KISUMU CITY

CLIMATE CHANGE COMMUNITY VULNERABILITY ASSESSMENT 2024

www.muungano.net/

healthycities.berkeley.edu

Citation: Corburn, J., Nyambuga, Kilion, Kimani, J. et al. 2024. Kisumu City Climate Change Community Vulnerability Assessment. CGHC, SDI-K & Muungano. www.healthycities.berkeley.edu

Executive Summary

INTRODUCTION

Kisumu County is suffering from climate change, mainly manifesting as extreme events and variability in the weather such as flash floods, riverine flooding, high temperatures characterized by heat waves, whirl winds, unreliable rainfall patterns, emergence of new pests and diseases and intense dry seasons. Food insecurity, unaffordable health care, poor water and sanitation systems, the impacts of erratic and unreliable rainfall and climate hazards are key magnifiers of the already high poverty incidence in the County. These changes have amplified the environmental effects that the residents across Kisumu are currently experiencing. Residents in wards within Kisumu that are in locations where they typically receive surface run-off from the hinterlands and thus experience pollution of water sources are at risk of climate change.

This research report aims to identify all the potential hazards and threats that Kisumu city experiences related to climate disasters and proposes strategies for risk reduction and risk management planning in wards across Kisumu City. This process includes mapping areas affected by climate disasters and understanding the coping and adaptive capacities of the vulnerable communities. This research is expected to improve collaboration and coordination among different stakeholders, including government agencies, NGOs, and community-based organizations, to ensure effective and efficient response to disasters. The key stakeholders identified in this study included community members, Slum Dwellers International (SDI), under the Voice for Just Climate Action (VCA) programme, the County Government of Kisumu, Maseno University as lead researchers, and Muungano wa Wanavijiji.

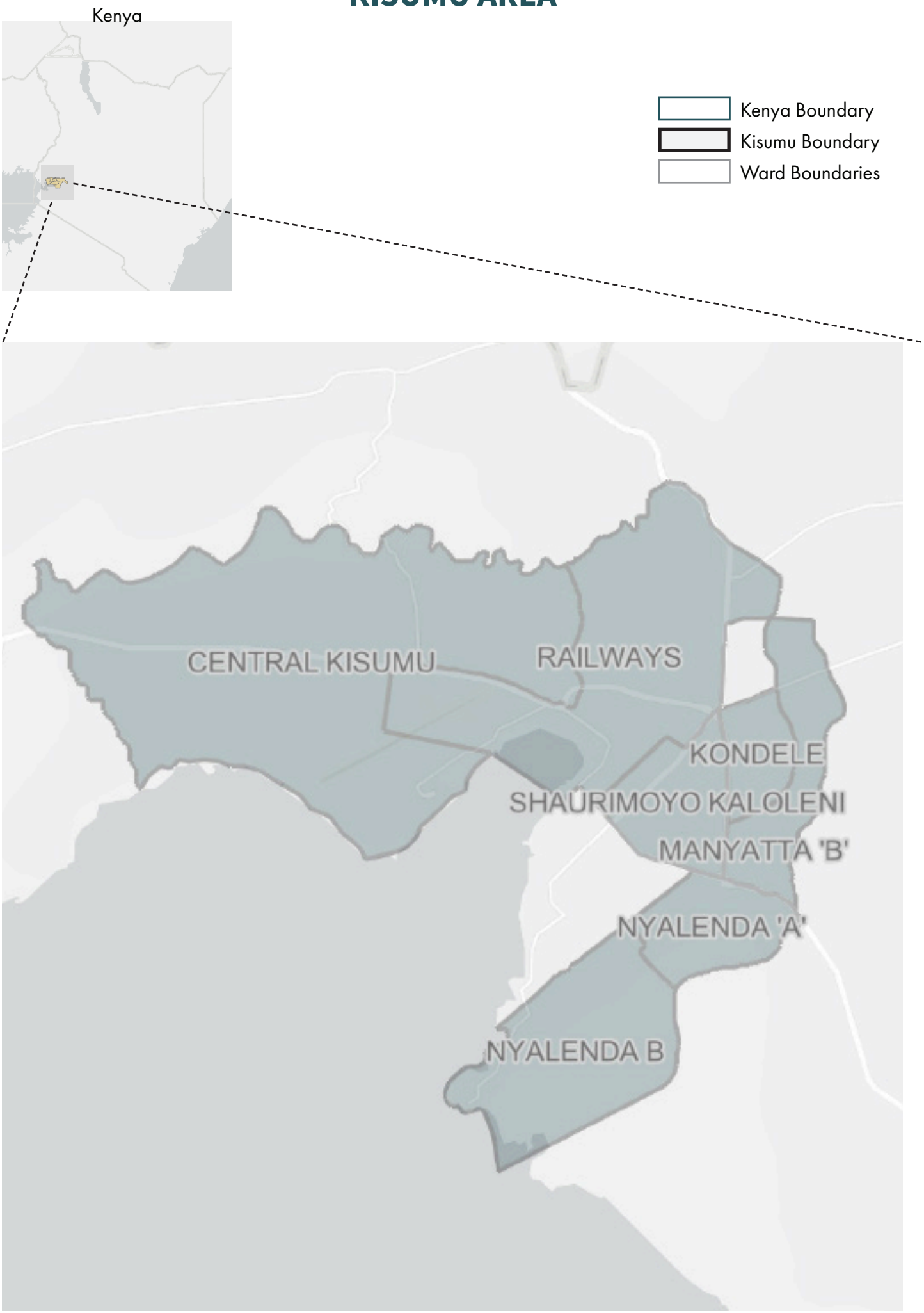
METHODS

This community-driven project aimed to establish co-affiant reliance on marginalized communities that are extremely affected by climate change in Kisumu City. Public participation adopted in this study comprised of participatory community mapping that doubled up as sensitization workshops to enable better understanding of the exercise amongst the key stakeholders. The study sites prioritized in this research were Central Kisumu Ward, Railways Ward, Kondele ward, Manyatta B ward Kaloleni-Shauri Moyo Ward, Nyalenda A and Nyalenda B wards in Kisumu County.

The primary objective of this research was to develop comprehensive vulnerability ward maps that highlight areas susceptible to climate change impacts and identify the key factors contributing to vulnerability. The researchers aimed to identify all the potential hazards and threats and assess the vulnerability of the community to these hazards and threats by considering factors such as physical, social, economic, and environmental vulnerability. They then mapped the affected areas, including the location of critical infrastructure, settlements, and vulnerable populations. Other goals of the researchers included understanding the coping and adaptive capacities of the community and improving collaboration and coordination among different stakeholders.

To achieve the research objectives, this study adopted a multidisciplinary approach, integrating data collection and compilation, geospatial analysis and mapping, developing a vulnerability complex, engaging with stakeholders, and conducting a scenario analysis.

KISUMU AREA

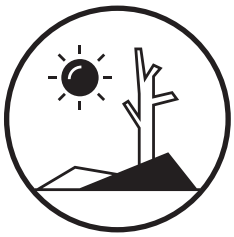

Kenya
Kenya Boundary
Kisumu Boundary
Ward Boundaries
CENTRAL KISUMU
RAILWAYS
KONDELE
SHAURIMOYO KALOLENI
MANYATTA 'B'
NYALENDA 'A'
NYALENDA B

Key Climate Vulnerability Issues

MOST FREQUENT COMMUNITY IDENTIFIED CLIMATE CHANGE-RELATED RISKS IN KISUMU

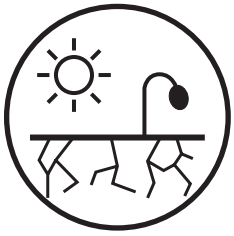
Floods

Floods have caused vital infrastructure to get damaged, water sources to get contaminated, and farmlands to be rendered unusable due to siltation. The onset of waterborne diseases becomes a recurrent health challenge. Some wards regularly receive surface runoff from agricultural hinterlands, leading to water source pollution with contaminants. The flooding of communities leads to a direct loss of life, injuries, and the displacement of populations.



Rising Temperatures

Heat waves are a recurring challenge and have caused dehydration, heat exhaustion, and even life-threatening heatstroke, especially for the vulnerable. It has diminished work enthusiasm and reduced crop yields. Water scarcity is exacerbated by rising temperatures.

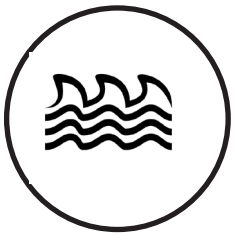


Droughts

Drought affects the availability of water and has cascading impacts on agriculture, livelihoods, and food security. Drought also increases poverty due to the increases in the price of food and how drought can limit livelihoods and reduce income, such as for street vendors. Droughts cause poor land management, deforestation, and climate change.

Key Climate Vulnerability Issues

MOST FREQUENT COMMUNITY IDENTIFIED CLIMATE CHANGE-RELATED RISKS IN KISUMU



Lake-level Rise

Lake-level rise causes a risk of overflow which can overwhelm existing drainage systems. This can exacerbate flooding, directly impacting the local hydrology. Lake-level rising also poses health risks by creating breeding grounds for disease-carrying vectors such as mosquitoes. Fluctuating lake levels cause a diverse threat to the urban fabric, from submerging infrastructure to displacing communities.

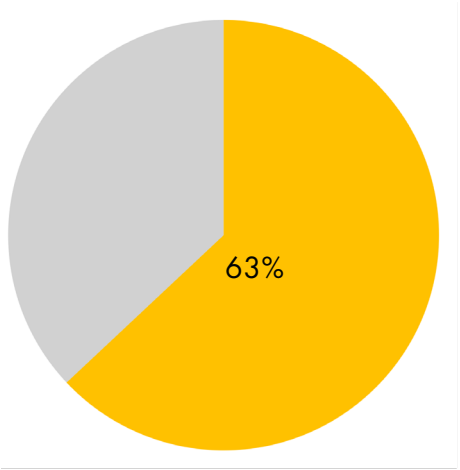
Strong Winds

Strong winds have caused damage to buildings, interruptions to power supplies, and increased risk of injury from flying debris. Strong winds affect livelihoods and personal safety. Strong winds are also suspected of contributing to health issues by increasing exposure to dust particulate matter and air pollution.

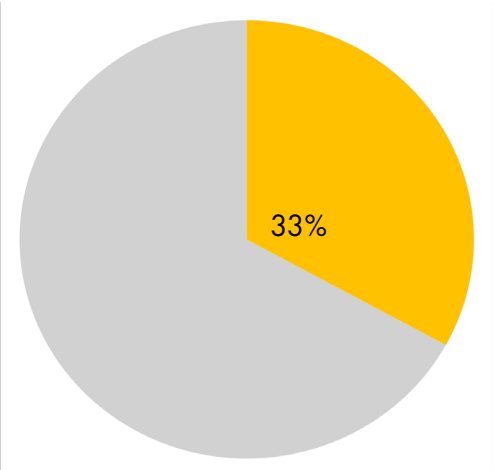
Fires

Fires can lead to loss of life, property damage, and long-term socio-economic challenges. The homes' close quarters allow for a fire to easily jump from one structure to another, turning individual incidents into community-wide emergencies.

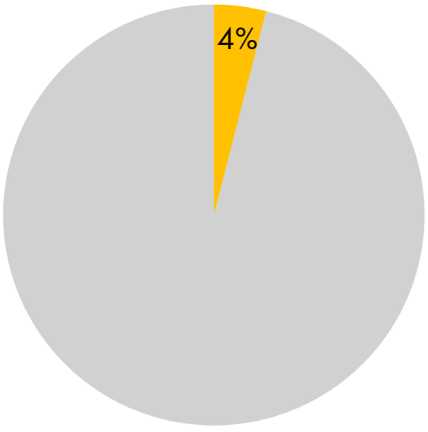
COMMUNITY PERCEPTIONS OF PREPAREDNESS FOR A CLIMATE CHANGE RELATED DISASTER IN SEVEN KISUMU WARDS



Roughly 63%
FEEL UNPREPARED



Roughly 33%
FEEL PARTIALLY PREPARED



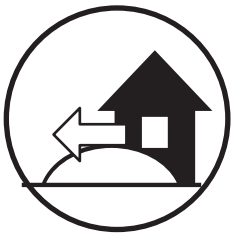
Roughly 4%
FEEL FULLY PREPARED

SOURCE: Kisumu Climate Vulnerability Risk Assessment Report , 2024

MAJOR IMPACTS ON VULNERABILITY & CLIMATE INJUSTICE IN KISUMU

Health Problems

Increased temperatures and changing rainfall patterns can exacerbate the spread of vector-borne diseases like malaria. With changing weather patterns, there is potential for increased mosquito breeding grounds, leading to more malaria cases. Moreover, extreme weather events, such as heavy rainfall, lead to waterborne diseases like cholera and diarrhea due to the contamination of drinking water sources.



Energy Issues

The unreliability of electricity can hamper economic activities, particularly for businesses that are energy-dependent. Extreme weather events can strain already vulnerable electricity infrastructure, leading to more frequent and prolonged outages resulting in infrastructure strain. In addition, high energy costs can eat into the profits of businesses. There also is the concern of safety issues, such as falling electric poles and electrocution risks which is a risk for residents.

Farming & Agricultural Risks

With changing climate patterns, the prevalence of pests and diseases can shift, introducing new challenges for farmers. Increased pest and disease prevalence can lead to higher pesticide and fungicide use. If not managed properly, its usage can have environmental implications, affecting soil and water quality. Due to this, farmers are facing heightened expenditures to salvage their yields.

Economic Impacts

Climate change affects the direct output, productivity, and the broader market dynamics and socio-economic stability. Shifts in rainfall patterns, increased frequency of extreme weather events, and the proliferation of pests and diseases disrupt economic activities. The combined climate risks of poor drainage design and blockages suggest that businesses, especially those dependent on physical locations and infrastructure, are at risk during heavy rainfall events.

Infrastructure Damage

There are significant issues with the design of drainage systems, which could indicate a high risk of flooding, especially during heavy rainfalls. This is likely vulnerable to waterborne diseases and property damage.

Property Destruction

Floods and strong winds lead to property destruction by carrying away components or roofing sheets from structures and destroying infrastructure such as roads, toilets, and businesses.

Water and Air Pollution

Residents are overly reliant on firewood and charcoal for energy. These also contribute to local air pollution. Floods destroy local water infrastructure, such as wells, taps & toilets, and one result is water contamination as from the pread of sewage. Women bear the greatest burden from damaged toilets and being forced to travel father for water collection.

High Food Prices

Climate change related foods & drought destroy crops, lead to low farm productivity and increase food prices. Strong winds tend to blow farm crops away, resulting in crop destruction. High food prices limit opportunities for street food vending and other livelihood possibilities.

BACKGROUND & METHODS

BACKGROUND

Climate change, ecosystem degradation, and social inequality trends threaten significant progress made on human well-being. Climate change in Kenya is increasingly impacting the lives of Kenya's citizens and the environment. Kenya has experienced a general warming trend since 1960, and the trend of rising temperature is expected to continue. This change has affected both social and economic activities.

Vulnerability to climate change is the degree to which a system is not capable of and unable to cope with adverse effects of climate change, including climate variability and extremes. Vulnerability mapping of climate change entails the mapping exposure, sensitivity, and coping strategies of human beings to climate change threats. A climate change vulnerability map is vital to assist the government and other stakeholders during the environmental assessment, spatial planning, infrastructural development, and regulation of activities that lead to environmental degradation.

A just transition will require increased recognition of how society is reliant on ecological systems and recognition of already unequal rights. However, current climate change governance models are yet to fully support inclusive and integrated planning. The systems of economic development and governance that brought us the climate crisis continue to persist as the same group of individuals in power continue to make the decisions. In this regard, Muungano wa Wanavijiji, SDI-Kenya in partnership with six organizations is implementing a five-year program on Climate action - Voices of Just Climate Action.

This program aims to unite and inspire civil society coalitions for a positive and innovative just transition agenda. Together we believe this needs a new level of civil society leadership by women and youth in Kenya hence our vision: A world where civil society is heard and respected as it influences and co-creates locally relevant, inclusive, and fundable climate solutions that deliver real benefits to people and nature as part of local and global responses to the climate crisis.

The key stakeholders identified in this study included community members, Slum Dwellers International (SDI), under the Voice for Just Climate Action (VCA) programme, the County Government of Kisumu, Maseno University as lead researchers, and Muungano wa Wanavijiji as the overall guides of the process. This assignment was aimed at identifying all the potential hazards and threats, mapping the affected areas, including locating critical infrastructure, settlements, and vulnerable populations, understanding the coping and adaptive capacities of the subject communities, including the availability of resources, access to information, and their ability to respond to and recover from disasters, and finally developing strategies for risk reduction and risk management planning. This is further expected to improve collaboration and coordination among different stakeholders, including government agencies, NGOs, and community-based organizations, to ensure effective and efficient response to disasters.

METHODS

Objectives of Study

1. Identify potential hazards and assess vulnerability of community
2. Map affected areas
3. Understand the coping and adaptive capacities of the community
4. Improve collaboraiton and coordination among different stakeholders

Identification of Informal Settlements

Vulnerability mapping data collection was conducted at the Ward level in Kisumu which includes Central Kisumu Ward, Kaloleni-Shauri Moyo Ward, Manyatta B Ward, Nyalenda A, Nyalenda B, Railways Ward, Kondele Ward

Data Collection

This study adopted a multidisciplinary approach to achieve the research objectives, integrating geospatial analysis, socio-economic data, and climate projections.

Geographic Information Systems (GIS) technology was employed to integrate and analyze the collected data.

Data Description

The household data collection was conducted in seven wards in the Kisumu Country. In total, 959 household questionnaires were administered. The total questionnaires administered per ward were as follows:

- 321 in Central Kisumu Ward
- 61 in Kaloleni-Shauri Moyo Ward
- 125 in Manyatta B Ward
- 113 in Nyalenda A Ward
- 125 in Nyalenda B Ward
- 45 in Railways Ward
- 168 in Kondele Ward

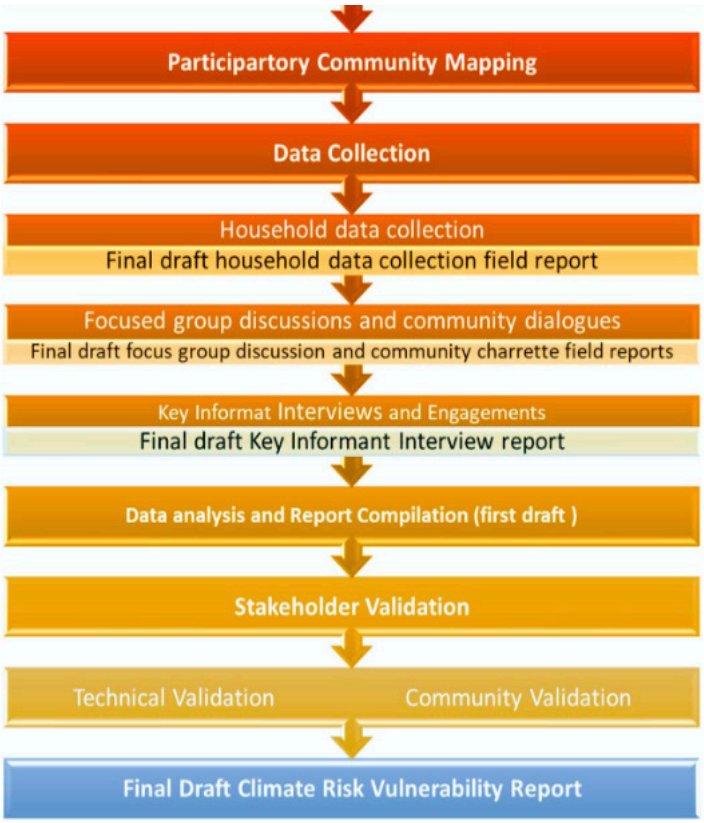
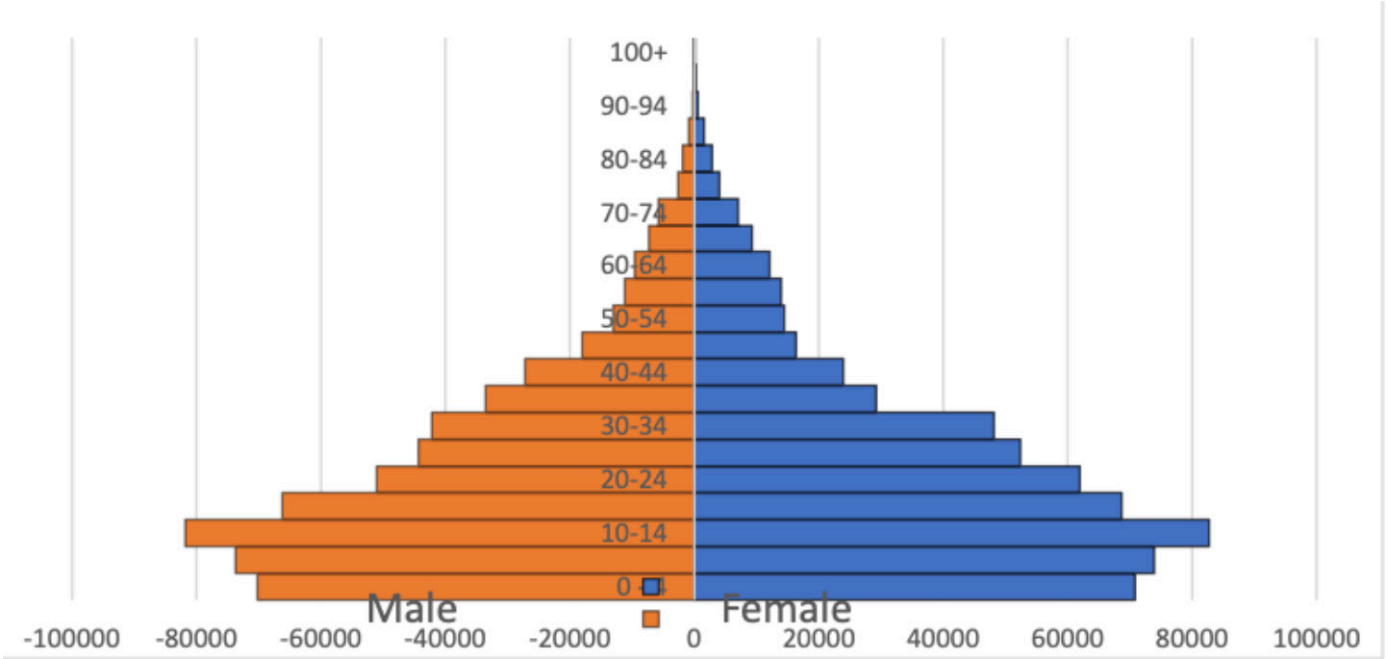


Figure 2. 3: Overview of Climate risk Vulnerability Mapping stages

Population Pyramid of Respondents in Kisumu Sub-county



FINDINGS BY CLIMATE

FLOODS

Understanding of Flood Risks

Floods

65%

** Percentages show a rough estimate of households reporting village affected by flooding*

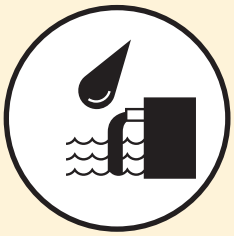
Wards with Strongest Flood Risk

Manyatta B | Central Kisumu | Nyalenda B

Major Impacts on Vulnerability

Infrastructure Damage

Unsuitable Farmland



Contaminated Water

Limited Mobility

Community Response/Initiatives to Floods

1. **Local Early Flood Warning Systems**
2. **Promotion of Flood-Resistant Agricultural Practices**
3. **Communal Flood Barriers**

Overview

Beyond the immediate danger of displacement and property damage, floods in Kisumu have deeper ramifications. Farmlands are rendered unusable due to siltation, vital infrastructure like bridges and roads get damaged, and water sources get contaminated. Additionally, the onset of waterborne diseases like cholera and bilharzia becomes a recurrent health challenge. The data provides insights into the experiences of different wards in relation to flooding. Covering aspects like the frequency of flooding, its impacts on safety and health, and the proposed solutions by respondents, this report aims to shed light on the gravity of the issue and potential remedies. importance of holistic approaches that encompass prevention, swift response, and comprehensive post-fire support.

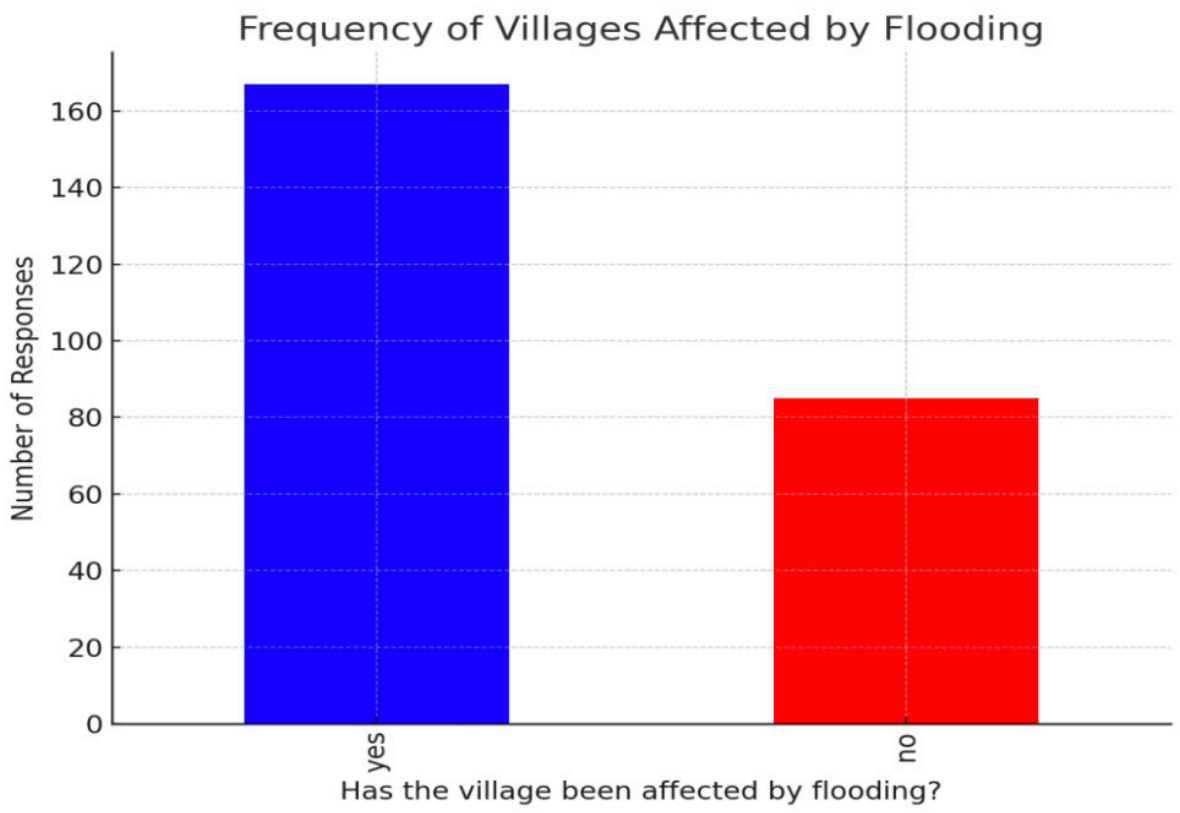
Factors Affecting Flooding

Digging deeper into the causes of flooding provides a clearer picture of the challenges faced by these communities. The most recurrent issue, as highlighted by 30 respondents, is the "poor design of drainage systems." This problem might be particularly acute in densely populated wards like Kondele, where rapid urbanization might have outpaced the development of adequate drainage infrastructure.

"Heavy rainfalls" is another significant factor, with 24 respondents attributing flooding in their villages to this natural phenomenon. Given the proximity of areas like Central Kisumu to significant water bodies like Lake Victoria, heavy rainfalls can quickly lead to rising water levels, affecting the adjoining villages. However, the complexity of the issue is evident when respondents cite combinations of factors. A sizable number (22 respondents) believe that flooding in their areas is due to a mix of "poor design of drainage system, blockage of drainage systems, and heavy rainfalls." This combination is a clear indication that while nature plays its part, human- induced challenges, possibly more prevalent in bustling wards, exacerbate the flooding problem.

Community Response to Flooding

Community initiatives and local adaptation strategies are vital in the face of recurrent floods, serving as a testament to the resilience and proactive spirit of Kisumu's wards. The qualitative interviews highlight the essential role of public participation in shaping the adaptation strategies in Railway Ward and beyond. This participatory approach not only empowers residents but also ensures that the local adaptation strategies are well-suited to the specific challenges and needs of each community.



FINDINGS BY CLIMATE

RISING TEMPERATURES

Number of Instances of High Temperature Incidents

High Temperatures

500+

** This is an aggregated estimate of instances of high temperature incidents per Kisumu's 2024 Climate Vulnerability Index Report*

Wards with Highest Prevalence of Heat Waves

Kondele | Manyatta B | Nyalenda B

Major Impacts on Vulnerability

Dehydration

Reduced Crop Yield

Limited Economic Growth

Sparse Water Access

Community Response/Initiatives to Rising Temperatures

1. **Protection and Enhancement of Water Infrastructure**
2. **Incorporating Green Spaces**
3. **Reinforcement of Heat-Protected Building Infrastructure**

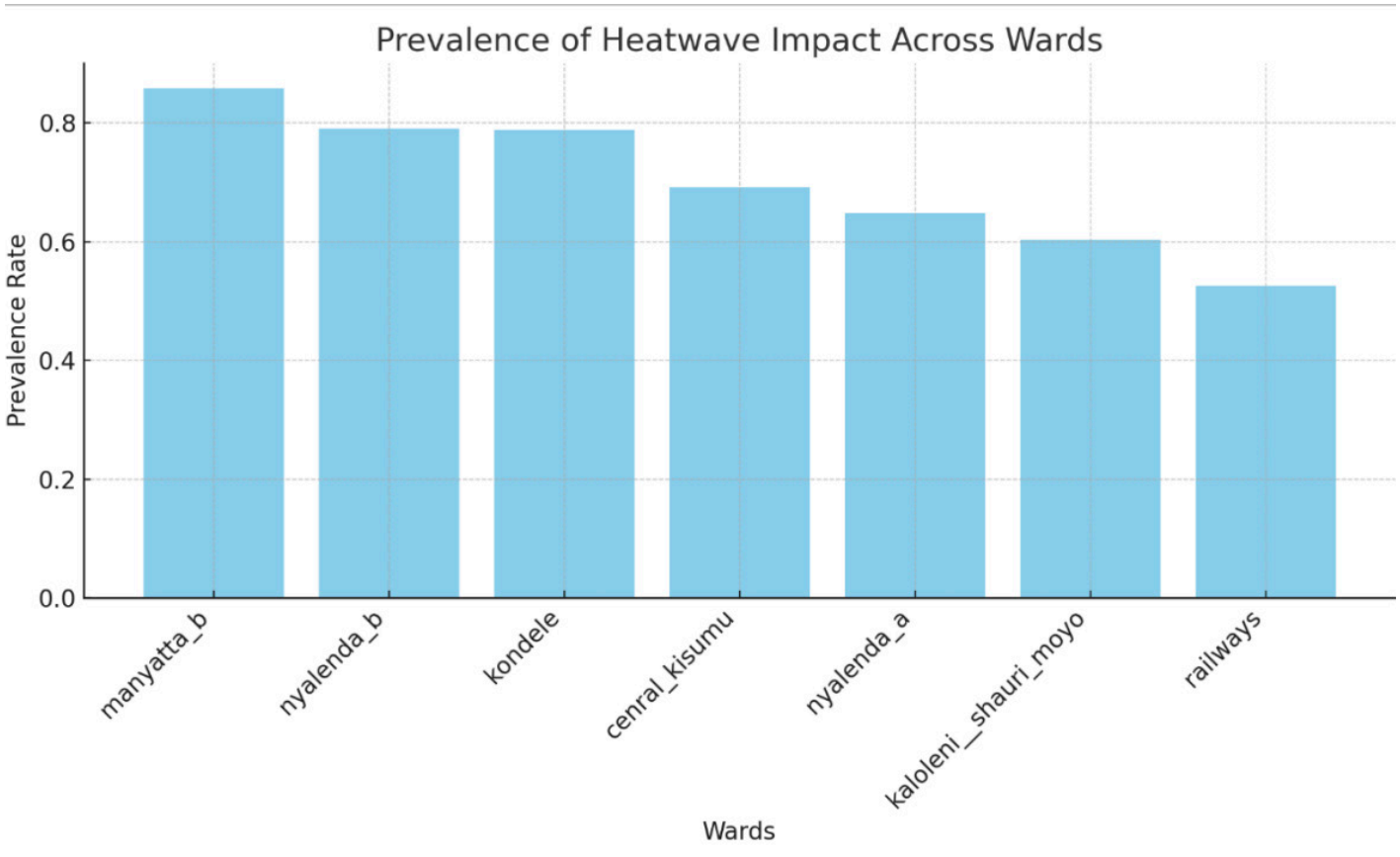
Overview

Rising temperatures can have dire implications for public health. This subtopic sheds light on heat-related illnesses in Kisumu, emergency response readiness, and the burden on local healthcare facilities during heatwave events. In the dense urban fabric of Kisumu City's wards, the sizzling crescendo of heat waves casts long shadows on public health. The urban heat island effect amplifies this phenomenon, particularly in concrete-laden areas like Kondele and Manyatta B, where greenery is sparse and buildings absorb sunlight only to relent it as relentless heat. The data, although not explicit about heat waves, suggests that these areas may experience significant health challenges when temperatures soar.

During such sweltering periods, residents of wards like Kondele and Manyatta B contend with a surge in heat-related ailments. Dehydration, heat exhaustion, and even life-threatening heatstroke are probable risks, especially for the vulnerable – the very young, the elderly, and those with pre-existing health conditions. The data indicates limited quick-access to health facilities in some wards, potentially exacerbating these risks when fast medical response is crucial. Moreover, as temperatures rise, the capacity for outdoor work diminishes, as indicated by the dataset's references to the 'reduced zeal to work.' This reduction in productivity can have cascading effects on economic stability and, consequently, on public health, as financial strain can limit access to nutritious food and healthcare services.

Agricultural-based wardssuch as Central Kisumu and railwaysreported to face their own set of challenges, as heat waves led to 'reduced crop yields,' threatening food security and increasing the likelihood of nutritional deficiencies. This is particularly poignant in areas where subsistence farming is prevalent and the community's sustenance is directly tied to the land's yield. The dataset suggests that some wards have better access to health services, which might mitigate the impact of heat waves. Yet, the extent to which these services can counteract the onslaught of high temperatures depends on their capacity andpreparedness to handle an influx of heat-related cases.

It's imperative to view the impacts of heat waves through the prism of each ward's unique socio-economic and geographical context. Some areas, possibly with better infrastructure and resources, might be more resilient, while others, strained by socio-economic challenges, could be more susceptible to the dire health repercussions of these meteorological extremes.



FINDINGS BY CLIMATE

DROUGHT

Awareness of Drought Presence in Neighborhoods

Droughts

92%

** This is an estimate of the number of respondents who acknowledged the presence of droughts, Kisumu Climate Vulnerability Index Report 2024*

Wards with Highest Prevalence of Heat Waves

Central Kisumu | Manyatta B | Nyalenda B

Major Impacts on Vulnerability

Water Shorages

Reduced Crop Yield

Food Insecurity

Community Response/Initiatives to Droughts

1. **Educational Initiatives**
2. **Infrastructural Improvements**
3. **Drought Resilience**

Overview

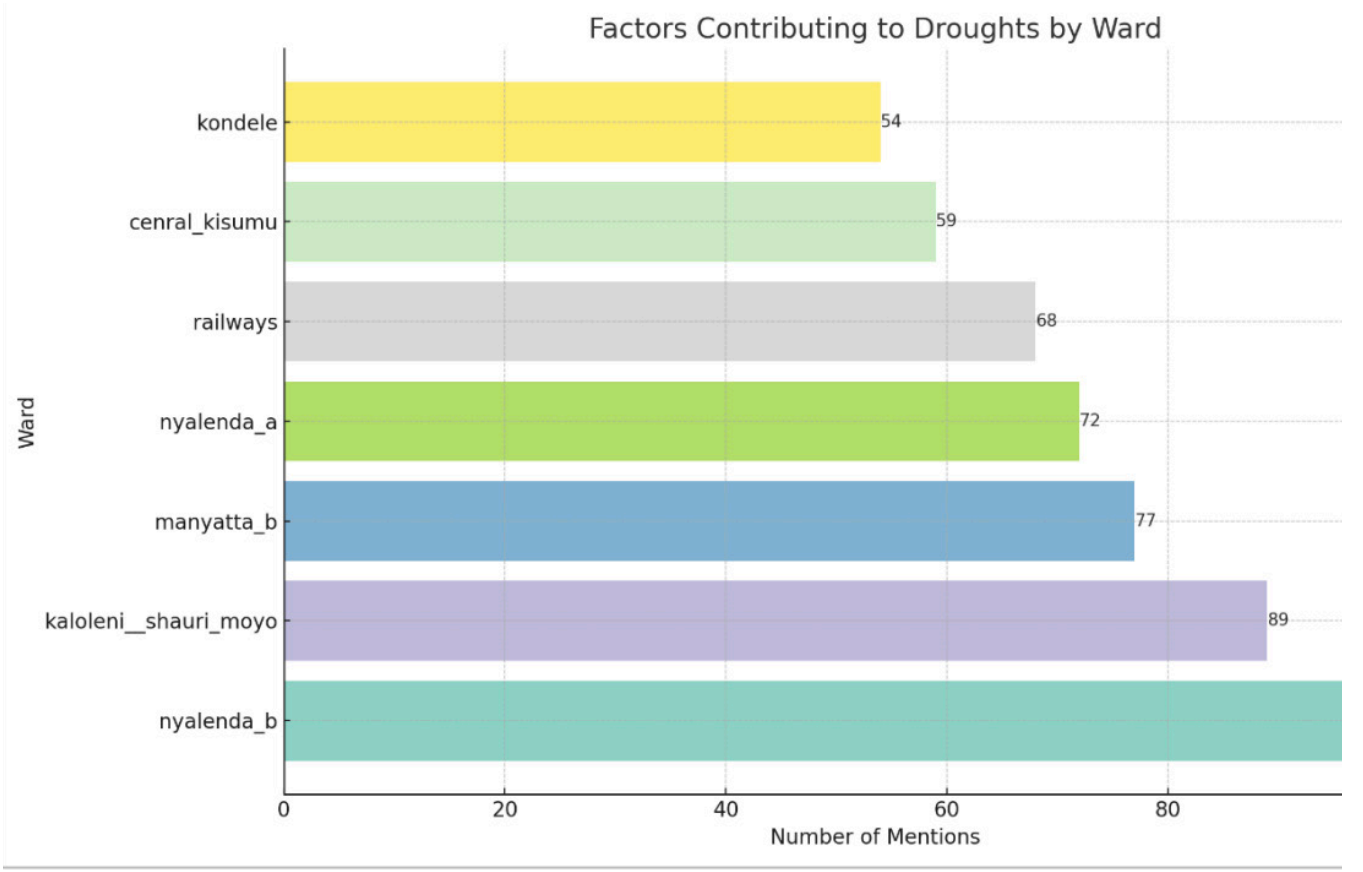
The analysis of the field survey data reveals a pronounced concern over droughts within specific wards. The data points to a significant awareness of drought as an environmental challenge, with 958 responses acknowledging its occurrence an implications. Furthermore, 525 responses delve into the factors contributing to droughts, providing a window into community perceptions and the local context of this issue.

Looking at the ward-specific data, Central Kisumu ward stands out with the highest number of mentions (189), suggesting that drought is a top-of-mind issue for its residents. Manyatta B and Nyalenda B wards follow with 155 and 148 mentions respectively. The presence of drought-related concerns in these areas could be attributed to several factors, such as dependency on rain-fed agriculture, inadequate water storage and conservation measures, or the urban heat island effect that exacerbates water scarcity in built-up areas.

While drought, at first glance, might seem counterintuitive given the concerns about lake-level rise, it underlines the diverse and often paradoxical nature of climate challenges. Drought affects not only the availability of water but has cascading impacts on agriculture, livelihoods, and food security. The data from households, when juxtaposed with the insights from the key informants and community charrettes, illuminates the depth and breadth of the challenges faced by the communities in these wards. This confluence of data and narrative emphasizes the urgency for holistic and adaptive strategies to address both water excess and scarcity.

Factors Contributing to Droughts

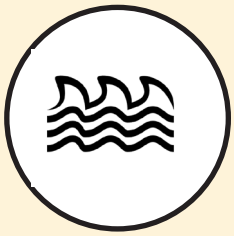
There are varied levels of awareness and concern among communities. Certain localities demonstrate a pronounced awareness, possibly mirroring first-hand experiences with drought repercussions. The findings reflect a broad recognition of drought issues throughout the surveyed locales, with some wards showing heightened involvement, indicative of either more direct impacts from drought or increased efforts in awareness-raising. Such insights are crucial for crafting Subtle interventions, potentially encompassing educational initiatives, infrastructural improvements, and policymaking to bolster drought resilience and readiness. Additionally, these patterns of engagement offer valuable guidance for further research and the strategic distribution of resources aimed at mitigating the ecological and economic effects of drought conditions.



FINDINGS BY CLIMATE

LAKE-LEVEL RISE

Awareness of Lake-Level Presence in Neighborhoods Due to Poor Drainiage



Lake-Level rise

64%

** This is an estimate of the number of respondents who acknowledged the presence of lake-level rise due to poor drainage, Kisumu Climate Vulnerability Index Report 2024*

Community-Identified Factors of Impacts on Lake-level Rise

Poor Drainage | Blocked Drainage | Settlement in Flood Plain

Community Response/Initiatives to Lake-Level Rise

1. **Implementation of Modern Hydrologic Models**
2. **Implementation of Green Infrastructure**
3. **Reinforcement of Regulations that Prevent Settlement in Flood Plains**
4. **Enhancement of Drainage Systems**

Overview

Lake-level rise in Kisumu City exemplifies the urgent need for dynamic climate risk vulnerability mapping to inform urban planning and disaster resilience strategies. As a lakeside city adjacent to Lake Victoria, Kisumu is on the frontline of climate-induced changes, where fluctuating lake levels pose a diverse threat to the urban fabric, from submerging infrastructure to displacing communities.

The development of a comprehensive vulnerability map would enable city planners and decision-makers to pinpoint critical assets at risk, understand the socio-economic implications of rising waters, and prioritize adaptive measures. This allows Kisumu City to anticipate and prepare for the realities of a changing climate, safeguarding its future growth and the well-being of its inhabitants

Impacts of Lake-Level Rise

The impacts of lake-level rise in the wards surrounding the lake underscore a blend of natural and man-made challenges, emphasizing the intricate interplay of environmental conditions, infrastructural shortcomings, and governance policies in shaping the region's susceptibility to the rising lake levels:

Poor design Drainage system: 124

Heavy rainfalls: 108

Blockage of Drainage system: 72

Floodplains: 34

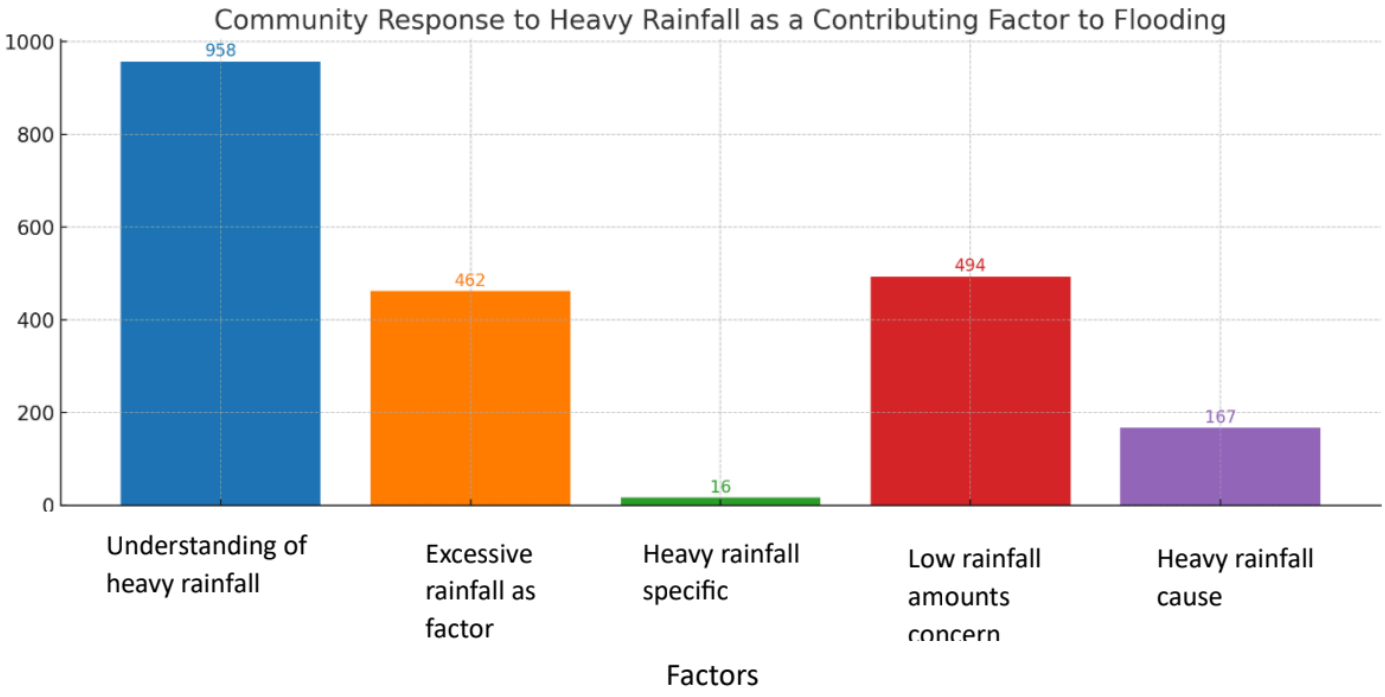
Other specify: 10

Agricultural practice: 4

Community Interventions

The rise in lake levels due to blocked drainage systems affects the socio-economic conditions of the residents. Blocked drainages can lead to standing water, which not only threatens properties and local infrastructure but also poses health risks by creating breeding grounds for disease-carrying vectors such as mosquitoes.

The interventions could include regular cleaning, debris removal, and infrastructure upgrades to accommodate higher water volumes during heavy rainfall events. Moreover, public education campaigns can raise awareness about the importance of keeping drainages clear and the role each citizen plays in maintaining the community's infrastructure.

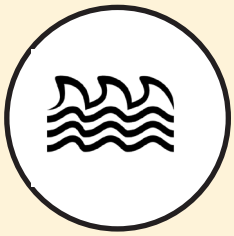


ıre 3. 54: Community response to heavy rainfall

FINDINGS BY CLIMATE

STRONG WINDS

Respondents who Report Experiencing Strong Winds More than 5x



Strong Winds More Than 5x

15%

** This is an estimate of the number of respondents who noted experiencing strong winds more than five times, Kisumu Climate Vulnerability Index Report 2024*

Wards With the Strongest Winds

Nyalenda B | Central Kisumu | Manyatta B

Major Impacts on Vulnerability

Damage to Buildings

Power Disruptions

Community Response/Initiatives to Strong Winds

1. **Relocating Affected Persons**
2. **Reinforcing of Roofs**
3. **Tree Planting**

Overview

The phenomenon of strong winds is not just a fleeting environmental concern but a palpable threat to the inhabitants of the wards surrounding the lake. Notably, Nyalenda B emerges as the most affected, with 68 instances indicating awareness or experiences related to strong whirlwinds. Following closely are Central Kisumu ward with 64 instances, Manyatta B with 45, and Railways with 38. These figures highlight the spatial distribution of this challenge, suggesting a need for targeted interventions. While strong winds might seem indiscriminate in their wrath, the data implies specific geographic susceptibilities, further enriched by the insights from the key informant interviews. The intertwining of community experiences, spatial data, and expert perspectives paints a comprehensive picture of the challenges posed by strong winds in the region.

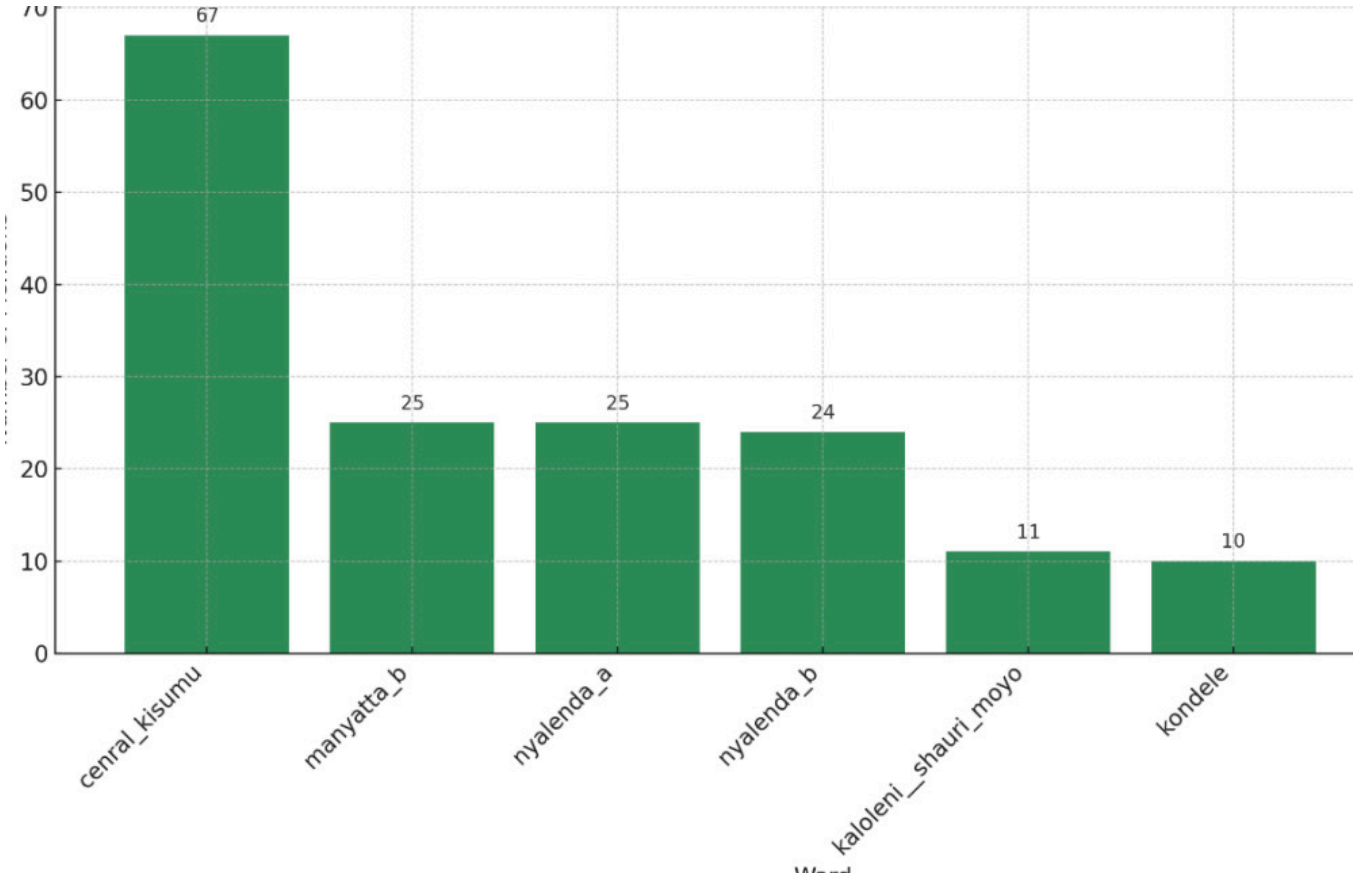
Effects of Strong Winds

The implications of strong winds in these areas are diverse, affecting infrastructure, livelihoods, and personal safety. In urban wards such as central Kisumu, the effects can be particularly severe, with potential damage to buildings, interruptions to power supplies, and increased risk of injury from flying debris. The high number of mentions in Manyatta B and Nyalenda B suggests that these residential areas are also vulnerable, possibly due to less robust construction standards and the presence of informal settlements.

Community Response to Strong Winds

The analysis of community responses to strong winds, as reflected in the survey data, provides a significant illustration of how various wards are preparing for and reacting to these events. With 170 responses across the dataset regarding community response to strong winds, there's a notable variance in preparedness and response levels across the wards.

Central Kisumu leads in terms of the number of responses, with 67 mentions, indicating that the community has been notably active in responding to the winds. This could involve emergency health responses, securing properties, or clearing debris after wind incidents. Manyatta B, Nyalenda A, and Nyalenda B also show substantial community engagement, with 25, 25, and 24 responses respectively, highlighting that these areas have recognized the importance of community-led initiatives in mitigating the risks associated with strong winds.



FINDINGS BY CLIMATE

FIRES

Community Awareness and Preparedness to Fires

Awareness	Preparedness
89%	<5%

** This is an estimate of the number of respondents who noted their awareness and preparedness to fires, Kisumu Climate Vulnerability Index Report 2024*

Wards With the Strongest Winds

Nyalenda B | Kaloleni/Shauri Moyo | Central Kisumu

Major Impacts on Vulnerability

Socioeconomic Vulnerability

Loss of Life

Property Damage

Community Response/Initiatives to Fires

1. **Tree Planting**

2. **High-Temperature Resistant Agriculture**

Overview

The presence of fire as a significant concern in these wards underlines the need for preventive measures, community awareness programs, and improved firefighting capabilities. Fires, whether natural or man-made, can lead to loss of life, property damage, and long-term socio-economic challenges. The analysed data, coupled with insights from the key informants and community charettes, highlights the urgency of addressing this challenge, ensuring the safety and resilience of the communities in these wards.

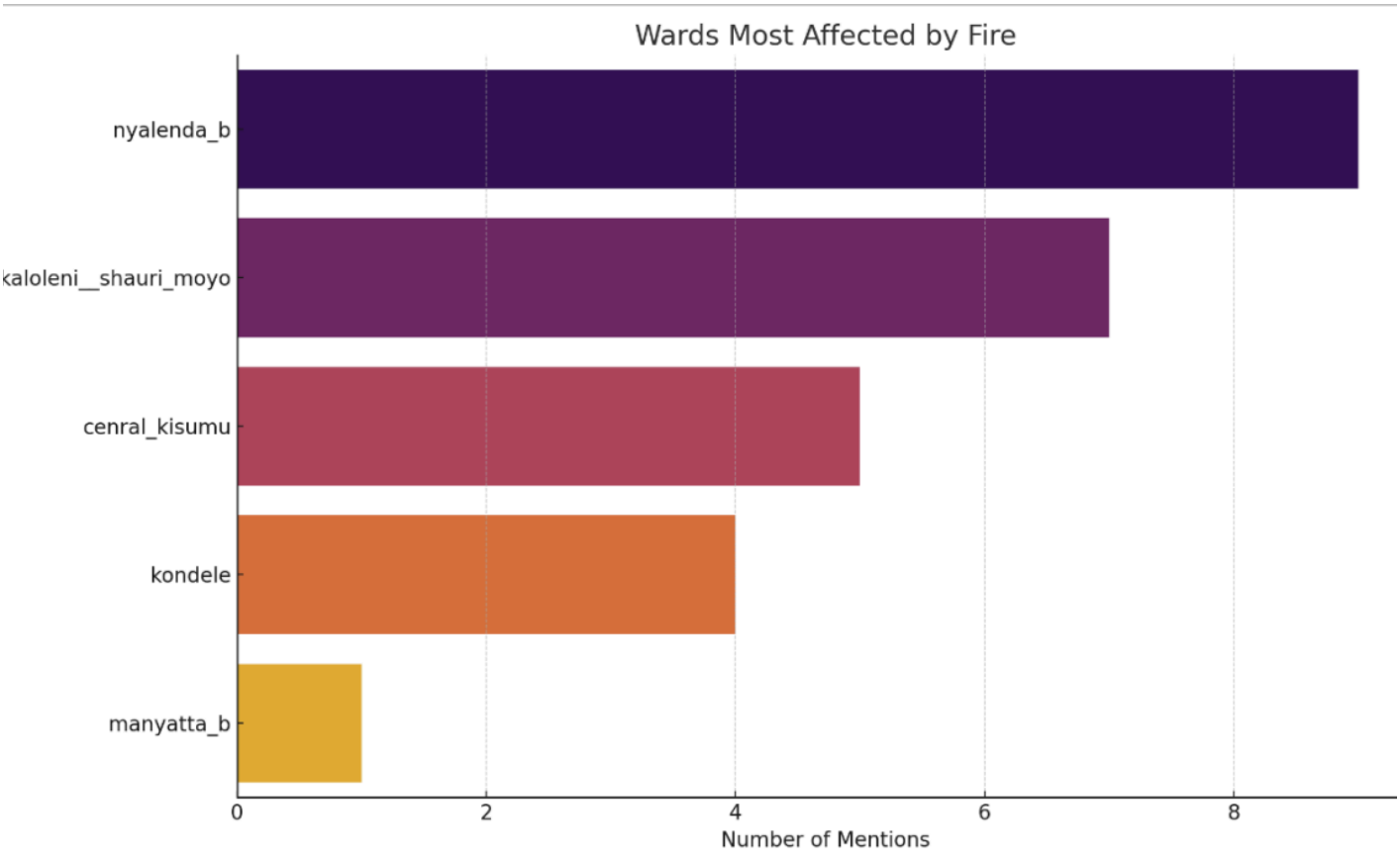
From understanding predisposing factors to bolstering response mechanisms and focusing on socio-economic rehabilitation post-incidents, each ward presents unique challenges and opportunities. The intertwining of data insights, community experiences, and expert perspectives is crucial to forge a path forward, ensuring safety, resilience, and sustainable growth for the communities in these wards.

The analysed data offers a quantitative glimpse into the wards most affected by fires, the qualitative aspect - the fears, experiences, and hopes of the community - adds depth to the narrative. Fires, with their potential for immediate destruction, highlight the need for robust response mechanisms. However, the community's perspective underlines the importance of holistic approaches that encompass prevention, swift response, and comprehensive post-fire support.

Mitigation of Fires

Mitigation and future planning strategies in the context of socio-economic resilience often focus on environmental initiatives, and the data from the wards in Kisumu underlines this trend. Tree planting emerges as a predominant theme, representing a shared understanding of its value in mitigating environmental risks.

The recurrence of tree planting in the dataset, with hundreds of mentions across different wards, suggests a concerted effort to embrace this strategy. The emphasis on planting trees speaks to a diverse approach to environmental stewardship. Trees provide a natural bulwark against soil erosion, serve as carbon sinks to mitigate climate change, and enhance urban green spaces, contributing to better air quality and biodiversity. The varied mentions of this activity, from general tree planting to the specific inclusion of high-temperature-resistant crops, reveal an adaptive strategy designed to respond to the changing climatic conditions. This adaptation is crucial, considering the rising temperatures and more frequent extreme weather events.



CLIMATE RISK VULNERABILITY ASSESSMENT REPORT FOR KISUMU CITY

Central Kisumu Ward

Railways Ward

Kondele Ward

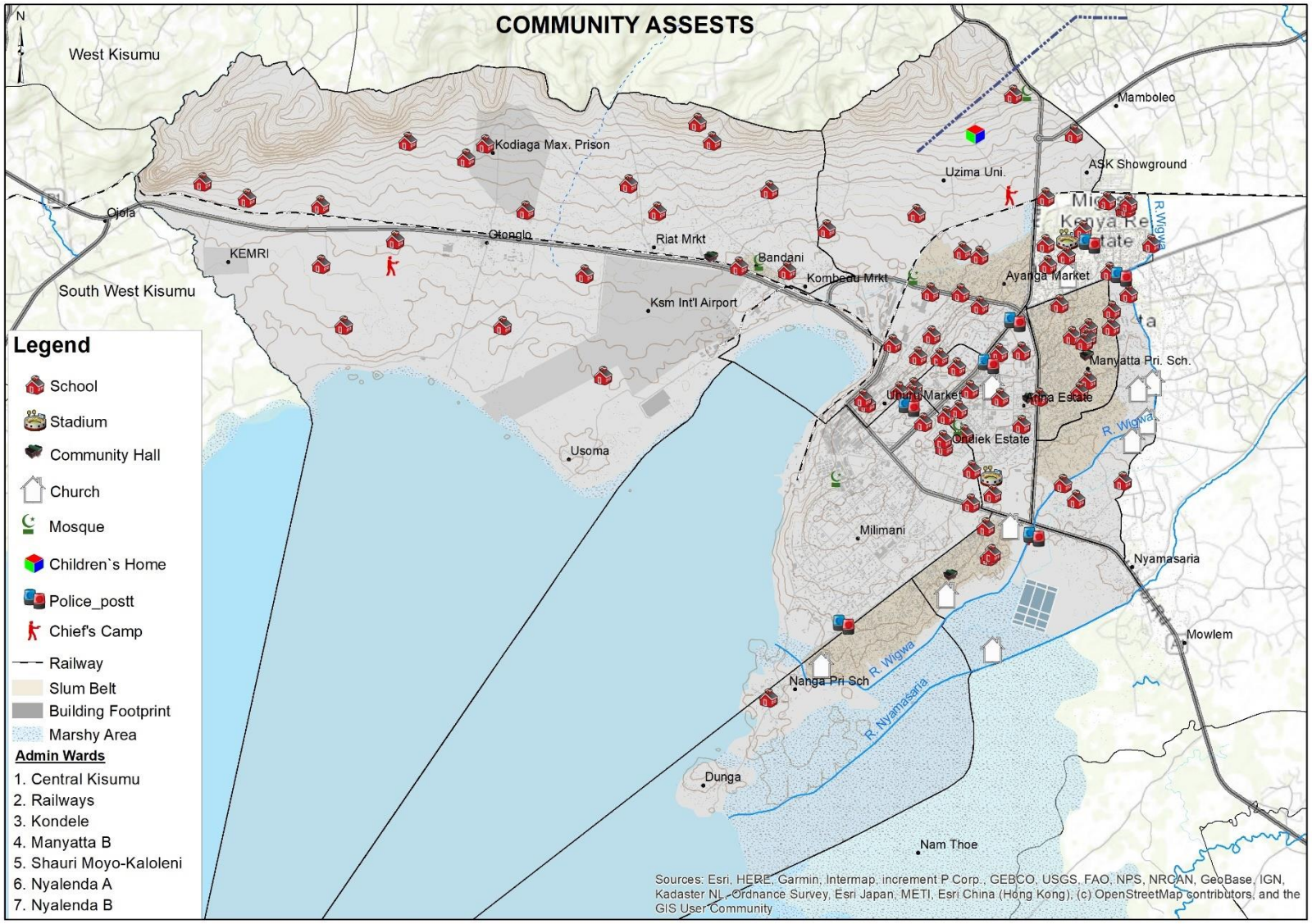
Manyatta 'B' Ward

Nyalenda 'A' Ward

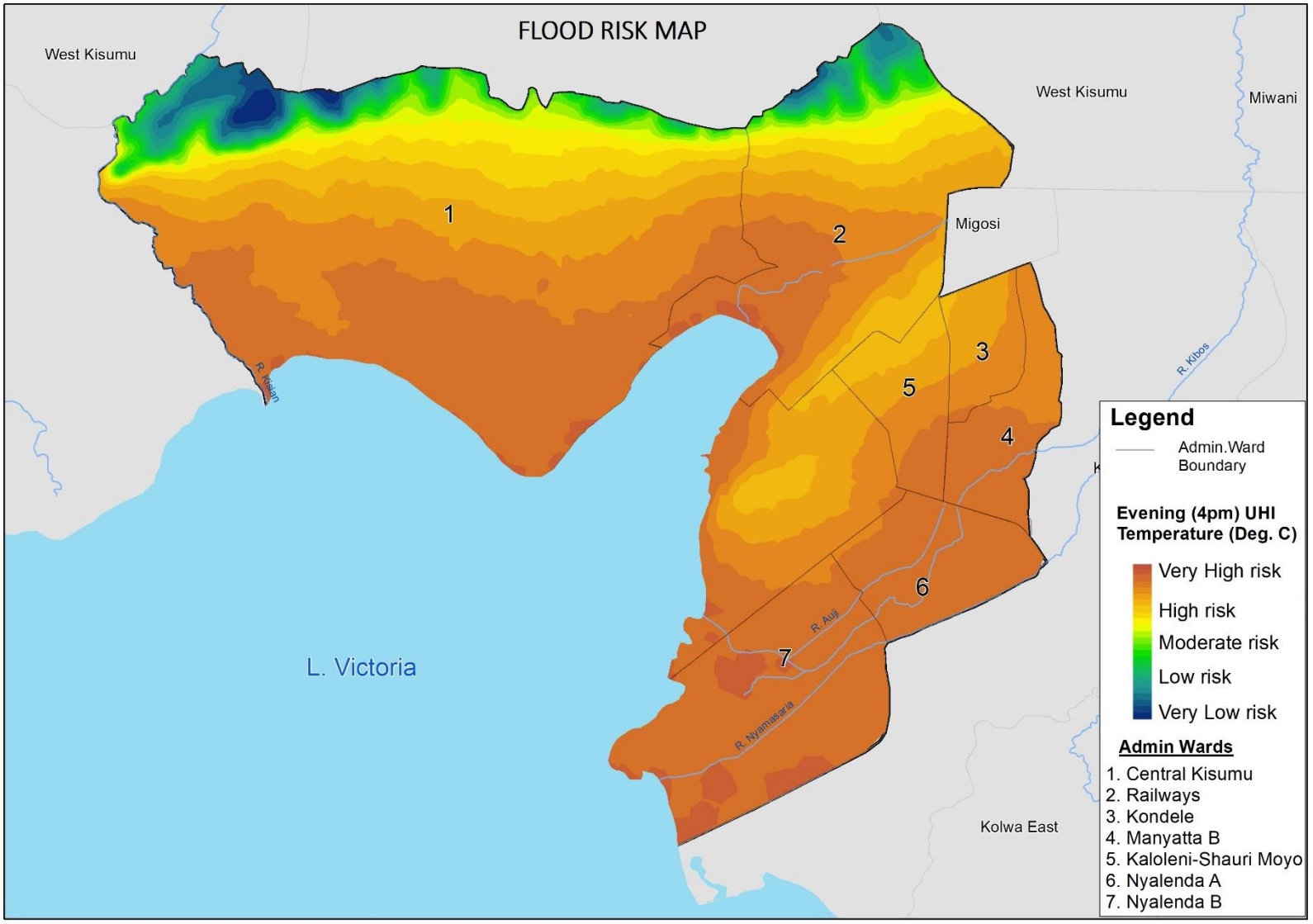
Nyalenda 'B' Ward

Shauri Moyo/Kaloleni Ward

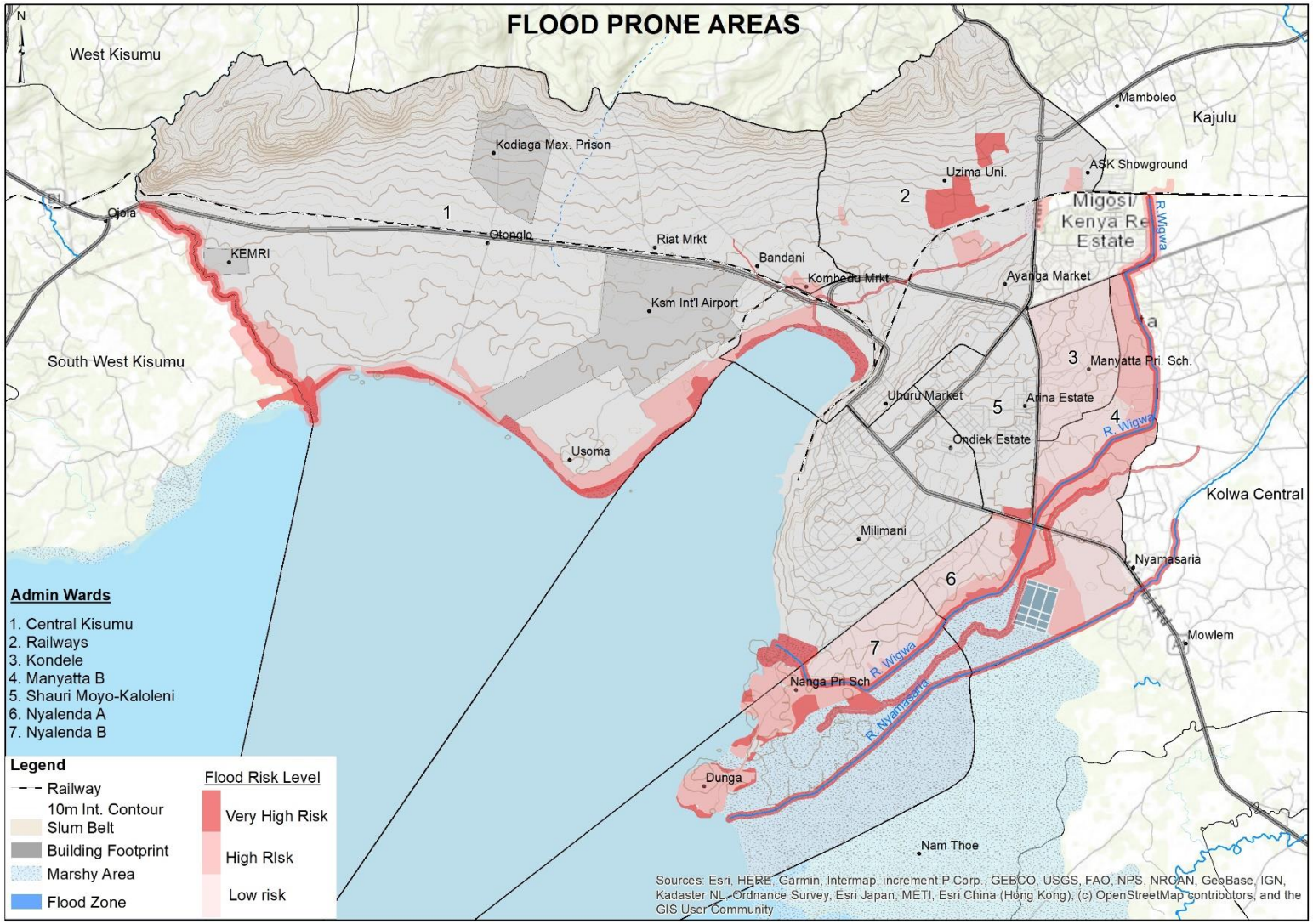
APPENDIX VI: Community Assets



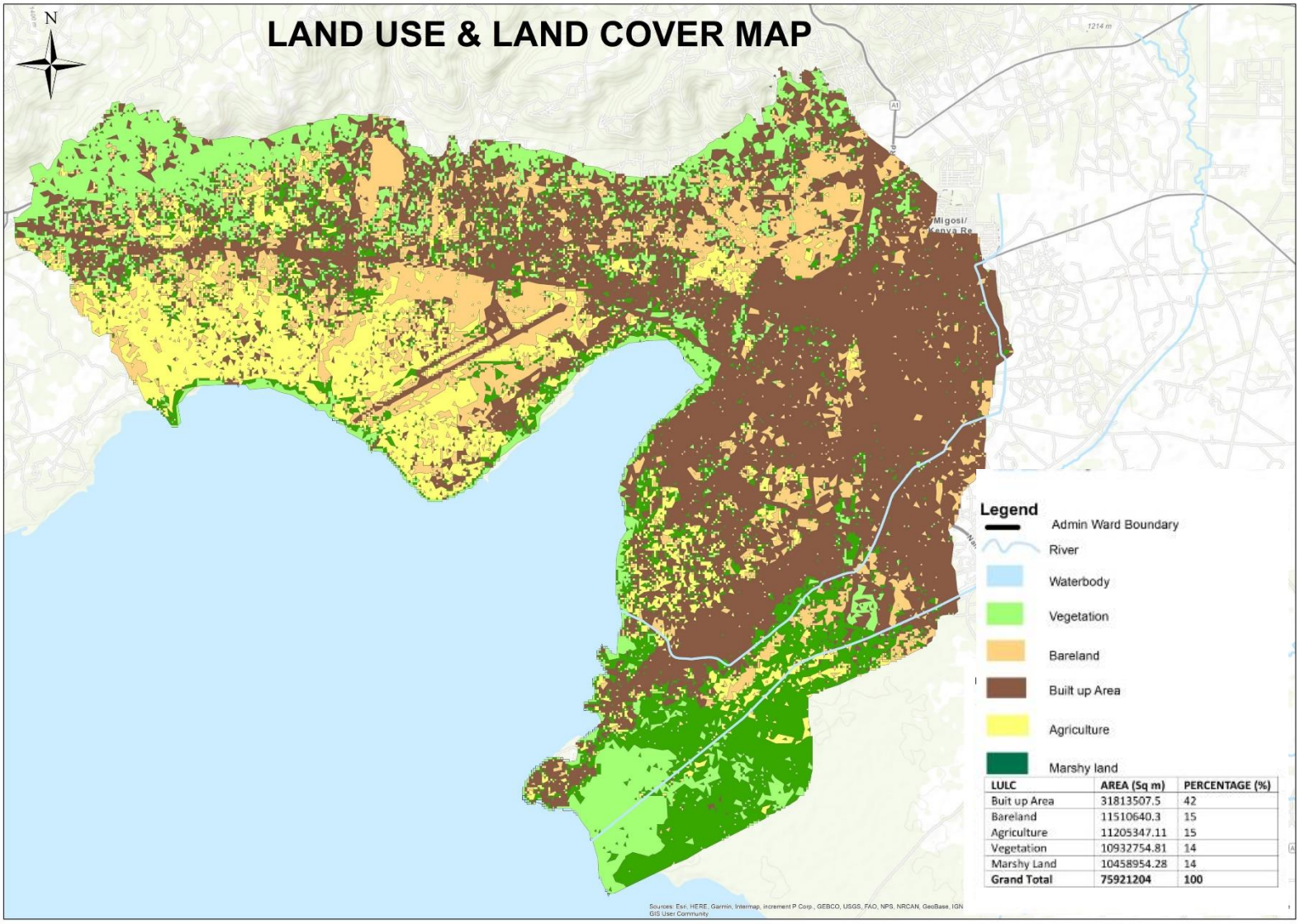
APPENDIX VI: Flood Risk Areas I



APPENDIX VII: Flood Risk Areas II

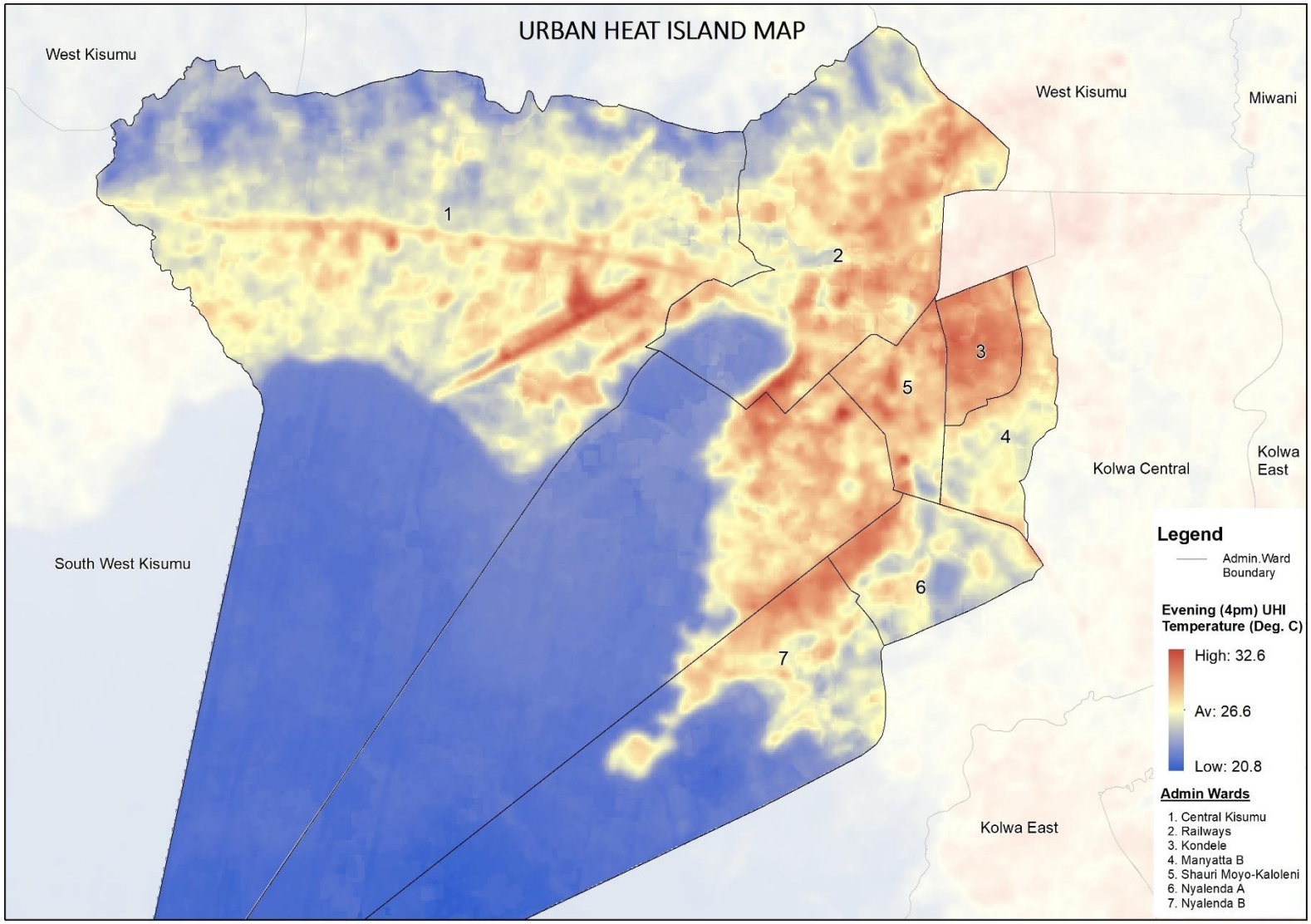


APPENDIX VIII: Landuse Land Cover

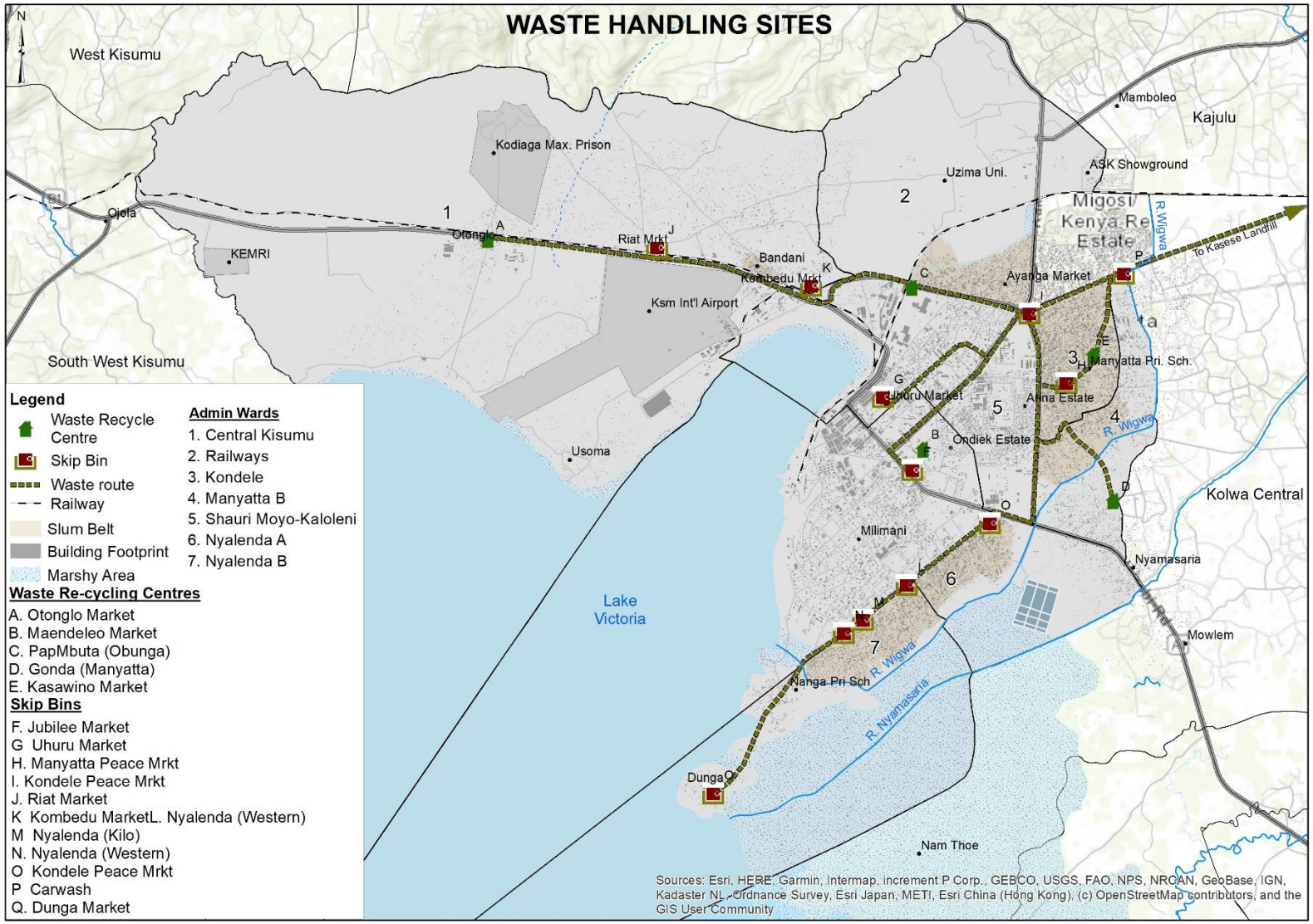


LULC	AREA (Sq m)	PERCENTAGE (%)
Buit up Area	31813507.5	42
Bareland	11510640.3	15
Agriculture	11205347.11	15
Vegetation	10932754.81	14
Marshy Land	10458954.28	14
Grand Total	**75921204**	**100**

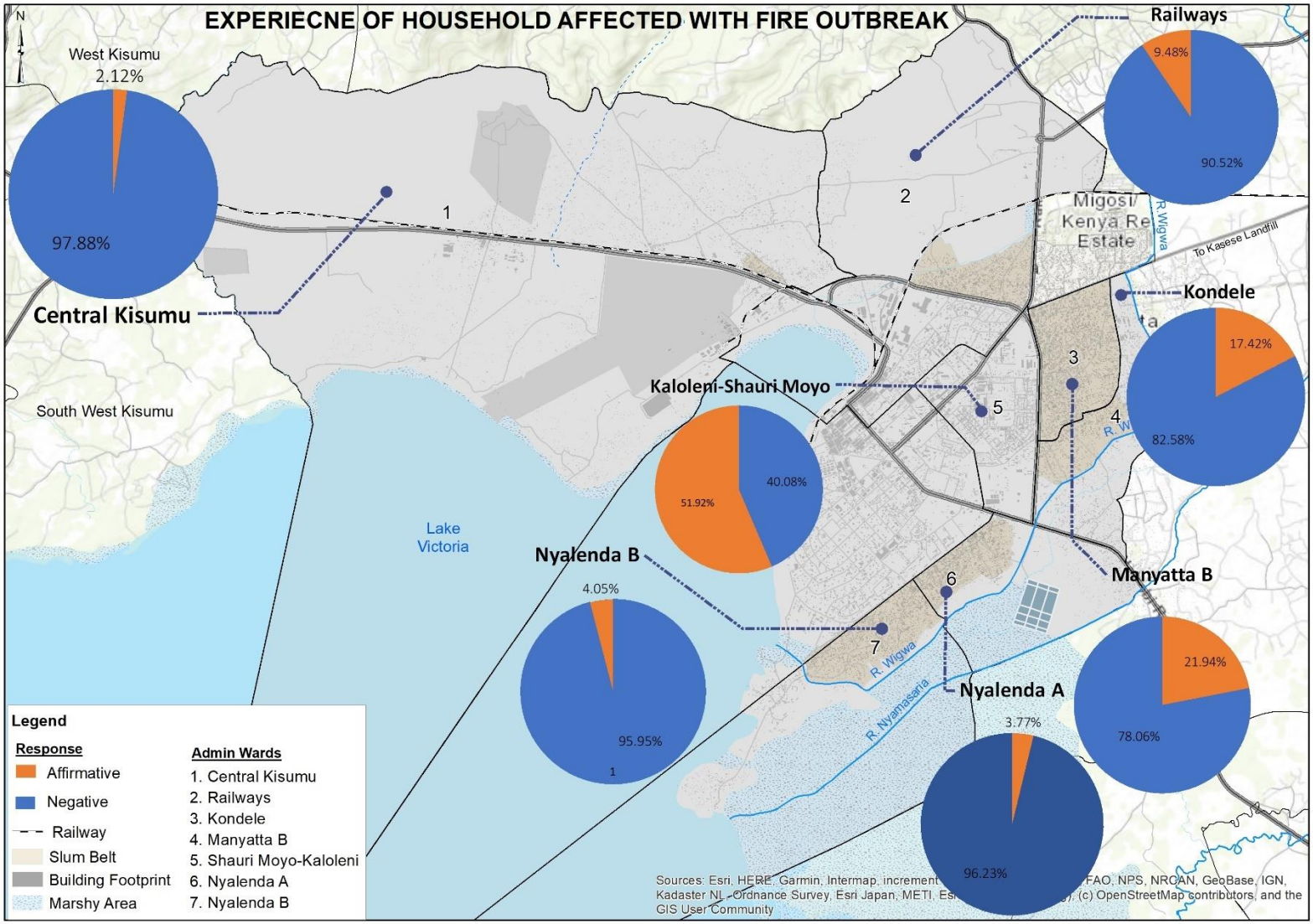
APPENDIX IX: Urban Heat Island



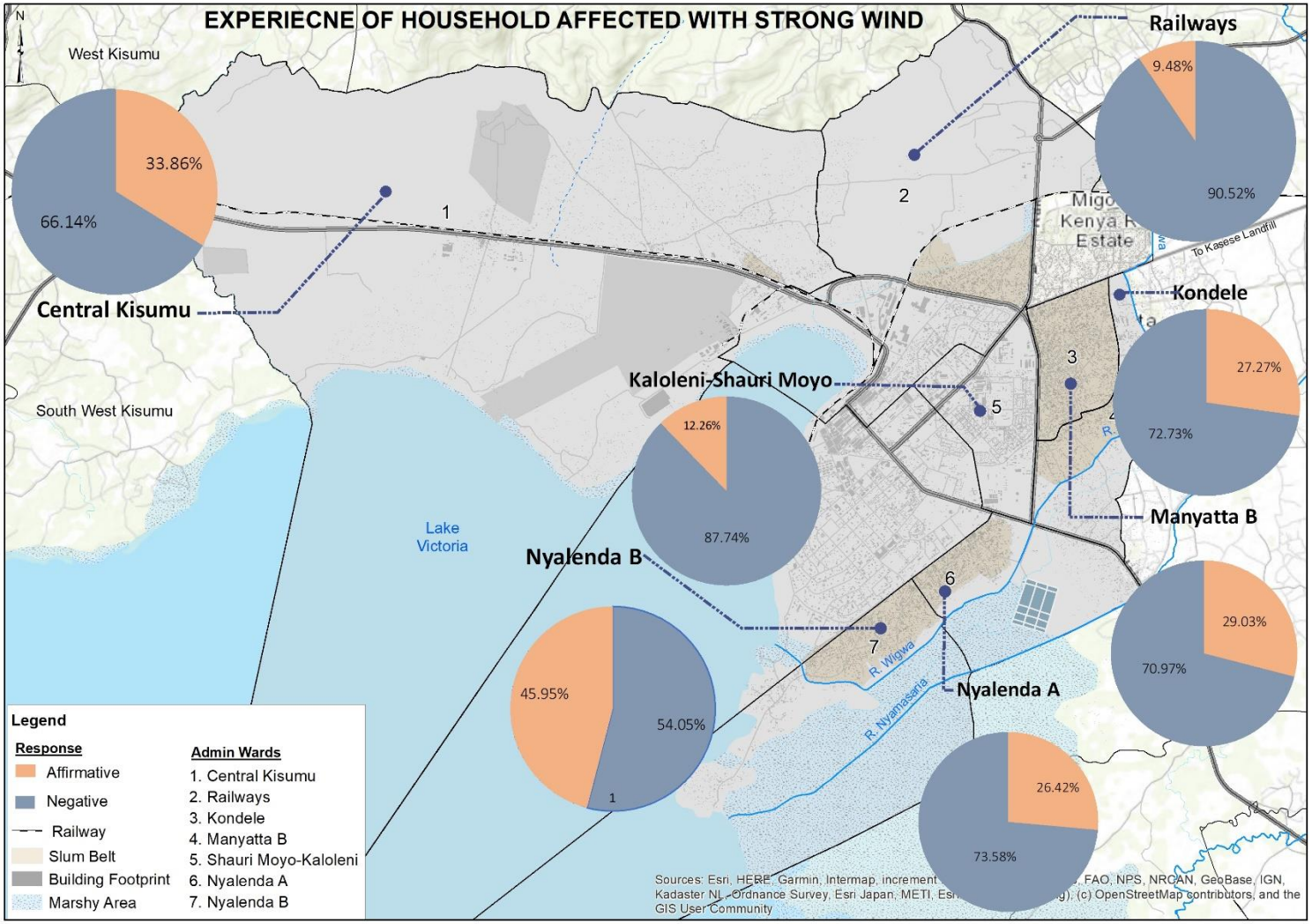
APPENDIX X: Waste Handling Sites



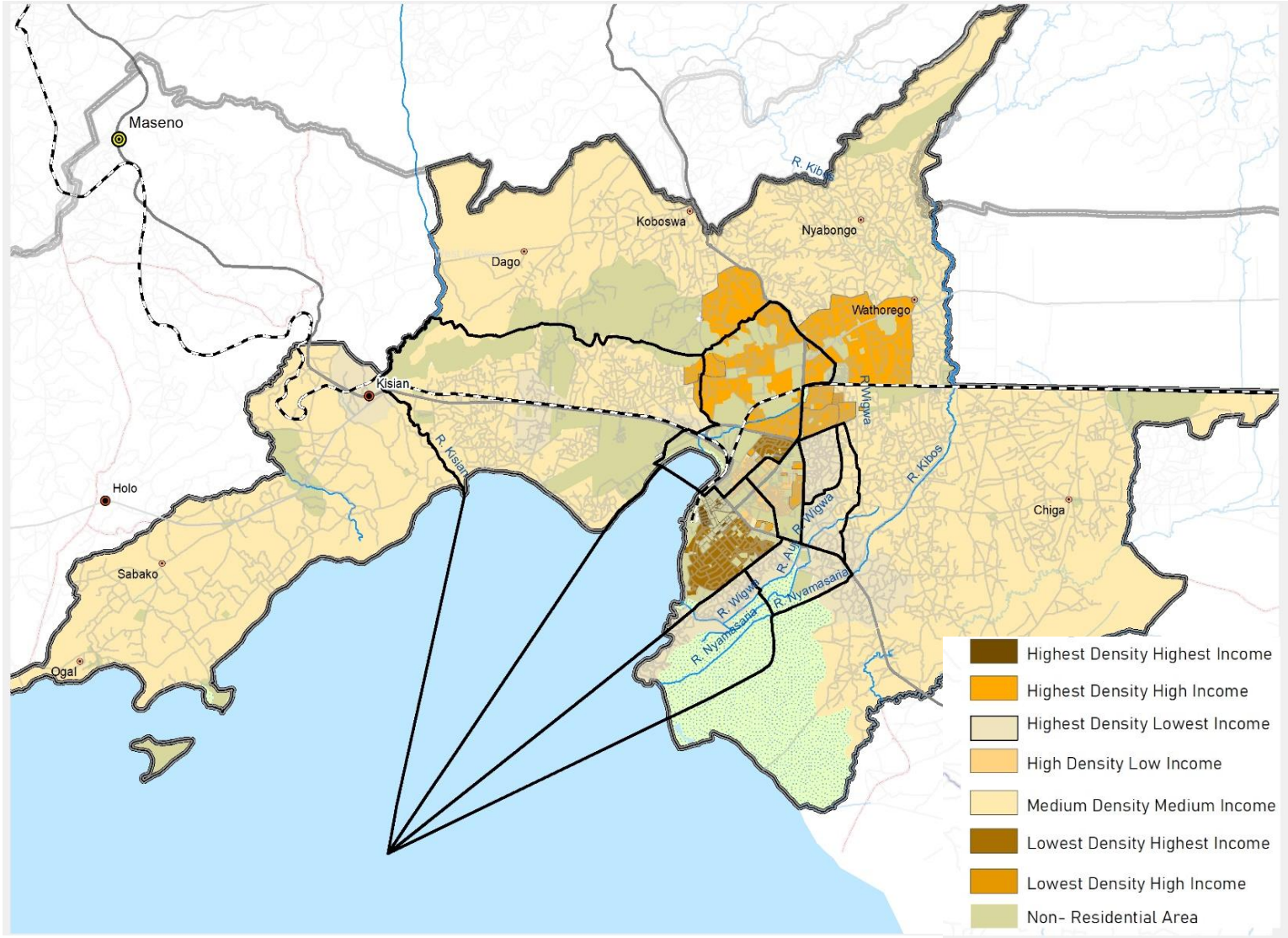
APPENDIX XI: Experience of Household affected with Fire Outbreak



APPENDIX XII: Experience of Household affected with Strong Winds



APPENDIX XIII: Population density vs Income areas Choropleth



APPENDIX XVI: Photo Gallery (Highlights of Challenges and Opportunities)

Nyalenda A- Kanyakwar Village

Nyalenda B- Nanga

Manyatta B

Kondele

Nyalenda B- Dunga

Nyalenda A- Western Unit

APPENDIX XV: Photo Gallery (Workshops and Trainings)

Official Project Launching Workshop

Co- Researcher Briefings and flagging

Technical Validation Workshop

Co-researchers' training Workshop

Community Mapping and Sensitization workshop

Community Validation Workshop

APPENDIX XVI: Threads of Resilience: Mapping Vulnerability Risk Assessment in The Urban poor

In the sprawling informal settlements of a bustling city of Kisumu County, where poverty and overcrowding define daily life, a new threat looms large: climate change. As temperatures soar and extreme weather events become more frequent, the residents of the seven informal settlements of Manyatta A and B, Nyalenda A and B, Kondele, Shauri Moyo and Railways Ward among others find themselves facing unprecedented challenges. Here, amidst the chaos of urban life, a community struggles to survive amidst the shadows of environmental challenges. This is where our story begins, in a place where vulnerability lurks around every corner and resilience is born from necessity.

Meet Jane (not her real name), a young woman who calls the slum home. As she navigates the maze of narrow pathways, she notices subtle changes in her surroundings. The once familiar rhythms of life are disrupted by erratic weather patterns and sudden floods that turn streets into rivers. Concerned by the growing threats, Jane joins a community initiative aimed at understanding and addressing these vulnerabilities.

When a prolonged high temperature hits the city, inadequate housing and access to clean water exacerbates the suffering of the informal dwellers. With each passing day, tensions rise as resources grow scarce and tempers flare. Jane, along with Muungano Wa Wanavijiji movement a group of passionate activists from the community, decides to act against the apathy of local government and the indifference of wealthier neighborhoods.

As Jane and with the support of Muungano Wa Wanavijiji mobilizes the community, they face numerous obstacles, from bureaucratic red tape to resistance from powerful interests.

Despite the odds, they organize grassroots initiatives to promote sustainable practices, such as opening of blocked drainages, setting up of waste recycling centres and rainwater harvesting systems. Along the way, they encounter skeptics and doubters within their own community, forcing them to confront deep-seated attitudes and beliefs. Led by a team of dedicated volunteers, Jane participates in a vulnerability risk mapping project. Armed with notebooks and GPS devices, they venture into the heart of the slum, documenting the process.

When a devastating flood engulfs the informal settlement following a heavy down pour season, Jane and her friends realizes the urgent need for collective action. They rally the community to demand for better infrastructure and disaster preparedness measures from the County government of Kisumu. Their efforts gain momentum as they gain support from sympathetic allies outside the informal settlement such as Slum Dwellers International and other environmental organizations.

Through perseverance and solidarity, the informal settlement community members have achieved small victories, such as improved drainage systems and increased access to affordable renewable energy. Although the challenges of climate change remain daunting, the residents of the informal settlements are empowered to face them head-on, knowing that they are not alone in their struggle. As Jane and other community members become optimistic over a transformed community, they see hope for a brighter, more sustainable future.

Undeterred by setbacks, members of, Kondele, Nyalenda A and B, Manyatta A and B, Railways and Shauri Moyo continue to advocate for change, leveraging their vulnerability map as a tool for empowerment and mobilization.

With the support of grassroots organizations and partner organizations, they try to push for investments in climate-resilient infrastructure, community-led initiatives, and policies that prioritize the needs of the most vulnerable. As the maps take shape, Jane and Muungano Wa Wanavijiji engage with the community, inviting residents to share their stories and struggles. They listen to Jane, a young mother striving to feed her children amidst rising food prices and William, a community mobilizer advocating for better waste management systems. Through their voices, the maps come alive, painting a portrait of resilience and resistance in the face of adversity

With ingenuity and resourcefulness, Muungano wa Wanavijiji mobilized their members within the community and with the support of Slum Dwellers International they embarked on a journey of discovery, conducting surveys, interviews, and participatory mapping exercises. As they navigate the maze of narrow alleyways and makeshift shelters, they uncovered the hidden vulnerabilities that lurk beneath the surface, from precarious housing to inadequate access to essential services. As members of these informal settlements begin to chart a path towards resilience, they reflect on the power of collective action and the resilience of the human spirit in the face of adversity.