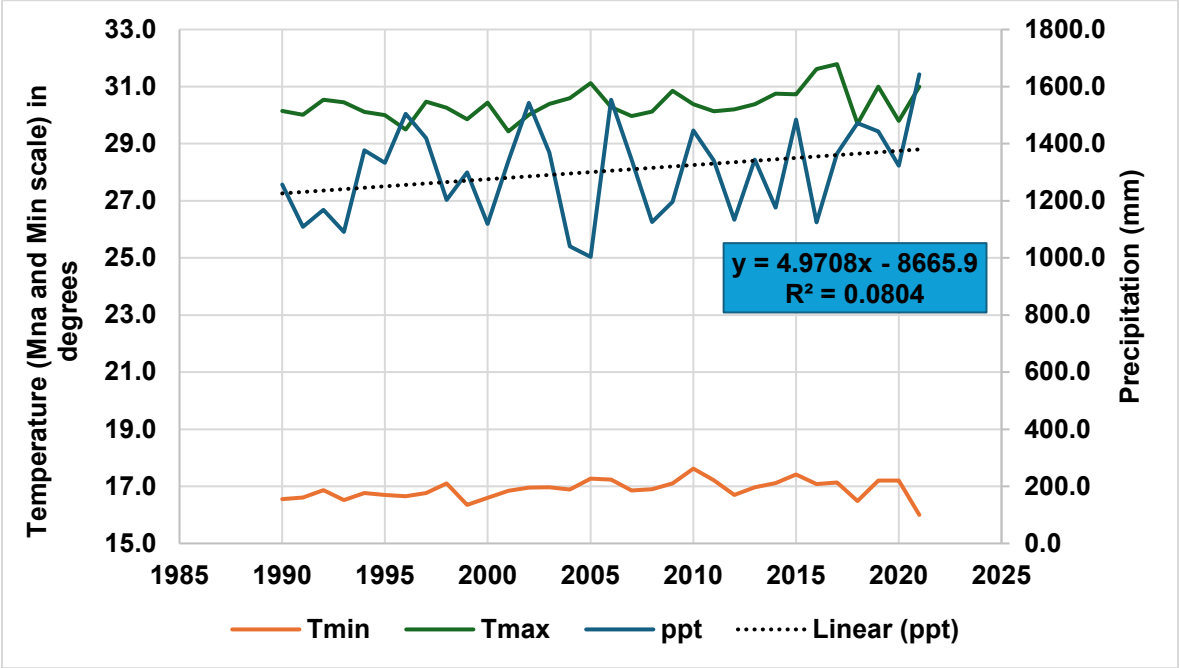

Figure 39: Analysis of temperature and rainfall pattern

Observations made on the lake level trends (Figure 40), from literature, show that the lake level rise which, even though affected by diverse factors, may be closely linked to the observed recent increases in rainfall in the regions. Between 2006 and 2020, the lake levels rose by a considerable margin of over 2m. This is a significant height considering that some settlements in Nyalenda B are barely 2m above lake levels or less.

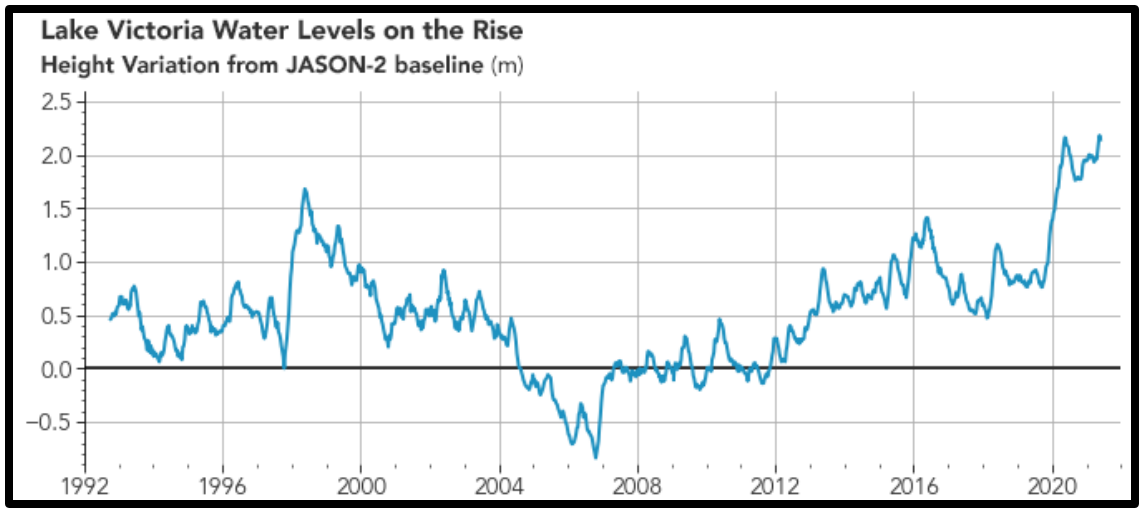

Figure 40: Water level Rise in Lake Victoria

During the period 2019-2020 (Khaki et al, 2021), Lake Victoria water levels rose at an alarming rate that has caused various problems in the region.

The rainfall patterns already communicating somewhat increased precipitation trends, and the study explored an analysis to assess the potential of storm return periods. Return periods usually show the extent to which a given damaging storm or flood will return in the future, it is a hydrological metric used occasionally to plan for flood defences and flood preparedness. Figure 41 shows the rainfall (storm) frequency return period calculated for a 50-year future period ending in 2050. The storm discharge rates have been calculated for daily amounts. The return period is plotted on a log curve to linearize the graph. The results show that the storm discharge rates for the baseline period were higher than the projected time periods. For instance, about 11-12 mm rainfall per day has a return period of 3 years, which means there is a possibility of Kisumu receiving rainfall worth 12mm every 3 years in Kisumu. This is quite significant considering the elevation and the fact that the city is relatively plain with flat topography, so much of this water will translate into flood storms. Perhaps planning for better drainage plans and widened drainage channels may be the policy priority based on these findings.

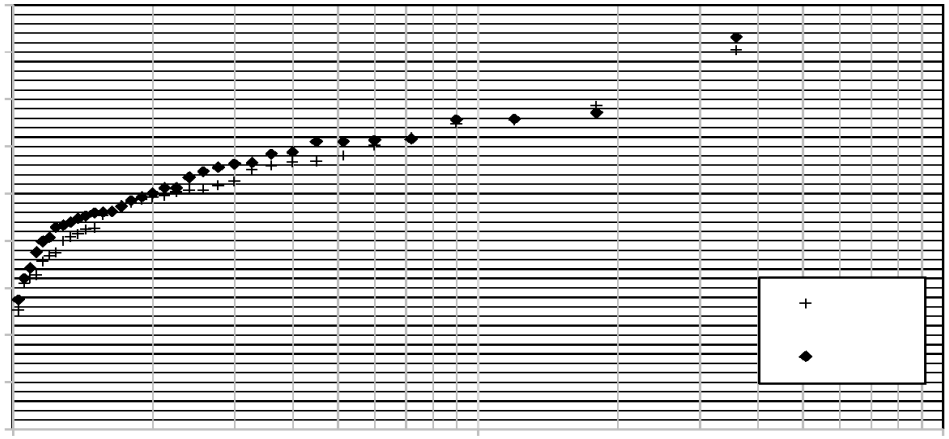

Figure 41: Rainfall Frequency

1.4 CROSS CUTTING ANALYSIS

3.4.1. Analysis of drivers of change, challenges and recommendations

The following table highlights some detailed analysis of key driver of changes and recommendations collated from the study.

Table 5: Analysis of Migration, Climate change and Insecurity to Kisumu: Drivers, Challenges, and Solutions

Risk	Key Drivers	Extent of Impact	Key Recommendations	Key Actors Mapped
Migration	• Unemployment in rural homes which forces people to move into the city to look for employment opportunities • High Poverty rates in the rural areas makes people move into the city with the hope	• Early pregnancy especially in the informal settlements where school going children are more vulnerable • Increase in diseases i.e. STIs and waterborne diseases which results due to poor sanitation,	• Enforcing Nyumba Kumi & Community Policing • Making migration smoother and more secure for newcomers and for easier	• Chief / National Admin • Police • Government Departments

	of getting a better life • Seeking Greener Pastures: Individuals migrate to Kisumu for better living conditions and economic opportunities, aiming for improved livelihoods and enhanced quality of life. • Job Transfer: Professionals relocate to Kisumu for new positions, contributing to local skills diversity and filling gaps in the labor market. • Social Media Influence: Online platforms highlight Kisumu's opportunities, attracting migrants who seek vibrant communities and potential for economic growth through shared experiences. • Political stability. Investors and businesspeople are always attracted in establishing their business within the city when there are political stability as was experienced during the "handshake" while on the other hand whenever there are political instability, investors and business persons run away • Social media influence •	unclean and unsafe water and poor waste disposal practices • Influx of street families as people moving into the city miss to find jobs and therefore can't afford the basic needs	recognition of the criminal elements within the Nyumba kumi • Encouraging self-employment to help migrants integrate and contribute positively to the local economy. • Identification and verification of the origin of newcomers before they are able to disperse and settle amongst people • Government to regularize fishing activities to know who is involved and also establishment of police posts along the beaches so as to maximize security. • There should be encouragement of investment in businesses run by women to help them increase their income so that they avoid sex for fish. • The government should impose rigid rules against drug abuse. •	• Churches/religious orgs. • National & County government • KEMRI CDCS • Community policing (Nyumba kumi) • Immigration office • Kenya National Bureau of Statics (KNBS) •

Environmental Degradation & Climate Change	• Industrial pollution from factories • Poor waste management • Deforestation • Overcrowding • Encroachment of riparian land • Poor drainage system • Non-gazzetement of important ecosystems like wetlands	• Loss of biodiversity and critical environmental hotspots • Causes respiratory infections and lung diseases • Inadequate waste disposal causes soil and water contamination, promoting health hazards and environmental decline • Charcoal burning contributes to air pollution and deforestation, harming ecosystems and human health. • Low Productivity in agricultural products as lands losing their value • Burning of fossil fuels Releases greenhouse gases, increasing atmospheric CO2 and contributing to global warming. • Overpopulation Expands resource consumption and waste production, straining ecosystems and increasing emissions. • Deforestation Reduces carbon absorption, releasing stored CO2 and disrupting local climates. • High rate of environmental degradation deteriorates ecosystems, reducing their ability to sequester carbon and maintain climate balance. • flooding • Death of Seasonal revers	• Promotes green spaces and sustainable infrastructure, reducing pollution and conserving natural resources. • Strengthening regulations protects ecosystems, ensuring compliance and accountability in environmental conservation efforts. • Minimizes landfill use and pollution, promoting recycling and reducing the environmental impact of waste. • Creation of awareness e.g. holding community dialogue sessions • Capacity building and training • Public private partnership on environmental conservations. • Encouragement of urban agriculture. • Coming up with community information centers on environment and climate change.	• Cabbage Collectors • SHOFCO CBO • UDS • PALAWAMA • Fresh life • DECYTA • KWS • TICH KOUMA • Eco Tourism Dunga • County Fisheries • NEEMA • Friends Of L-Victoria (OSIENALA) • Kenya Met • KIWASCO • Private & Public waste management companies • Digital Alert of Alert • Jaramogi Oginga Odinga University

		• Destruction of Ozon layer • Drought & Surge in respiratory diseases • Unpredicted weather Patterns	• Funds for clean-up activities should be issued directly to the locals. •	• • Center for Environment and Climate Justice • • Wheel 4 tree
Insecurity	Unemployment, increased pressure on natural resources, drug and substance abuse, high illiteracy levels, peer pressure, poverty, gender discrimination as well as bad political and poor governance. • Poverty • unemployment • Drug and substance abuse (bhang, miraa, cocaine) • Peer pressure • Lack of parental guide • Poor mental health (Trauma & anxiety)	• Rape • Absence of parental support can result in poor decision-making and vulnerability to negative influences, increasing community insecurity • Poverty limits access to basic needs, fostering hopelessness and fear, leading to insecurity as individuals struggle to survive. • unemployment increases frustration and desperation, driving individuals toward crime and unsafe behaviors for economic survival • Substance abuse impairs judgment and increases criminal behavior, leading to instability and insecurity in communities. • Peer pressure can lead individuals to engage in risky or criminal activities, exacerbating insecurity as norms shift toward deviance	• **Strengthening Nyumba Kumi & Community Policing** • Enhances community trust and cooperation, allowing proactive crime prevention and quicker response to security issues. • **Construction of Police Stations/Post** • Increases police presence, improving response times and deterring criminal activity in vulnerable neighborhoods. • **Enforcing Laws on Drug and Substance Abuse/Sell** • Reduces drug-related crime and addiction, fostering safer communities and encouraging healthier lifestyles.	• Kenya Police • Chief • Church/religious orgs • Pamoja Trust & Unmade trust • Security firms • Community Policing • Faith based organizations • Self Help groups • Social Justice Center • National Government Administrative Officers • Crime Si Poa • Independent

			• **Provide Employment Opportunities for Young People** • Engages youth positively, reducing idle time and potential involvement in criminal activities through programs like Kazi Mtaani. • **Spiritual Intervention** • Promotes moral values and community cohesion, providing guidance and support to individuals at risk of engaging in crime. • **Provide Formal Education** • Enhances skills and knowledge through programs like TVETs, empowering individuals and reducing vulnerability to crime and insecurity.	Policing Oversight Authority • Directorate of Criminal Investigation

3.4.2. Analysis of Historical events and timelines

The community enumerated some memorable events that form art of the historical events around migration, climate change and environmental degradation as well as security. Some of these historical events have shaped the growth and changing perspectives of Kisumu, for instance the declaration of city status for Kisumu in the 2001 pronounced a new dawn in the city consequently attracting more people into the city. Again, during the post-election violence in 2007/8, many people moved in while other, especially from non-local communities migrated to other cities and towns.

Table 3.4: Historical Risks and Crisis in Kisumu: Impacts and Community Memory

Risk	Year crisis/event was more pronounced	How event/crisis is remembered by community
Migration	2000	Centenary celebrations Centenary celebration Kisumu becoming a city Trees planted at sports ground
	2007-2008	Tribal conflict Retrenchment of people Loss of lives The increase in the number of street families Theft Destruction Displacement of people
	2008-2009 after handshake/GCG	Increased job opportunities Handshake Improved infrastructure
	1997 2024	Floods Destruction of properties by el-Niño Death/ loss of lives Excess fish in Lake Victoria
	2017	Establishment of marine schools Creation of employment
	2020	Corona virus Establishment of corona market
	2023	Dying of fish Afri-Cities Conference- people came to Kisumu
Environmental degradation	2008-2009 2005- flooding	Construction of the bypass led to displacement of people

	2022-drought	Harvesting marram soil Loss of lives and properties Loss of livelihoods Migration in search of pasture for livestock
	2024-2025	Construction of Obunga –Kisat road. Construction of roads and drainages
Insecurity/crime/VE	2021	Fear and threats Covid-19
	2007-2008	Post-election violence Tribal clashes Loss of lives Displacement of the people Economic losses
	2019-2020 conflicts	Loss of sources livelihoods Rise in the cost of living
	2022	Loss of lives Tribal clashes Economic losses
	2024-anti-finance bill GenZ demonstrations	Death Displacement Economic losses Tribal clashes

3.4.3. Photovoice Recording

Photovoice recording is the art of communicating community stories using photos and or mini videos. In this study photovoice recording was undertaken using six community members who were specially chosen from the community and based on their willingness to participate in the exercise. The six participants were drawn from the low-income settlements of Nyalenda, Manyatta, Obunga/Nyawitta, Nyamarais, Dunga Beach, and Kogony/Mlimani to align with the study area. After their selection, the photovoice participants were inducted and trained on how to approach the process, they were then issued with mobile devices of good camera qualities for use in the photo recordings. Each participant was instructed on the types and how to collect photos within a duration of 14 days. After the 14 days, a photovoice workshop was organized that brought together the photovoice participants and the project team for an opportunity to present and talk about their photos and the stories accompanying each photo to the plenary. From the population

of photos received from the six participants, a sample group of 54 photos were selected to represent the bigger picture and the underlying social and economic issue from the city in line with the underlining the overarching questions of the study. The stories were compiled in a photovoice sub- report sent separately.

Figure 42: Photovoice participants engaging during the photovoice workshop meeting

3.4.4. Analysis of the Kisumu County efforts and interventions in addressing research problems

Kisumu City has taken several steps at addressing the complex interconnected challenges of climate change, migration, and insecurity, though gaps in scale and integration remain.

On climate adaptation, the county has developed a County Disaster Management Policy and launched initiatives such as the "3 million Trees" campaign to restore green covers and improve microclimates. It is piloting waste-to-energy projects including converting water hyacinth into biogas as a way of reducing pollution and providing alternative energy. Kisumu residents have recognized the value of locally led adaptation planning to manage climate change faced by communities and Indigenous peoples.

However, environmental enforcement remains weak, as seen in continued encroachment into wetlands and poor waste management in informal settlements.

Regarding urban migration and settlement upgrading, the study established that Kisumu city has implemented the Kenya Informal Settlements Improvement Project (KISIP), supported by the World Bank, to improve tenure security, drainage, and basic services in slums. The earlier Kisumu Urban Project (KUP) also aimed at infrastructural uplift. Yet, rapid urbanization continues to outpace planning, leading to unregulated settlements in flood-prone zones.

Beside these efforts, Kisumu city has also created an enabling environment for enhancing investor confidence and positive migration influences as well continuous sensitization of populations on the benefits of friendly urban development practices. The city also engages in regional cooperation through the Lake Region Economic Bloc to manage cross-border environmental and migration issues, but implementation is still nascent. Overall, Kisumu's efforts reflect awareness and emerging governance structures, but a more coordinated, multisectoral strategy is needed to break the climate-migration-insecurity cycle effectively.

CHAPTER SUMMARY AND KEY TAKE AWAYS

The report presents a comprehensive analysis of migration dynamics, insecurity, and environmental changes in Kisumu City, Kenya, based on surveys, Focus Group Discussions (FGDs), Key Informant Interviews (KIIs), and spatial assessments in the light of the changing urban demographic factors. Conducted in settlements like Manyatta, Nyalenda, Obunga, and Mlimani, the study highlights interconnections between climate change, urban migration, and security challenges.

The study sample was gender-balanced and inclusive of the underrepresented groups such as people living with disabilities, women and youths. Livelihoods across Kisumu centered on business (52%), casual labor/formal employment (14%), and farming (8%). Informal activities like street vending were noted, often stigmatized but vital for migrants. Income disparities were stark where most earned below 5,000 KES/month, especially in slums like Manyatta A and Obunga, while Mlimani had higher earners. Slums correlated with vulnerability to environmental risks and insecurity.

The study established that migration drives Kisumu's growth, fueled by economic opportunities in business, fishing, education, and manufacturing. About 43% of residents were born outside Kisumu, mainly from rural Kisumu County like Muhoroni, Nyakach and, Seme and neighboring counties such as Siaya and Homa Bay. Cross-border migrants from Uganda, Burundi, Rwanda, and DRC engage in vending, fishing, and jewelry trade, often undocumented via beaches. Environmental factors like flooding and lake level rise like the one observed recently in 2021 displace rural populations, exacerbating overpopulation, unemployment, and informal settlements. Positive impacts include new skills (e.g., new fishing nets making skills) and economic boosts, but negative cultural impacts also predominate including gender-based violence, crime and transactional sex popularly known as "sex-for-fish" or Jaboya system" whose ultimate outcomes are skewed business opportunities for women.

Insecurity is on the rise in Kisumu manifesting in various forms including theft, robbery, murder, GBV and are linked to unemployment, poverty, drug abuse, and migration. Youth and boda-boda operators are implicated, with hotspots in dense slums. Population density correlates with insecurity with overpopulated slums being the hotspots. The main vulnerable groups insecurity remains women and children.

The climate and environmental change particularly increased flooding, lake level rise, and land degradation are key drivers of rural-to-urban migration. Environmental shocks displace communities, especially from low-lying and riparian areas, pushing them into the

city in search of safety and livelihoods. This influx intensifies urban pressures, leading to overcrowded informal settlements, strained resources, and heightened unemployment.

Migration, in turn, exacerbates urban insecurity. Competition over scarce jobs and housing, combined with widespread poverty and a large youth population, fuels crime, substance abuse, and gang activity. Undocumented cross-border migrants further complicate security, with some engaging in or being vulnerable to exploitation, illegal fishing, and gender-based violence.

The result is a reinforcing cycle where environmental stress prompts migration, migration intensifies urban insecurity, and insecurity deepens socio-economic vulnerabilities, making residents more susceptible to climate impacts. This complex interlinkage highlights the need for integrated policies that address environmental management, sustainable urban planning, livelihood creation, and community-based security to build resilience in Kisumu.

CHAPTER 4: CONCLUSION & RECOMMENDATIONS

4.1 CONCLUSION

In conclusion, this report illustrates a deeply interconnected and self-reinforcing nexus in Kisumu, where climate change, migration, and urban insecurity form a cyclical crisis. Search for economic opportunities and environmental factors primarily manifested through intensified flooding, lake level rise, and encroachment and destruction of biodiversity hotspots act as critical push factors, displacing rural and peri-urban populations and driving them into the city. This influx accelerates unplanned urban growth, straining inadequate infrastructure, housing, and public services, particularly in informal settlements.

The resultant urban pressure significantly exacerbates insecurity in Kisumu city, especially in informal settlements. Competition over dwindling economic opportunities and resources, combined with widespread youth unemployment and social fragmentation, fuels a rise in crime, gang violence, gender-based exploitation, and substance abuse. The situation is further complicated by undocumented cross-border migration, which challenges law enforcement and creates vulnerabilities to criminal infiltration and exploitation, especially in the fishing industry. The impacts are profoundly gendered, disproportionately burdening women with increased workloads, exposure to transactional sex, and heightened risks of gender-based violence.

While Kisumu County has initiated commendable standalone interventions such as disaster management policies, slum upgrading projects, and community policing, the report underscores that these measures remain fragmented and insufficient. The study acknowledges the urgent need for integrated policy approach that simultaneously strengthens climate resilience through catchment-based environmental restoration, creates inclusive urban planning and livelihood opportunities, enhances community-led security mechanisms, and fosters regional cooperation. Only through such a holistic and coordinated strategy can Kisumu build sustainable urban resilience, safeguard its vulnerable populations, and chart a path toward secure and equitable development.

4.2 RECOMMENDATIONS

The following key recommendations are developed from this study

4.2.1 RECOMMENDATIONS ON INSECURITY

Deliberate efforts to enhance Urban Safety & Insecurity Prevention Policy

- The police department of Kisumu to establish permanent police posts in all high-density informal settlements and at major beaches such as Dunga beach with 24-hour patrols. With the police stations close to the communities, it would be easier to undertake intelligence gathering, reporting and engage community much closely and track incidences of criminality more effectively.

Creating forums /platforms for community-police engagements

- The Kisumu city regional security authorities to encourage community-police collaboration and regular meetings with chiefs and police to report and combat insecurity may enhance trust and accountability among locals. On the other hand, by actively engaging with local authorities and demanding accountability, communities can ensure that public services are effectively delivered, enhancing safety and security.

Economic Empowerment for Vulnerable Groups, Especially Women and Youth

- The county government of Kisumu to address unemployment, poverty, and gender-based vulnerabilities by encouraging self-employment, investing in women-led businesses, and providing youth employment opportunities through programs like Kazi Mtaani. This would reduce reliance on stigmatized livelihoods, curb early pregnancies and STIs in informal settlements, and mitigate insecurity driven by idle youth and economic desperation.

Foster Education, Spiritual, and Institutional Interventions to Build Social Cohesion

- A multi-sectoral group under the county government of Kisumu to provide civic/formal education and spiritual interventions through churches to address root causes of insecurity like drug abuse, peer pressure, and poor governance. Empowering communities and stakeholders with civic education on matters such as climate change and migration, enabling adaptive resilience strategies and reducing social tensions from overpopulation and resource competition.

4.2.2 RECOMMENDATIONS ON ENVIRONMENTAL AND CLIMATE CHANGE

Climate Change Adaptation & Disaster Risk Reduction Policy

- Operationalize the Kisumu County Disaster Management Policy and its comprehensive recommendations including the proposed catchment-level interventions with upstream counties (i.e Kericho, Nandi) for reforestation, terracing, and gulley rehabilitation to reduce siltation and flash floods into Kisumu. While at the same time enhancing an early-warning system to affected communities linked to Kenya Meteorological Department.

Enforce Riparian Protection and Relocate Flood-Prone Settlements

- The county government of Kisumu to strictly Enforce the 30-metre riparian reserve along all rivers and Lake Victoria shoreline (strictly implement EMCA 1999 and Physical and Land Use Planning Act 2019) with immediate eviction and relocation support for structures in flood plains (especially Kapuothe, Nyalenda B, Obunga, Nyamasaria). The county government of Kisumu should mandate climate-risk screening for all new settlements and infrastructure projects while at the same time fast-track completion of stormwater master drainage plan for Kisumu City with widened channels and retention basins.

4.2.3 RECOMMENDATIONS ON MIGRATION CHALLENGES

Managed & Regularized Migration Policy on Migration and Settlement

- To manage the negative impacts of rapid migration such as increased crime, undocumented arrivals (e.g., at beaches), and population pressure in slums like Nyalenda and Obunga, the study recommends enforcement of Nyumba Kumi initiatives, verify newcomers' origins, and regularize activities like fishing. This includes establishing police posts along beaches and making migration smoother for legitimate newcomers to reduce criminal hideouts and promote cohesion.
- Regularize beach and lake-front settlements: issue temporary occupation licences, register all boats and fishermen (including migrant fishermen), and phase out illegal fishing nets introduced by cross-border migrants.

Governance & Institutional Coordination

- The county Government of Kisumu to form a Kisumu Climate-Migration-Security Taskforce chaired by the Governor and including national government, NEMA, NDMA, Kenya Police, immigration department, Lake Region Economic Bloc (LREB), and community representatives.

Built the Host culture among receiving communities

- A multistakeholder effort including county government and civil society groups to promote friendly host culture among Kisumu residents through civic education and empowerment programs as a way of empowering the local receiving communities to see immigrants in good light. Changing the perception of the host community to see see newcomers as economic and social boosters with abilities to enhance local opportunities may enhance integration and cohesion

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ANNEXES

ANNEX I: Detailed Methodology

This study adopted a mixed-methods research design to examine the complex intersections between climate-related migration, environmental change, and security dynamics in Kisumu city. The research framework integrates qualitative and quantitative approaches through individual interviews, focus group discussions, key informant interviews, GPS surveys, spatial modeling, and photovoice recording. The study area encompasses diverse settlements within Kisumu city, ranging from informal settlements like Nyalenda A, Nyalenda B, Manyatta A, Manyatta B, and Obunga to middle and high-income areas, as well as peri-urban zones. This geographical spread enables comprehensive analysis across different socio-economic contexts, environmental conditions, migration patterns, and security challenges. The research design facilitates methodological integration through sequential data collection, where findings from one method inform subsequent approaches, while parallel analysis of different data types allows for robust cross-validation and triangulation. By combining spatial analysis with social data collection, the study captures both observable physical changes and community perceptions, providing a holistic understanding of the dynamics between climate change, migration, and security in Kisumu.

Data quality control

- Before field work, the project team exchanged ideas and aligned themselves to all expectations, data collection approaches and methodology. Data collections tools were formulated, reviewed, digitized where possible and pretested before the beginning of the actual data collection as a way of validation and quality control and checks.
- The use of multiple data collections involving II, KII, FGDs, Photovoice and GIS surveys and modelling were intended to triangulate the findings and generate valid, verifiable and acceptable results. During the data collection, quality checks and screening of incoming data were observed to ensure its quality. The data collection team occasionally provided daily briefs on the ongoing work in the field and there was a regular debriefing meeting in the evenings after work to ensure challenges were shared and lessons learned to inform improvements in the following day's exercise.
- Collected data were carefully screened, pre-processed, cleaned and analysed based on standard research practices and tools

2.1 Data Sources and Tools

This project relied on diverse data sources and tools to achieve its objectives. Primary data came from FGDs, IIs, KIIs, as well as community mapping. Climate data were obtained from the Kenya meteorological department covering the period 1991- 2021. Spatial data was obtained from various geo-databases. For Land Use/Land Cover (LULC) analysis, Landsat data accessed through Google Earth Engine was selected to ensure consistency across years: Landsat 7 (1999), Landsat 5 (2009), Landsat 8 (2019), and Landsat 9 (2024). Sentinel-2 imagery was used to maintain harmonization for comparative analysis across decades. For Land Surface Temperature (LST), Landsat 4 (1988), Landsat 8 (2019), and Landsat 9 (2024) provided valuable insights into urban heat island patterns. Digital Elevation Models (DEMs) derived from USA Geological Survey (USGS) Shuttle Radar Topography Mission (STRM) supported elevation mapping and watershed delineation. Flood mapping incorporated Sentinel-1 radar data, GSW Global Surface Water, and WWF HydroSHEDS datasets, all accessed through Google Earth Engine. Primary data collection complemented secondary datasets. These inputs provided granular, ground-level insights into insecurity vulnerabilities, environmental challenges, and migration-related concerns. Administrative boundary shape files sourced from the GADM database ensured precise delineation, while school and health facility datasets were accessed via Humanitarian OCHA for critical infrastructure analysis. The settlement data utilized was from OpenStreetMap (OSM).

2.2 Research Methodology

2.2.1 Individual Interviews

Individual interviews were conducted in all major settlements of Kisumu. The settlements encompassed the city's low-income informal settlements, middle-income settlements or estates and the high-income settlements. The informal settlements involved included Nyalenda A, Nyalenda B, Manyatta A, Manyatta B, Obunga, and Nyawitta, while the middle-income and the high-income settlements included Kogony, and Milimani respectively. A representative sample of interview participants were selected across the range of settlements in Kisumu city with the help of a community guide while purposive sampling techniques were used to identify additional samples to ensure wide-spread of sources and diversity of respondents. In total, 60 individual interviews were distributed proportionately based on the sizes of the settlement (Table 2.1. The Individual Interviews were accomplished using digitally configured questionnaires in Kobo Collect Toolbox and entries were entered electronically using mobile electronic devices.

2.2.2 Focus Group Discussion (FDGSs)

Seven Focus group discussions (FGDs) involving 80 participants were involved in the study drawn from the main settlements as described in section 2.1 above. The seven FGDs included Nyalenda A, Nyalenda B, Manyatta A, Manyatta B, Obunga/Nyawitta, Kogony/Milimani, Women Only

FGD. Representative numbers were drawn from these settlements based on gender representation and villages within the settlements. The Women-Only FGD was purposively chosen from the majority women-led fisherfolk groups (women involved in fishing business including selling and eateries) to gather unique and isolated insights into issues affecting women and girls in their day to day economic activities within the lake belt regions and Kisumu slums more specifically. The FGDS were conducted separately and independently in appropriate venues within Kisumu city.

Table 2.2: Focus Group Discussion Schedule and Participation

FGD	Date and location	Number of participants
Nyalenda A	7th October 2024	10
Manyatta A	8th October 2024	12
Nyalenda B	7th October 2024, At Parkview Conference Room	12
Manyatta B	8th October 2024, At Parkview Conference Room	12
Milimani	9th October 2024	5
Kogony	9th October 2024	4
Obunga & Nyawita	9th October 2024, At Saint Anna's Conference Room	13
Women Only FGD	10th October 2024, At Saint Anna's Conference Room	12
Total Number		80

Community Mapping

Through focus group discussions, residents engaged in mapping exercises where they identified areas of concern on flip charts, highlighting locations of environmental hazards, security risks, and zones where vulnerable groups face particular challenges. This community-led identification of hotspots informed the spatial mapping of security and vulnerability patterns across Kisumu city (Figure 2.4 & Figure 2.6)

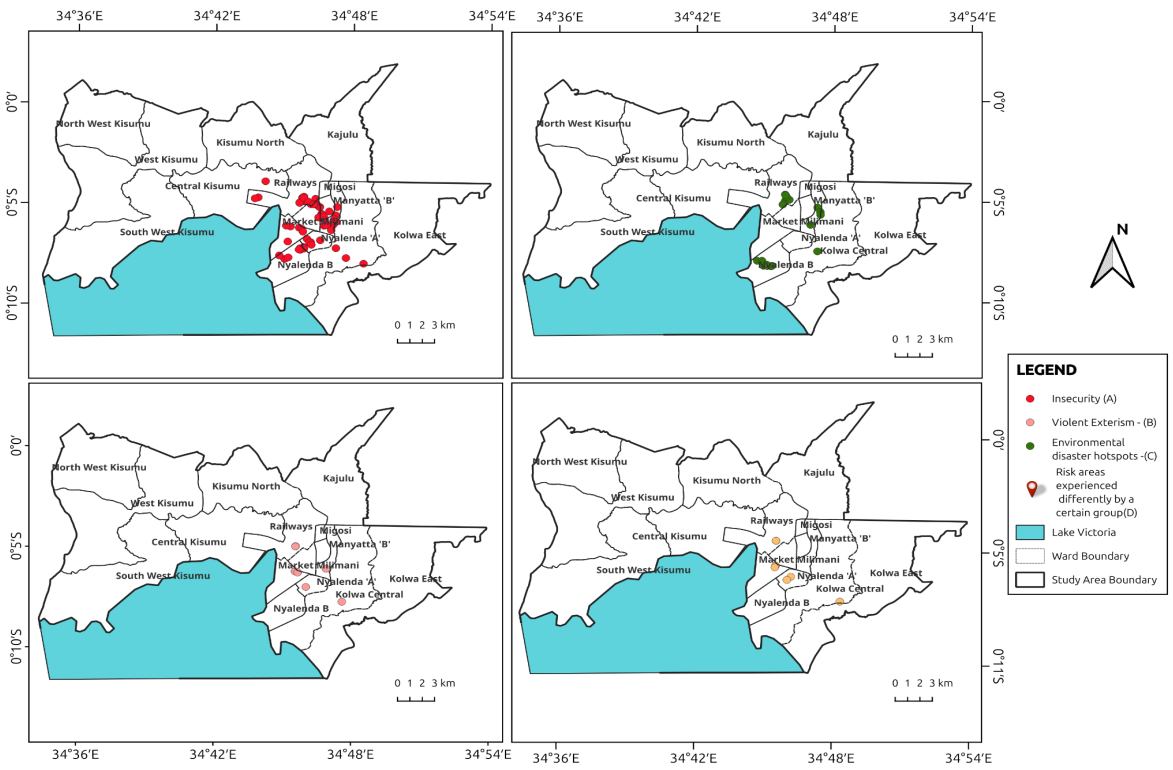

Figure2.5: Spatial Generated Map of hotspot areas

Figure 2.6: Community Mapping Exercise during FGD Session

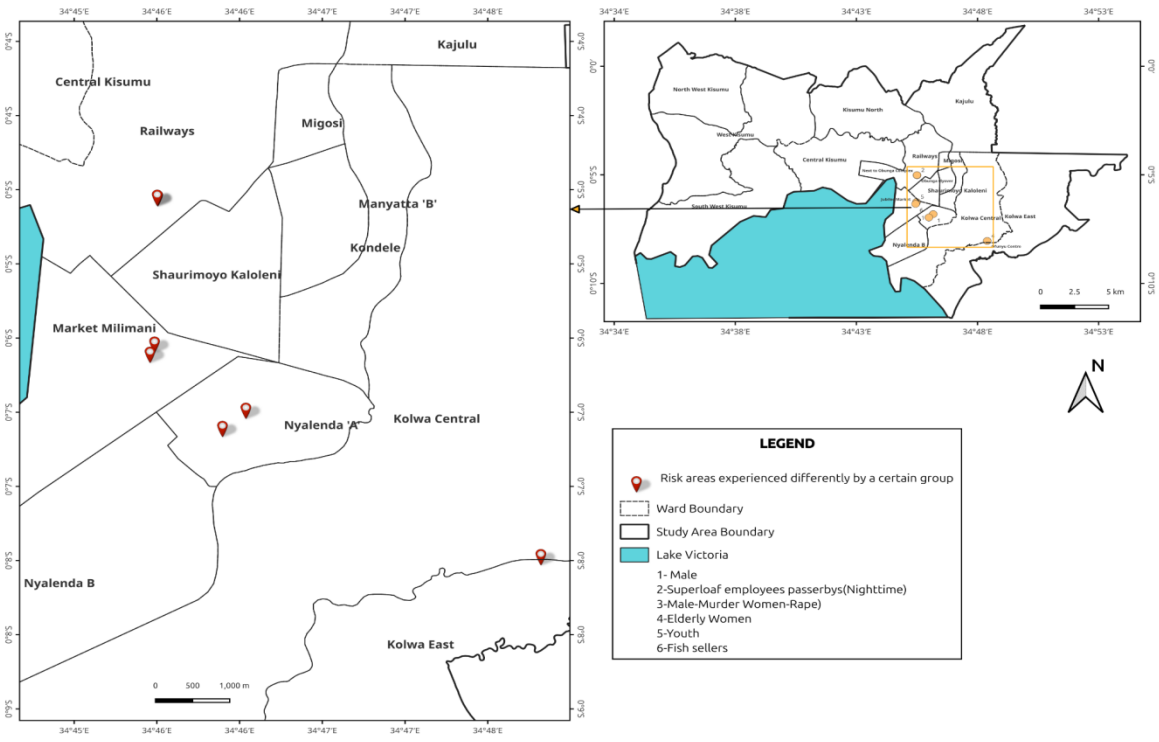

Figure 2.7: Distinct risk patterns for different groups

As part of the focus group discussions, a community mapping exercise was conducted to visually capture the residents' perceptions of their neighbourhoods. During these sessions, participants drew their neighbourhoods on flip charts, marking key locations that represented the most pressing concerns in their communities. This hands-on mapping activity enabled participants to identify hotspots for insecurity, areas heavily affected by environmental degradation, and locations where particular groups face specific risks. For example, areas near illicit brew joints were highlighted as crime hotspots, while locations prone to flooding and other environmental hazards were also mapped. Participants were able to illustrate where women, elderly individuals, or other vulnerable groups felt most at risk, whether from crime or unsafe environmental conditions.

2.2.3 Key Informant Interviews (KII)

The key informant interviews targeted key experts and leaders of relevant organisations of interest to the project including government and , non-governmental organisations, , community and youth-based organisations as well as independent experts, researchers and activists. Valuable insights and inputs were gathered from the KIIs using specially structured KII question guides formulated and pretested before the beginning of the data collection exercise. The study conducted a total of 22 KII drawn from the mentioned organizationsorganizations aligned to respective thematic focus areas, for instance, environment, governance, peace and security, civil

rights and justice, water and sanitation and research. The governance structures included the local administrators like the Chief and the County government of Kisumu. As a way of gaining insights on the catchment-wide dynamics, the study conducted four KII from the neighbouring counties of Kisumu including Nandi, Vihiga, Nyamira, and Siaya which areas, are believed to be the main sources of Kisumu's migrants as well as sustenance in terms of water resources origins and food supply into the city. The neighbouring counties interviews were conducted using digital survey forms. Except for the neighbouring counties KII, the rest of the KIIs were interviewed in-person and recorded.

Table 2.3: Profile of Key Informant Interviews

KII name	Roles in organization	Organization	Date of interview	Area of action	Informal settlement
Alie Elverld	Founder	SWAP	9th October 2024	*Rights and peace*	*Citywide*
Mrs Rose	Head of Kisumu Office	Umande Trust	14th October 2024	*Environment*	*Citywide*
Mr. Maurice	Vice Chairperson	Beach Management Unit	11th October 2024	*Accountability*	*Regional*
Mr. Edwin Korir	Conservation Education Officer	Wildlife Clubs of Kenya	9th October 2024	*Policy and justice*	*Citywide*
Mr. Tom Ogalo	Founder	Jijenge Youth Organization	9th October 2024	*NRM*	*Region*
Mrs. Beatrice	Mama Mboga		14th October 2024	*Governance and policy*	*Countywide*
		SHOFCO	14th October 2024	*Children rights*	*Citywide*
Mr. Mike	Program Manager	SUSWATCH	14th October 2024	*Children rights*	*Citywide/regional*
Mr.	Chief Obunga		15th October 2024	*Environment*	*Regional*
Richard Oyoo	The Chairperson	Friends Of Lake Victoria (Osienala)	11th Oct, 2024	*WASH*	*Manyatta B*

Anne Okelo	Programs Officer	Sustainable Innovations	11th Oct, 2024	*WASH and Clean energy*	*Obunga*
Lena Atieno Jobita	Assistant Chief	Nyalenda B	14th Oct, 20224	*WASH, Waste management, Capacity development*	*Manyatta and Nyalenda*
Lizian Onyango	Programs Coordinator	Kisumu Slum Dwellers International	14th Oct, 2024		*Obunga and Nyalenda*
Michael Otieno Nyaguti	The Chairperson	Magnam Environment Network	14th Oct, 2024	*Natural Resource Management and Climate Change*	*Multi-stakeholder engagement (NGOs in WASH)*
Oscar Okungu	The Chairperson	Kisumu County Government Department of Environment	15th Oct, 2024	*Community Health, Economic empowerment, Research*	*Citywide*
Neighbouring Counties	Prof. Wycliffe Oboka	Vihiga County	1st November, 2024	Disaster Management Expert and cientist, County government of Vihiga	
	Dr. Vera Achieng	Siaya County	29th October, 2024	Environmental Researcher and Consultant	
	Mr. Silas Maiyo	Nandi County	2nd November 2024	County Technical Officer	
	Mr. Josphat Mokaya	Nyamira county	28th October, 2024	Agribusiness promoter	

2.2.4 Photovoice Recording

Photovoice recording is the art of communicating community stories by the use of photos and or mini videos. In this study photovoice recording was undertaken using six community members who were specially chosen from the community and based on their willingness to participate in the

exercise. The six participants were drawn from the low-income settlements of Nyalenda, Manyatta, Obunga/Nyawitta, Nyamarais, Dunga Beach, and Kogony/Mlimani to align with the study area. The photovoice participants were independent from the groups that had participated in the FGDs and the KII as well as individual interviews. It was desirable that they be people who could tell the story from raw experiences and without influence of the interactions with the questionnaires.

After their selection, the photovoice participants were inducted and trained on how to approach the process, they were then issued with mobile devices of good camera qualities for use in the photo recordings. Each participant was instructed on the types and how to collect photos within a duration of 14 days.

After the 14 days, a photovoice workshop was organized that brought together the photovoice participants and the project team for an opportunity to present and talk about their photos and the stories accompanying each photo to the plenary. From the population of photos received from the six participants, a sample group of 54 photos were selected to represent the bigger picture of the entire study area in line with the underlining the overarching questions of the study. The stories were compiled in a photovoice report attached to this report.

Participant	Area	Total photos	Photos sampled
Millicent Atieno	Dunga Beach	50	6
Rennah Anyango	Nyalenda A	354	10
Nancy Odongo	Manyatta/Migosi/Mamboleo	311	8
Moses Chiaji	Kogony/Mlimani	287	10
Lavender Oloo	Nyalenda B	220	9
Geoffrey Odhiambo	Obunga/Naywitta	305	11
Total sampled			54

2.2.5 Ground Truthing Tour

To supplement the data collection methods, a ground truthing tour was organized to visit and visualize the reality on the ground. This was done as a way of validating spatial model findings while at the same time providing a realistic feel of the reports provided by the communities during the FDG sessions. The ground truthing involved picking coordinates using GPS Essentials, photo recording and note taking where necessary.

2.2.6 Data Analysis

Spatial Analysis and Mapping

This study employed a mixed-methods approach integrating primary and secondary data, with primary data collection utilizing KoboToolbox digital questionnaires developed to capture demographic information, migration patterns, environmental challenges, security perceptions, and community resource vulnerability. The digitized questionnaires were created and tested by the GIS expert, who trained data collectors on proper usage, incorporating GPS coordinate capture.

This analysis methodology examined migration patterns, security dynamics, land use/land cover changes, land surface temperature variations, flood risk assessment, and watershed characteristics, with each component utilizing specific analytical techniques to understand the complex interplay between climate-related migration and urban development in Kisumu City. The intersection analysis was accomplished in a GIS environment and incorporated the primary data collected, demographic data from secondary sources, and modelling. The analysis assessed the complex interactions between security, migration, climate and urbanization which altogether answered the overarching questions. Land use and land cover analysis was undertaken using the Normalized Difference Vegetation Index (NDVI) using Near-Infrared and Red bands to evaluate vegetation coverage. Moreover, the Land Surface Temperature analysis utilized Landsat imagery from three time periods (1988, 2019, and 2024) to evaluate the spatial temperature change over time. In addition, the study understood to delineate river watersheds for the most flooded river in Kisumu, this was achieved through the analysis that employed SRTM DEM data to visualize the topography and hydrological characteristics of the study area. Python**,** a high-level programming language widely used for data analysis and visualization, was employed for preprocessing, cleaning, and analyzing primary data, with statistical insights visualized using bar graphs and pie charts. Detailed spatial methodology is available in Annex 1.

Climate model and flood return period

In the final analysis, the study analyzed storm return periods into the future. This was deemed important to show the extent to which Kisumu city may be vulnerable to future floods of different magnitude. Flood return periods define the durational frequency of return of a given magnitude of floods. The storm and flood frequency analysis were used to estimate the frequency of occurrence of a flood event by providing probabilities of occurrences over a period of 50 years. The study used the annual maximum rainfall data series from 1965 to 2015. The procedure involved development of Intensity-duration-frequency (IDF) analysis curve for rainfall to understand the frequency of storm events and probability of storm exceedance which was then used to evaluate flood risk and vulnerability of sanitation facilities. The analysis relies on a mathematical model which calculates the return period (*T*-yr) by using the following frequency factor equation:

$$T = \frac{N+1}{m} \quad or \quad P = \frac{M}{N+1} \quad \text{.....equation 1.}$$

Where *m, is the order number of events and N* = total number of events in the data series T is frequency / return period and P is the probability of exceedance.

a. The frequency curve was constructed on a Log base axis against the monthly rainfall intensity.

More about IDF curves can be read from the following literature (Liu & Li, 2008; Ebrahimian, 2012; Ahmad *et al*., 2015; Welderufael & Woyessa, 2013).

DETAILED GIS ANALYSIS METHODOLOGY

Methodology Overview

This study employed a mixed-methods approach integrating primary and secondary data, with primary data collection utilizing KoboToolbox digital questionnaires developed to capture demographic information, migration patterns, environmental challenges, security perceptions, and community resource vulnerability. The digitized questionnaires were created and tested by the GIS expert, who trained data collectors on proper usage, incorporating GPS coordinate capture. The analysis methodology examined migration patterns, security dynamics, land use/land cover changes, land surface temperature variations, flood risk assessment, and watershed characteristics, with each component utilizing specific analytical techniques to understand the complex interplay between climate-related migration and urban development in Kisumu City.

i) Migration

Survey data was preprocessed using Python's pandas library to examine migration characteristics across multiple variables. The analysis first examined the duration of stay for all survey respondents in their current locations within Kisumu City. For those identified as migrants, the study investigated their counties of origin to understand migration source patterns, and their ongoing relationships with their native homes, and assessed whether migration met their expectations regarding improved opportunities and services.

The study incorporated demographic variables to understand how different population segments experienced migration, examining patterns across age groups, education levels, gender, marital status, and livelihood sources. This demographic analysis was complemented by a spatial examination across Kisumu's residential areas including Nyalenda A & B, Manyatta A & B, Obunga, Nyawita, Kogony, and Mlimani, revealing how migration experiences and impacts varied by location.

The analytical framework considered both individual and community-level impacts, examining how migration influenced both the migrants themselves and their host communities. Through normalized percentage calculations, the analysis explored variations in migration reasons and impacts across different neighborhoods. Statistical visualizations were created using pie charts for categorical distributions and normalized stacked bar charts for comparative analyses.

The spatial patterns of migration origins were mapped through a geo-referencing process. Origin locations provided by respondents, including both villages and counties, were georeferenced using Google Earth Pro to obtain precise coordinates. These coordinates were then visualized in QGIS, distinguishing between current settlement locations, migrants from within Kisumu County, neighboring counties, and other counties across Kenya.

ii) Insecurity

With crime and insecurity emerging as significant concerns in areas experiencing migration, the analysis explored these challenges through both spatial and perceptual lenses. Survey responses helped understand community views on the connection between climate change and insecurity, with perspectives captured through pie chart visualizations.

A spatial mapping approach documented different types of security incidents, including burglary & theft, gender-based violence, murder, political violence, violent crime, and tribal clashes. These incidents were georeferenced and visualized using graduated symbols to represent their occurrence across different neighborhoods.

Population density was integrated into the analysis to examine potential correlations between demographic pressure and insecurity patterns. Areas were classified into three density categories using population data from Census 2019, enabling the visualization of relationships between population concentration and insecurity incidents.

iii) Land Use and Land Cover Mapping

Land use land cover (LULC) mapping provides important information about the Earth's changing land use and cover patterns (Garg et al., 2019). This analysis utilized Google Earth Engine's cloud computing platform for processing Landsat imagery spanning 1999-2024. A supervised classification approach, employing the Random Forest algorithm, was applied, with a 70:30 ratio for training and test data, and accuracy metrics such as overall accuracy and kappa coefficient were calculated.

To better understand urban expansion patterns, a subsequent reclassification step consolidated these categories into built-up and non-built-up areas. This binary reclassification enabled clearer visualization and quantification of urban growth over the 25 years.

iv) Land Surface Temperature (LST)

The Land Surface Temperature analysis utilized Landsat imagery from three time periods (1988, 2019, and 2024), specifically selecting February scenes with minimal cloud cover to ensure data quality and temporal comparison. The analysis followed a systematic process to derive surface temperature values.

The process began with the visualization of true and false color composites for initial assessment. Subsequently, the Normalized Difference Vegetation Index (NDVI) was calculated using Near-Infrared and Red bands to evaluate vegetation coverage. This NDVI was then used to derive the Fractional Vegetation Cover (FV) through a squared scaling approach based on minimum and maximum NDVI values within the study area.

$$FV = \left(\frac{\text{NDVI} - \text{NDVI}_{\text{min}}}{\text{NDVI}_{\text{max}} - \text{NDVI}_{\text{min}}} \right)^2$$

Emissivity calculations incorporated vegetation's thermal properties, using the FV values with appropriate scaling coefficients. The thermal band data underwent conversion to brightness temperature using calibration coefficients, followed by the final LST computation that integrated both brightness temperature and emissivity values. The calculation included conversion to Celsius for practical interpretation.

$$EM = 0.004 \cdot FV + 0.986$$

Where:

- *FV* is the Fractional Vegetation Cover.

$$LST = \frac{Tb}{1 + (0.00115 \cdot (Tb/1.438)) \cdot \ln(EM)} - 273.15$$

.

Where:

- *Tb*: Brightness temperature (in Kelvin) from the thermal band.
- *EM*: Emissivity calculated using the EMEMEM formula above.

The methodology accounted for potential limitations through careful consideration of emissivity scaling assumptions and NDVI-based vegetation representation. The computed

LST values, including minimum and maximum temperatures, were exported and mapped in QGIS to visualize the spatial distribution of surface temperature patterns across the study area.

v) Watershed Delineation

The Watershed delineation analysis employed SRTM (Shuttle Radar Topography Mission) Digital Elevation Model (DEM) data to visualize the topography and hydrological characteristics of the study area. The process began with the preprocessing of DEM data to correct for sinks and ensure hydrological continuity. The hydrological analysis utilized tools to compute flow direction and flow accumulation, enabling the identification of stream networks and drainage basins within the study area. A catchment boundary was delineated by identifying pour points, representing the lowest points within the hydrological system, and tracing upstream contributing areas The derived stream network and catchment data provided a detailed visualization of the hydrological system, highlighting the flow patterns and contributing areas for River Auji.

vi)Flood Mapping

The flood extent analysis employed Sentinel-1 Synthetic Aperture Radar (SAR) data using VV and VH polarizations from ascending orbits to detect and map inundated areas. The analysis compared two temporal windows: a pre-flood period (January to March 2024) and a flood period (April to June 2024), computing mean backscatter intensity for each period.

Flood detection utilized a multi-step approach, beginning with the calculation of backscatter ratios (VV/VH) for both temporal periods. The Refined Lee Filter was applied to reduce speckle noise, enhancing data quality. Change detection between the two periods employed a threshold-based approach to identify potential flood-affected areas.

The methodology incorporated multiple refinement steps to improve accuracy.
Permanent water bodies were masked using the Global Surface Water dataset, while areas with slopes exceeding 5% were excluded to focus on genuine flood-prone zones.
Additional refinement included the removal of isolated pixels through connected-component analysis, ensuring the identification of coherent flood areas.

Summary

Methodology	Goal	Specific activity	Tool to be used	Target group/sample
GIS/Spatial	▪ the objective is to develop map overlays of settlements in Kisumu and intersection with conflict areas and key community resources	▪ Digital questionnaires using Kobo toolbox ▪ Spatial mapping and Map overlays ▪ Satellite image analysis (change detection)	▪ GIS/QGIS	▪ desktop
Participatory techniques	▪ Participatory techniques allow for data gathering from the general community using activities that engage groups dynamics. There is a sense of ownership and consensus building	▪ FGD ▪ Community mapping (mapping of critical resource areas, conflict areas, environment hotspots) ▪ Role play ▪ Historical timelines analysis ▪ Consensus building	▪ Participatory tools	▪ 9 FGD meetings including: ▪ 5 informal settlements ▪ 2 middle- and high-income settlements ▪ 2 peri urban settlements/ environs
Video/photo voice story	▪ Recording videos and photo stories to document and report information as observed by community members	▪ Story documentation and storytelling ▪ Photo stories	▪ Video records	▪
Key Informant Interviews	▪ To get in-depth information	▪ Consultative interviews	▪ Interview guide	▪ 10

	from key experts and stakeholders			
Household/individual surveys	▪ Surveys will help to gain individual perspectives from individual community members	▪ Questionnaire interviews	▪ Questionnaires	▪ 10 from each of the 5 sampled informal settlements (50) ▪ 5 from each of the 2 sampled middle/high income areas ▪ 10 from each of the 2 peri urban areas

Annex II: Environment and climate change analysis from Individual Interviews for FDG Analysis

Table 3.2: FDG Analysis

Key questions	Nyalenda A	Nyalenda B	Milimani/Kogony	Obunga & Nyawitta	Women Only	Manyatta A	Manyatta B
What are the key environmental issues in Kisumu and what are the causes and impacts	➢ Water source contamination ➢ Pollution and waterborne diseases. ➢ Fish deaths. ➢ burning wastes ➢ poor sewage treatment	➢ poor waste management ➢ pollution due to the emergence of industries etc. ➢ pest and diseases affecting livestock	➢ Deforestation, ➢ unplanned urban expansion ➢ rise of Lake water Level ➢ displacements of people ➢ climate change	➢ Pollution from companies such as Kibos ➢ Flooding ➢ Poor waste management	➢ Poor Waste management ➢ Pollution ➢ Poor waste management ➢ Cutting down trees ➢ Overfishing	➢ Encroachment of riparian lands and green spaces as caused by overpopulation. ➢ Flooding ➢ Waste mismanagement	➢ Pollution ➢ Flooding ➢ Displacement of communities
How is climate change impacting Kisumu and how is it linked to environmental degradation	➢ Climate change has resulted in unpredictable weather patterns, flash floods, extreme droughts and heat waves that have had severe impacts on the Kisumu residents which include low farm produce and displacements of people. ➢ This has resulted into displacement and migration of people from the rural areas who are dependent on farming into the city to seek for an alternative source of income	➢ Climate change has resulted into low agricultural produce, flash floods, drought, death of seasonal rivers, surge in respiratory diseases among others. ➢ The unpredictable weather patterns, flash floods have resulted in displacement and migration of people who were dependent on farming from the rural areas into the city	➢ Climate change has resulted in heat waves and extreme temperatures, unreliable rain patterns, floods, ➢ Climate change has led to backflow of the lake among others and ultimately displacement of people which has seen more people migrate into the city	➢ Climate change causes environmental degradation leading to natural disasters like drought, floods and unpredictable weather patterns. ➢ The climate-driven rural-to-urban migrations have led to population pressure in the city hence further environmental stress.	➢ Industrial pollution, that is the discharge of industrial effluents from Kibos sugar company to the rivers has led to water pollution and also air pollution through the emission of gasses. ➢ Discharge of chemicals lead to pollution in lake and death of fish	➢ Environmental problems have led to climate change. ➢ Destruction of riparian areas and vegetation near Kisumu are causing extreme climate events	➢ Many people are running away from rural areas because farming can't do well. ➢ They come to the city leadingto population pressure in the city natural resources hence further environmental stress.
Linkages between environmental problems and insecurity/displacement/migration	➢ Growing population in the city results in expansion of the informal settlement areas and results to clearing of the vegetation cover to give room for settlements. It also results to water sources and air pollution due to lack of appropriate waste management	➢ Overpopulation in the informal settlements results in pollution, littering, poor sanitation, and environmental degradation, adversely affecting local ecosystems and the quality of life for residents	➢ Influx of migrant's results in growth of informal settlements that contribute further to environmental degradation through pollution	➢ Pollution results to Change in water temperatures leads to the death of fish that causes loss of livelihoods making those in fish business resort to criminal activities to earn their living.	➢ There is a strong linkage. During floods people always get displaced from places like Kapuothe. Some get completely displaced	➢ Discharge of wastes into the lake leads to pollution that results into the death of fish hence impairing livelihoods.	➢ Settling along riperain areas like river Auji has resulting in flood intensity where every year people must be displaced in some parts of Manyatta B

Annex IV: Pictorials

Sweden

Sverige

Life & Peace

INSTITUTE