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Pamoja Trust
Creating Voice and Space with the Urban Poor

Settlement Profiling on Losses and Damages Arising from Climate Change Impacts

Case of Nyalenda B and Manyatta B Informal Settlements in Kisumu County, Kenya.

Executive summary

Kenya's cities are experiencing rapid urbanization, which has led to significant growth in informal settlements and the emergence of new ones. The characteristics of these informal settlements reveal inherent vulnerabilities, typically summarized as inadequate access to infrastructure and basic services, insecurity of land tenure, high poverty levels, and generally inadequate housing, as defined by the United Nations.

Many of these settlements are located in areas prone to climate hazards, exposing their residents to climate change impacts for which they are ill-prepared. Moreover, the insecurity of land tenure commonly deters both residents and external stakeholders from investing in long-term climate mitigation and adaptation measures, as the lack of formal ownership reduces incentives for building durable infrastructure and implementing sustainable environmental practices. As a result, these communities are disproportionately affected by climate-related disasters, exacerbated by their pre-existing vulnerabilities.

This settlement profiling report focuses on two informal settlements in Kisumu County, Kenya, examining the losses and damages incurred due to climate change impacts. The report concludes that both Nyalenda B and Manyatta B are affected by slow-onset climate events and various climate hazards, including flash floods, rising temperatures, prolonged dry seasons, increased heavy rainfall, and strong winds.

Their vulnerability to climate change is compounded by environmental conditions such as geographic location, topography, soil typology, and lack of development. Social factors, including demographic arrangements, social groupings, urbanization rates, health and education status, and cultural aspects, further influence their exposure. Finally, their economic conditions, defined by the systems they rely on for livelihoods, play a critical role in their vulnerability.

Both settlements experience significant economic and non-economic losses, particularly as a result of flooding events. Economic losses manifest through the destruction of social and physical infrastructure,

including housing, existing roads, drainage facilities, and sanitation systems, as well as the loss of income-generating activities, particularly within informal business ventures. Non-economic losses, on the other hand, are reflected in the loss of lives, social and intrinsic values, and biodiversity.

Despite these challenges, the resilience of the settlements is evident in their coping and adaptive capacities, many of which are closely tied to cultural adaptive strategies. The interplay of climate change impacts, vulnerabilities, and exposure to these impacts—along with the significant losses and damages experienced by households and gaps in community-led resilience strategies—highlights the need for a coordinated approach. Such an approach is essential to address these challenges and to assist communities in rebuilding better in the face of both reversible and irreversible losses and damages

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1.0 Background

Kenya, like many other countries, is experiencing rapid urbanization. According to the Kenya National Bureau of Statistics, the urban population reached 31.1% in 2019, totaling approximately 14.83 million people. Nairobi, the capital, leads with the highest urban population of 4.397 million, followed by Mombasa, Nakuru, Kisumu, and Eldoret. Notably, in Nairobi, about 70% of residents live in informal settlements or areas with slum-like conditions. In Kenya, informal settlements are marked by insecure land tenure (ranging from squatting to informal rental arrangements), high poverty levels, limited access to essential services and infrastructure, and overall poor living conditions.

Climate change poses significant challenges for urban areas worldwide, and Kenya's informal settlements are particularly vulnerable. While efforts to adapt to and mitigate climate change are ongoing, these settlements are often the hardest hit by climate impacts and related natural disasters. This vulnerability arises from multiple factors; environmental, social, and economic that limit their resilience and preparedness. The lack of climate-resilient infrastructure further compounds these issues, leaving residents with inadequate coping capacities.

In Kenya, informal settlements face heightened risks from floods, landslides, extended droughts, and the urban heat island effect. Due to limited preparedness and the high exposure and vulnerability of the population, these communities often experience severe losses and damages during climate-related events. For residents already living in fragile conditions, disasters create additional challenges due to scarce personal resources and delayed post-disaster response, hindering recovery efforts. Many residents are also excluded from aid distribution and post-disaster rebuilding initiatives, which further deepens their vulnerability to future hazards.

Addressing climate challenges in informal settlements requires a comprehensive understanding of their physical conditions, demographics, and unique vulnerabilities. Effective climate action

must consider these complexities to build climate-resilient urban communities.

This report examines the losses and damages suffered by residents of two informal settlements in Kisumu County, Kenya: Nyalenda B and Manyatta B.

We begin by offering a contextual overview of each settlement, exploring vulnerabilities to climate hazards across environmental, social, and economic dimensions. We also outline the main hazardous and slow-onset climate events affecting these areas and assess their existing coping and adaptation strategies. Following this, we examine the economic and non-economic losses and damages in these communities and provide insights and recommendations for policy and practical interventions on Loss and Damage.

2.0 Introduction

This loss and damage settlement profiling report has been developed in the context of two informal settlements; Nyalenda B and Manyatta B. Administratively, both settlements are located in Kisumu County. Nyalenda B settlement is situated at Nyalenda B Ward in Kisumu Central Sub County while Manyatta B settlement is situated at Manyatta B ward in Kisumu East Sub County. Nyalenda B settlement comprises of five community units; Western, Kilo, Got Owak, Nanga-Kapuothe, and Dunga amongst the five, Dunga, Nanga and Western are the most affected by climate change impacts.

Manyatta B settlement on the other hand comprises 6 units; ; Upper Kanyakwar, Lower Kanyakwar, Gesoko, South Kuoyo, Central Kuoyo and North Kuoyo units and amongst these, Lower Kanyakwar, Lower Kuoyo and Gesoko are the most affected by climate change impacts in the form flooding.The main cause of losses and damages resulting from climate change is flooding hazards and this vulnerability is attributed to the settlements' geographic locations, topography and proximity to major water bodies. But aside from flooding, the settlements are also affected by urban heat Island and droughts as a result of pro- longed dry seasons.

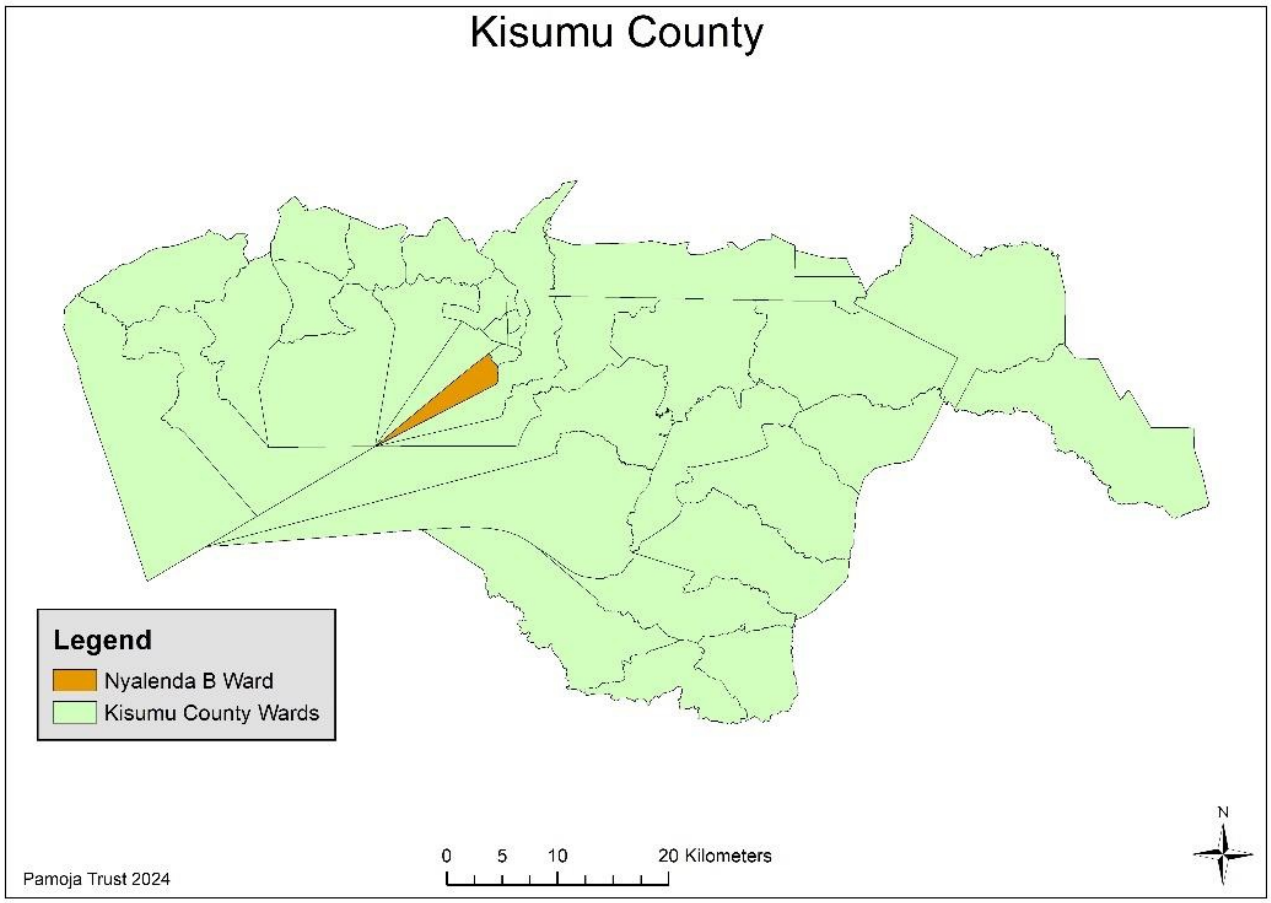


Figure 1: Nyalenda B in the context of Kisumu County

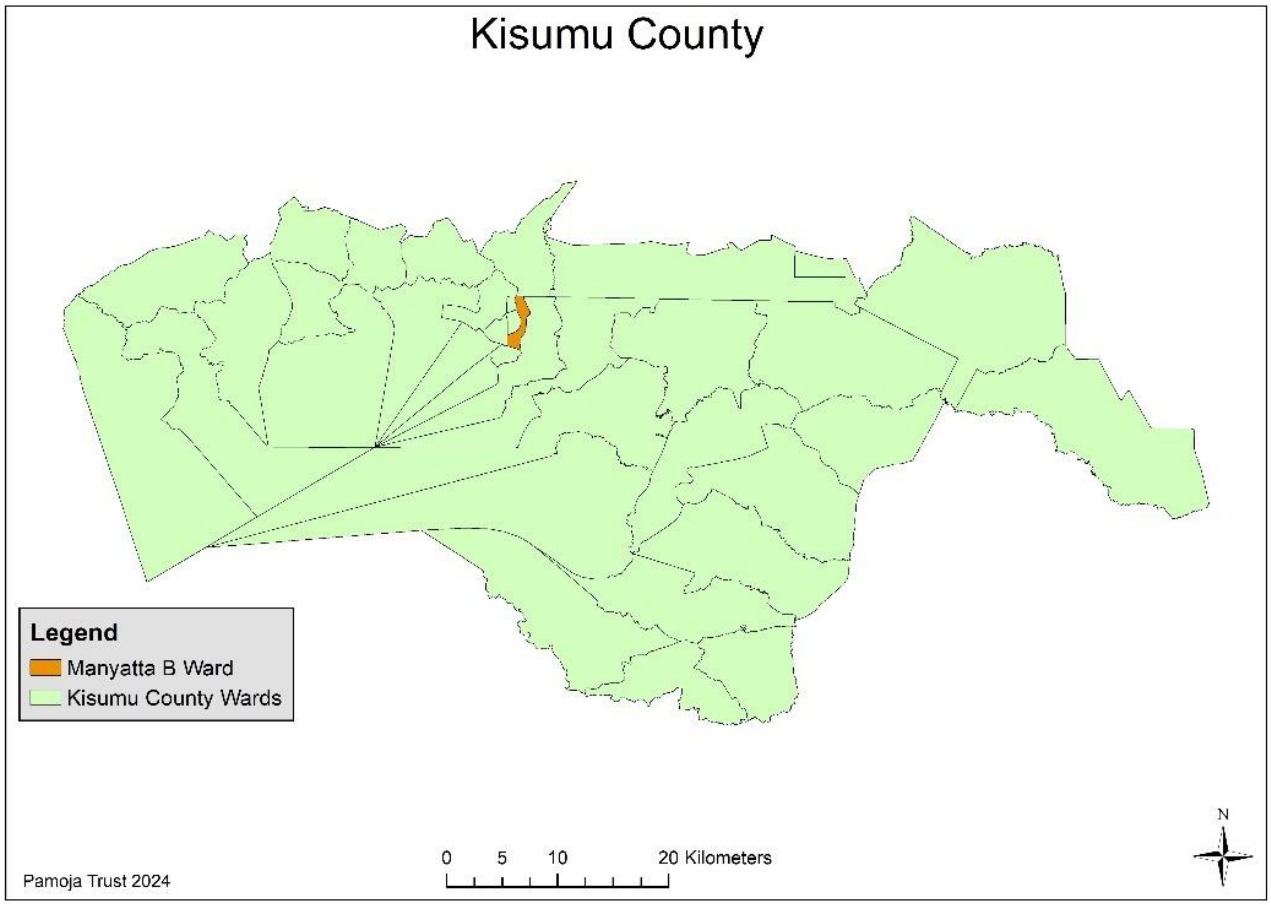
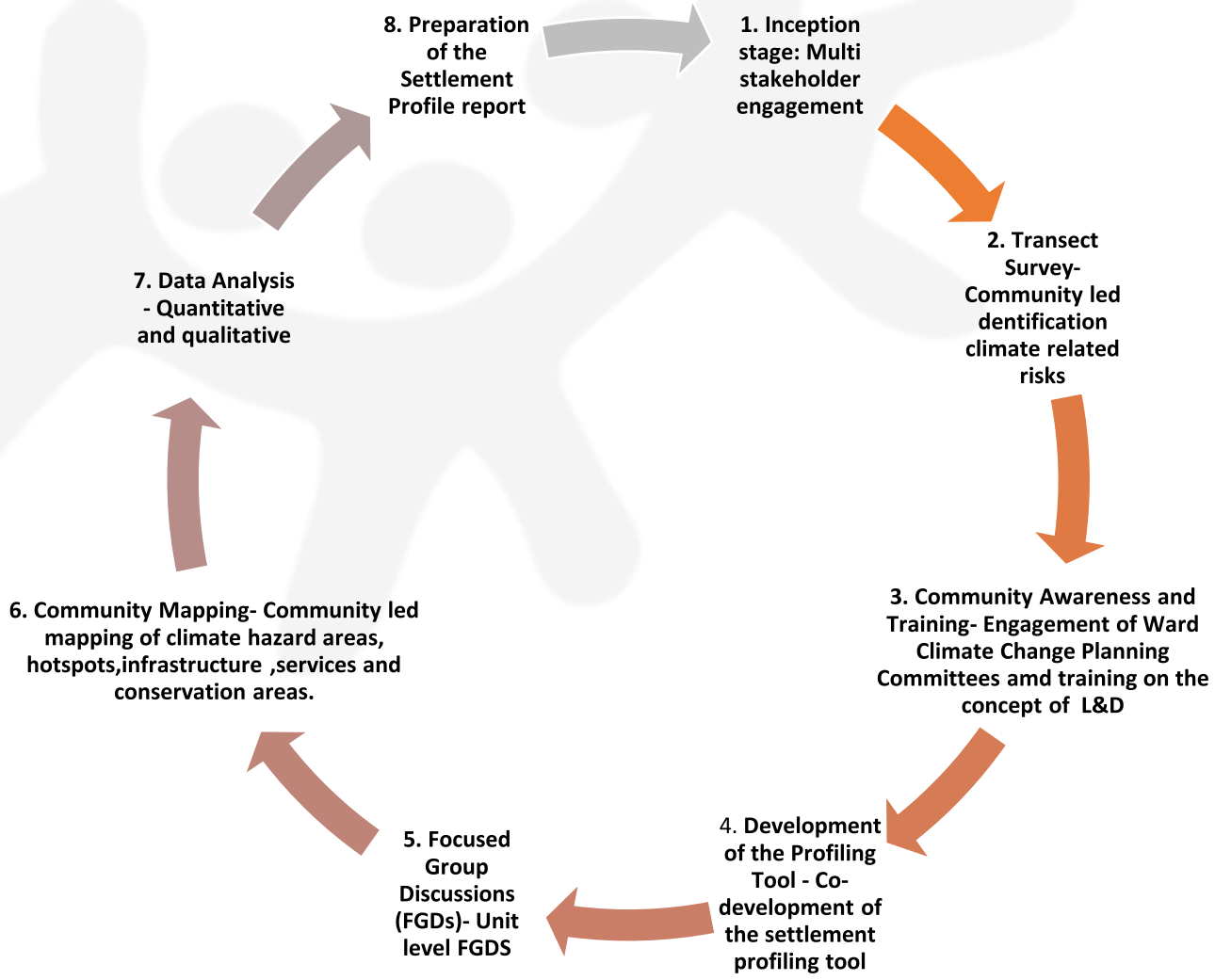


Figure 2: Manyatta B in the context of Kisumu County

2.1 Methodology

The methodology of developing this settlement profile heavily relied on interaction with the local knowledge and observations undertaken at a time when the community had just experienced extreme rainfalls that led to heavy flooding



i. Inception stage.

This stage involved identification and engagement of key stakeholders, including affected community members, community leaders, local government officials, NGOs, and. This ensured that the process is inclusive and considers diverse perspectives.

ii. Transect Survey

Transect surveys were conducted across the settlement and were coordinated by the community members and done to identify and map climate-related risks. This involves walking through the

settlement along predetermined paths to observe and document environmental conditions, infrastructure, social amenities and other community assets. The observations were documented using photography and notetaking.

iii. Community Awareness and Training

The team organized awareness and training sessions for community members and other stakeholders including the Ward Climate Change Planning Committee and government representatives, on loss and damage concepts and major terminologies used in the climate discussions. This training covered both economic and non-economic losses, and general awareness on the impacts of climate change in the settlement over the years. The community members identified the specific climate-related risks they face, fostering a sense of ownership and empowerment in the process.

iv. Development of the Profiling Tool

In collaboration with the community members, a climate change loss and damage settlement profiling tool was developed that captures relevant data on history, climate risks, vulnerabilities, infrastructure, and community resources. The tool included both qualitative and quantitative indicators.

v. Focused Group Discussions (FGDs)

Conducting focused group discussions at each community unit level. The discussions aimed at gathering in-depth information about local experiences with climate change, including historical events, coping strategies, and losses incurred. The information gathered during the discussions were categorized into themes such as economic impacts, health issues, and social disruptions. Additionally, the community members were able to fill the profiling tool at the community unit levels during the FGD sessions

vi. Community Mapping

The community members were engaged in the mapping exercises to identify climate hazard areas, hotspots, infrastructure, services, and conservation areas. Participatory mapping technique was used to

ensure community input and accuracy relying heavily on SP MAPPER. In addition to desk community mapping, the community members and the project team were able to walk around the settlement to collect spatial data for the climate hazard areas, hotspot areas, critical infrastructure, services, historical and conservation areas as well as livelihoods. The hand drawn maps and spatial data collected were used to prepare visual maps that highlight key areas of concern and community resources

vii. Data Analysis

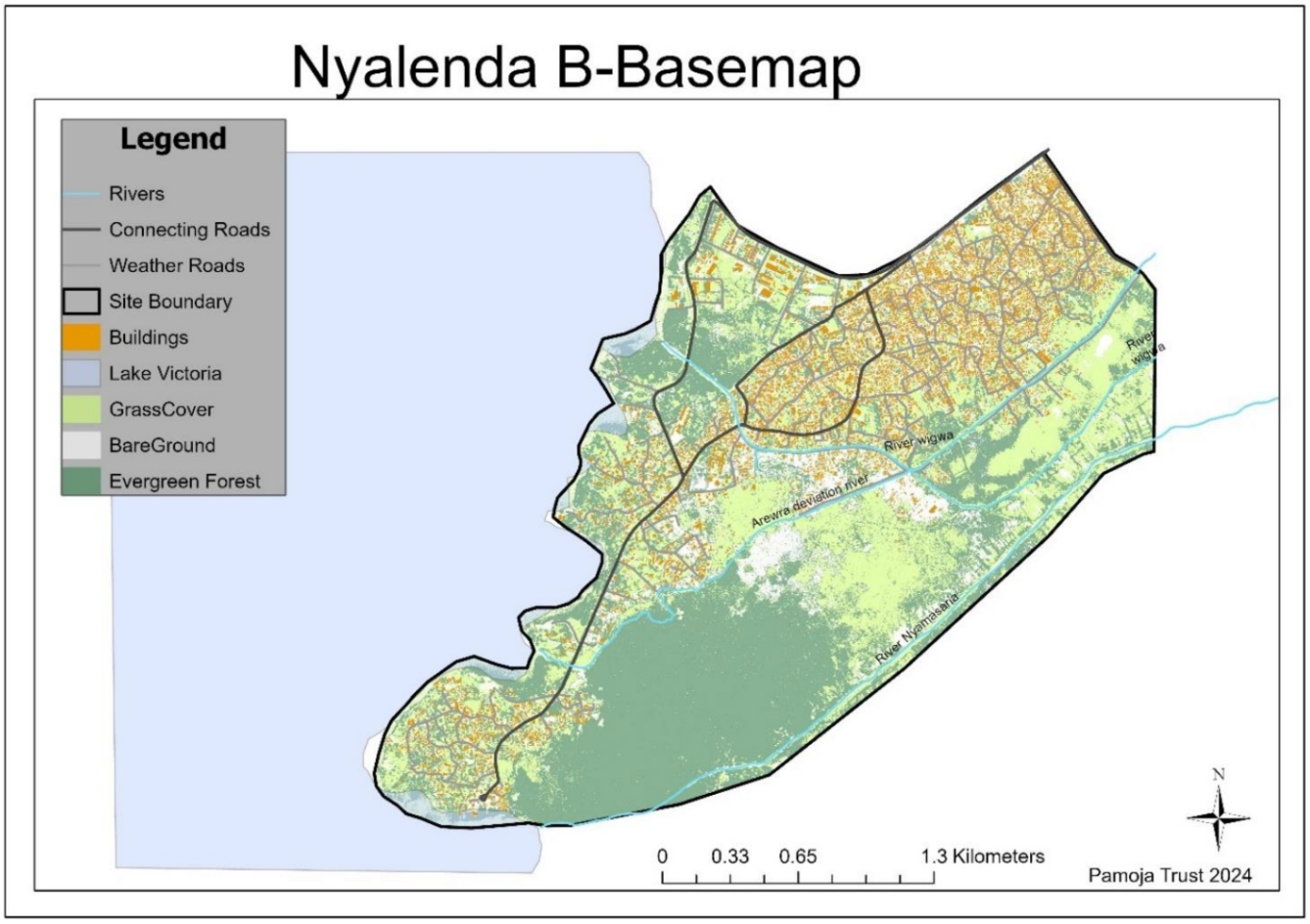
The socio-cultural and economic data collected during the transect survey, using the profiling tool, during the FGDs and the spatial data collected in the field were compiled and analyzed. Key trends and patterns related to climate risks and losses were identified.

viii. Preparation of a Comprehensive Profile Report

The findings were used to prepare a draft comprehensive report including the identified risks, community vulnerabilities, and recommendations for addressing loss and damage. The draft report was subjected to stakeholders for feedback and validation where they were able to give inputs and comments.

Figure 3: Climate Change Planning Committee Members inspecting an affected waste sorting site in Manyatta B

3.0 case study 1: Nyalenda B Informal Settlement



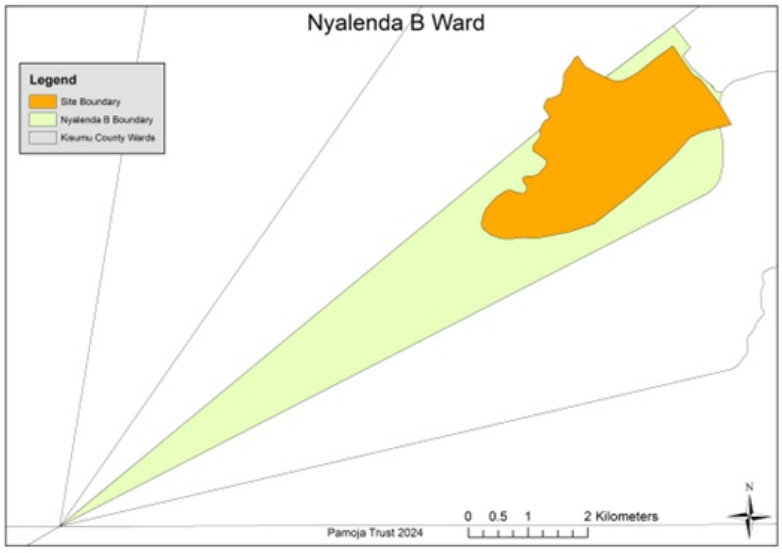


Figure 4: Base map of Nyalenda B detailing the built environment and natural resources

3.1 History of the Settlement

Nyalenda B has a diverse history, with each community unit within the settlement having its own unique historical formation that significantly influences the way of life of the individuals currently inhabiting the settlement. For some of the units, history further reveals the link to the unit's vulnerability to climate change impacts.

Unit	History
Kilo	A business selling meat using the metric system was established in the area, led to the area being named "Kilo," referring to the weighing scale used for the meat. This eventually developed into Kilo Market where there was a slaughterhouse and local brewing attracting people to the unit. The area is home to various ethnic groups, including the Luo and Luhya.
Western	The original inhabitants of Western unit were from the Kasagam clan. During the early 20th century, inhabitants from Siaya County (Alego and Gem) moved to the area following the construction of the Kenya -Uganda railway. The community has seen a rise in population since then.
Nanga Kapuothe Unit	The name "Kapuothe" originates from the Luo word "Puothe," meaning farms, while the area was initially known as "Dago," meaning waterlogged place. During heavy rains from 1957 to 1963, landowners were forced to relocate to various locations, including Five Ways, Kilo, Katworo, Got Owak, and Nyalenda A. Once the floods receded, many returned to reclaim their ancestral land, with some rebuilding homes and others selling their land to relocate elsewhere. The name "Nanga" means clothing in Luo, a reference to the introduction of clothes by white settlers during colonial times. The area was also used by settlers for shooting practice, leading to its name "KarJoNanga," meaning a place occupied by people of clothes.
Got Owak	Got Owak was initially an uninhabited area characterized by bush, hills, and rocks, with only one person named Owak residing there. Following severe flooding that displaced residents from their farms in Kapuodhe, they were compelled to settle in Got Owak,
Dunga	Dunga is a fishing community and was originally a forest with no inhabitants. The Kasagam people migrated there to settle in the area, along with other communities such as the Kano, Luhya, and Hindus, who were attracted by the area's fishing opportunities and transportation routes.

3.2. Climate Hazards and Slow-Onset Events

Nyalenda B settlement experiences both slow-onset and extreme climate change events. According to community perceptions, the area is highly vulnerable to climate-related risks, facing impacts annually. In recent years, the frequency of these hazards has noticeably increased compared to past decades.

Event	Type	Period	Manifestation
Extreme Hazard	Flash Floods	2009(windy)-destruction 2019-people never went back 2022 Most extreme 2024	Flooding due to heavy rainfalls and backflow waters from the lake due to the rising lake levels. Commonly occur in Kapuothe and Dunga areas, Got Owak village units
Slow onset events	Urban Heat Island	2019- 2024	Increased warm temperatures during the days and night time
	Increased rainfall patterns	Riverline flooding in 2022, 2023 2006, 2011, 2012	
	Loss of Bio-diversity	Past 40 years	The fish species have been getting extinct over time

3.3. Nyalenda B Dimensions and Trends of Vulnerability and Exposure to Climate Change Impacts

Vulnerability describes a set of conditions that derive from the historical and prevailing cultural, social environmental, political and economic contexts that makes people and or a place vulnerable to climate change impacts.

3.3.1. Environmental Dimensions

· Physical location at a natural system:

Nyalenda B settlement is situated within the Lake Victoria zone, a naturally vulnerable area significantly impacted by climate change and environmental degradation. The settlement is adjacent to River Wigwa, originally constructed as a canal during the colonial period for stormwater management.

However, during the rainy season, the river often overflows, leading to severe flooding in the nearby Nanga-Kapuothe area.This flooding is exacerbated by the lake's backflow and the overflow of River Nyamasaria (Kibos River), which becomes increasingly silted due to heavy rainfall and human activities such as agriculture.

The overflow from River Nyamasaria into River Uhuru and River Wigwa further intensifies flooding risks. Efforts to mitigate these effects included the digging of a waterway to drain floodwaters from farmlands; however, this has since transformed into Stream Alewra, which now contributes to flooding in adjacent neighborhoods. :

Additionally, the settlement's topography as depicted in the Figure 5 (topography map) plays a significant role in its vulnerability, as runoff from half of Kisumu City area during heavy rainfall flows towards Nyalenda, further complicating water management issues. Environmental challenges such as deforestation in Vihiga County and Nandi Hills lead to increased siltation of the aforementioned River Nyamasaria(Kibos River).

These factors underscore the urgent need for comprehensive strategies to enhance resilience against flooding climate change impacts in Nyalenda B.

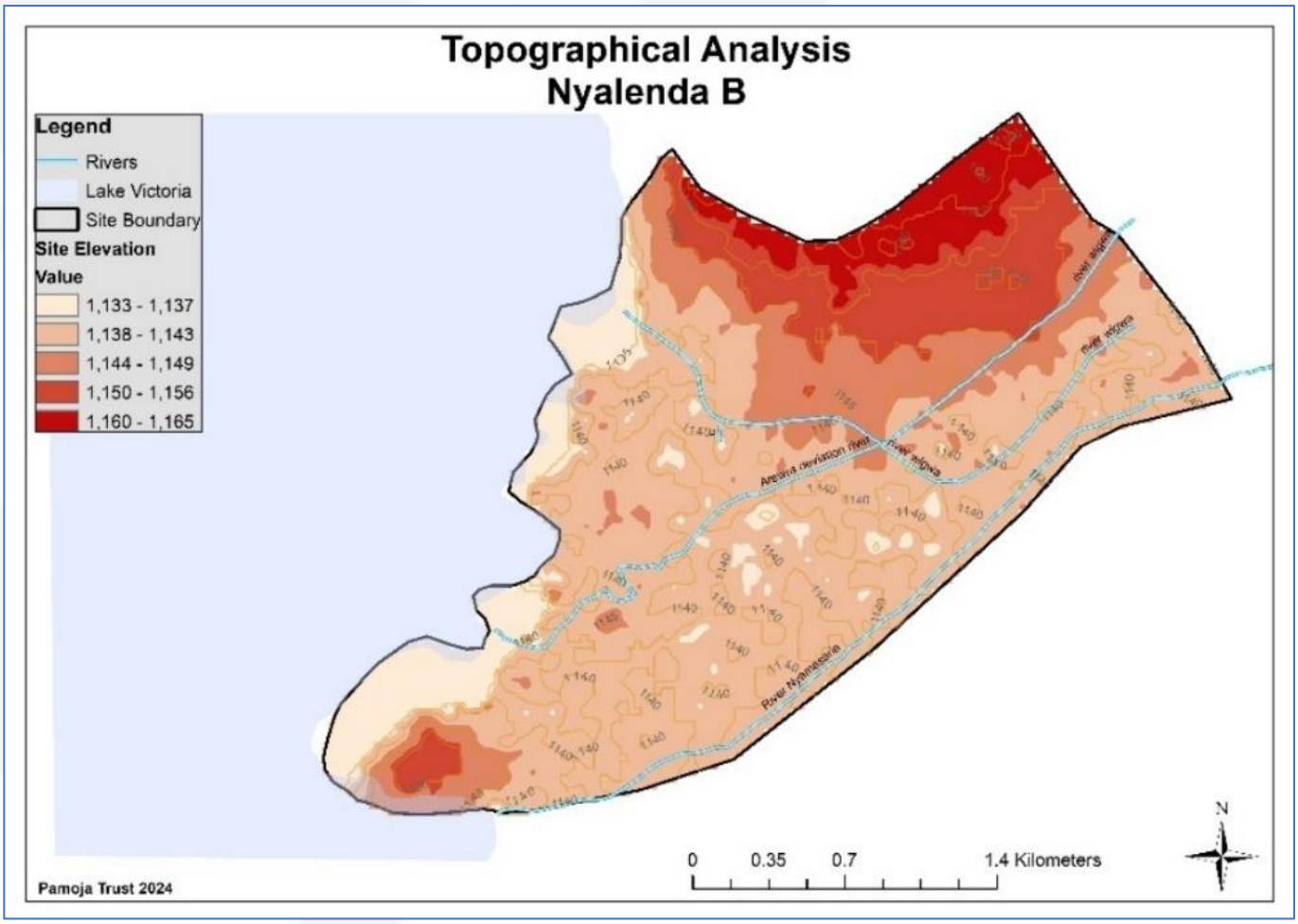


Figure 6 : Nyalenda B topographical map

Figure 7: Image of a section of Nyalenda B affected by lake backflow

· Floodplain and Wetlands encroachment:

Different individuals have occupied and own the land adjacent to the lake, River Nyamasaria and River Uhuru which was constructed to manage stormwater and overflows of River Nyamasaria. Despite this been an ancestral communal land in the past, a glimpse at the history reveals that the area was initially known as "Dago," meaning waterlogged place. During heavy rains from 1957 to 1963, landowners were forced to relocate to various locations. Once the floods receded, many returned to reclaim their ancestral land, with some rebuilding homes and others selling their land to relocate elsewhere. To date there is human occupancy in the flood plains and wetlands which has increased the people's exposure to flood hazards.Figure 6 below shows the distribution of wetlands in the settlement.

Figure 8: Houses developed at a floodplain

Challenges:

There is deficits in risk communication where the people believed that the flood risk had been removed. The government has
continued with the process of providing titles without development control enforcement on use of the land for occupation.

· Informal Settlement Pattern and un-development trajectory

Nyalenda B is an unplanned area that is urbanizing at a fast rate. The state of being unplanned in a hazardous area exacerbates its vulnerability to disaster risk exacerbates due to poor infrastructure development, environmental degradation, lack of institutional coordination, insufficient attention to both existing needs for infrastructure maintenance and appropriate ongoing adaptation to infrastructure to meet potential climate extremes. Being an informal settlement, there is also low priority for government spending in investment in its infrastructure and services with high dependency for its development being dependent on Informal Settlements improvement programs i.e. Kenya Informal Settlement Improvement Program (KISIP)/AFD which led to the development of infrastructure. The Road to Dunga was developed by AFDB, if the road was not constructed, the impacts of flooding would have been experienced and would have been extreme affecting the entire settlement.

Figure 9: Section of Nyalenda B informal settlement

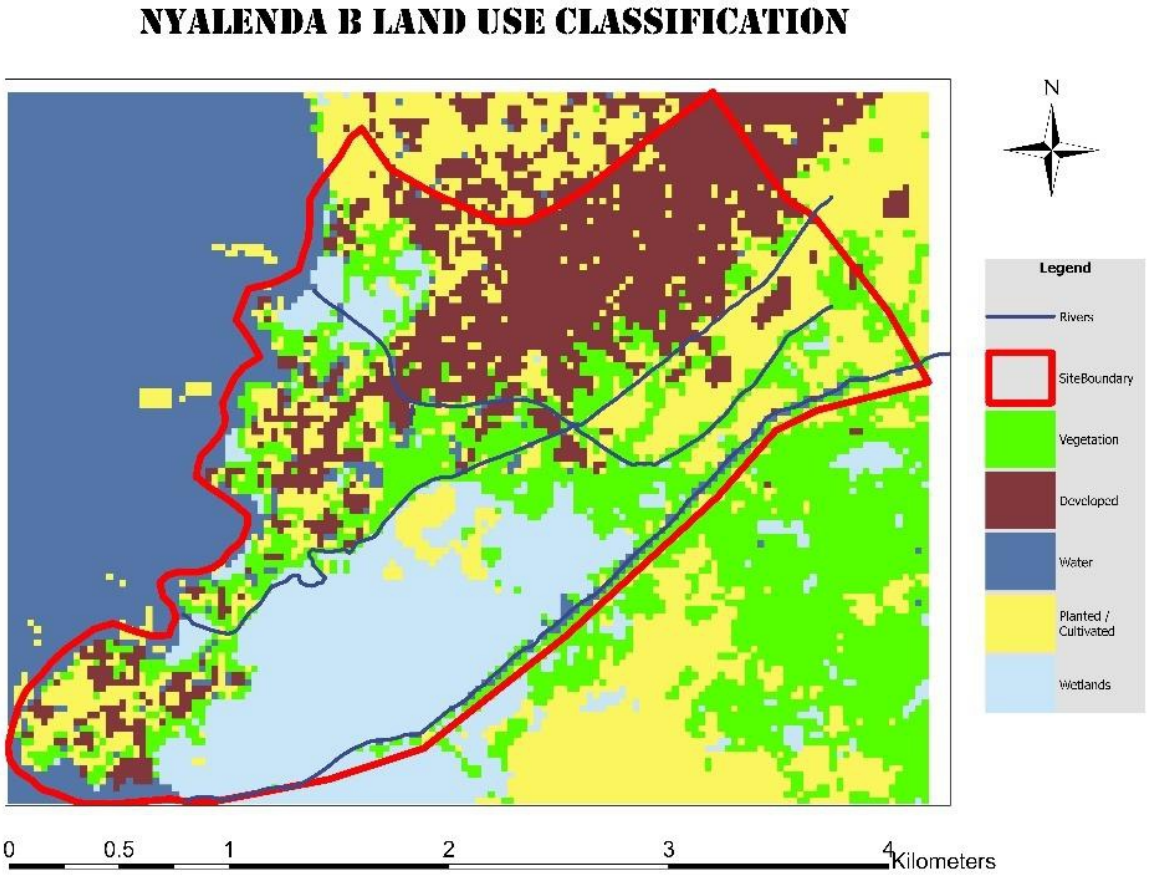


Figure 8: Nyalenda B land use classification map detailing the existing land uses in the settlement

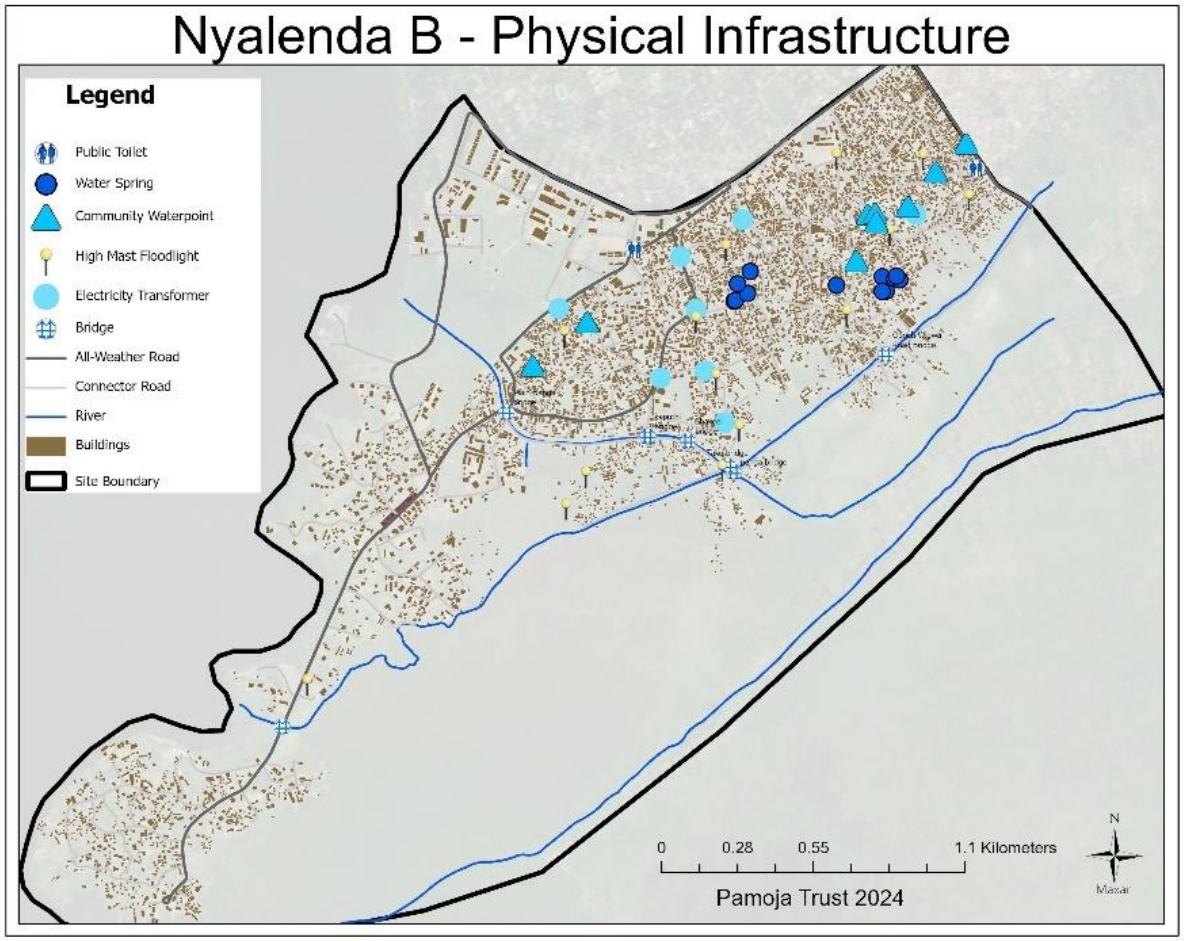


Figure 10: Map depicting the existing physical infrastructure in Nyalenda B

· Presence and lack of presence of Physical Infrastructure

· *Roads*

As shown on figure 10 above, major access road within the settlement is Dunga Road which is well tarmacked. The rest of the access roads are murram roads which are in poor condition, affecting mobility and access to marketplaces, educational facilities, health care facilities, particularly during the adverse weather conditions such as heavy rains.

Figure 11: Status of Nyalenda B roads

· *Bridges*

Nanga bridge is the main bridge that provides access across river Wigwa. The bridge is however in the form of a box calvert that is often flooded as it causes obstruction and also contributes to increased water backflow, leading to heightened flooding. The flow of river waters is blocked at the bridge due to accumulation of solid waste at the riverbed as well as siltation and water hyacinth. If the bridge had been well constructed and raised, the blockages would not be present.The other bridges along river Wigwa are temporary bridges that requires upgrade to enhance accessibility and connectivity especially during the rainy seasons.

Figure 12:Nanga Bridge that the community now refers to as a box culvert

Challenge:

Maladpative strategies
Due to the construction of the bridge that has exposed the Nyalenda Community to increased flooding, the community feels that its prioritization, design and location lacked adequate community engagement.

· *Storm water drainage*

The main storm water drainage system in the settlement and a better part of the city channels water to River Wigwa and Nam Thoi swamp which abuts the ward. Some of the housing structures are located near drainage channels and are worst affected during rainy seasons. There is need to have proper maintenance of the storm drains to enhance flow of rainwater during the rainy seasons and curb flooding.

Figure 13: Existing dug up water drainage channels

· *Solid waste management*

There is poor solid waste management in the ward. Most waste are disposed at illegal and informal waste disposal sites within the neighbourhood which worsen the state of sanitation and hygiene in the settlement. During the rainy season the poor solid waste management and flood waters lead to spread of water borne diseases.

40% of the respondents confirmed that they have access to solid waste collection point while there is only one designated waste collection point with a waste skip within the settlement. The rest of the waste is dumped at informal and illegal locations.

Figure 14: Solid waste disposal

· *Land Tenure*

While private land ownership in Nyalenda B, is highly appreciated by the community members and leads to the development of Nyalenda B, its comparison to the previous status as community land pre- colonial era has exposed it to climate change impacts. Community land management practices that governed land uses including areas set aside for conservation, herding and as water catchment areas are no present leaving these areas unprotected. As private lands, individuals have put up houses on these riparian and wetland areas increasing the settlement's exposure to flooding.

· *Lack of sewer line*

Despite a major city sewer line cutting across the settlement and liquid waste disposal been done at River Wigwa, Nyalenda B settlement lacks a sewerline. As a result, households release liquid waste in River Wigwa. During flooding events, households in the settlement are exposed to water borne diseases.

Figure 15: Liquid waste disposal

3.3.2. Social Dimensions

· Demography

Despite being situated in the city, much of Nyalenda B is held under a freehold land tenure system. This results in a diverse demographic, encompassing both older and younger generations. The older generation, particularly those who own land in the flood plains, is significantly impacted by flooding events. Their situation is worsened by the fact that they lack the resources to seek alternative land, as these areas are their ancestral homes where they also expect to be buried according to cultural traditions.

The settlement has experienced rapid population growth, which has led to increased land subdivision and a greater occupation of wetlands, as suitable alternative lands are scarce. Consequently, those forced to reside in the wetlands face heightened risks of flooding.

· Social Groups

Like any other human settlement, Nyalenda B displays variations in social groupings. As an informal settlement, it attracts low-income earners seeking affordable housing, making it a vulnerable location for those affected by floods. A closer look at the settlement reveals that many homes, particularly in flood-prone areas, are rental properties. Semi-permanent houses make up approximately 70% of the housing stock, with construction materials ranging from stones and iron sheets to bricks, concrete blocks, mud and wattle, and wood. When flooding occurs, these homes often sustain significant damage, leaving residents completely displaced.

Additionally, there are many women-headed households in Nyalenda B, whose vulnerabilities are heightened by the impacts of flooding. These women face the dual challenge of seeking daily wages to support their families while also fulfilling caregiving roles for their children. Households led by individuals with disabilities experience similar difficulties, further exacerbating their exposure to the adverse effects of flooding.

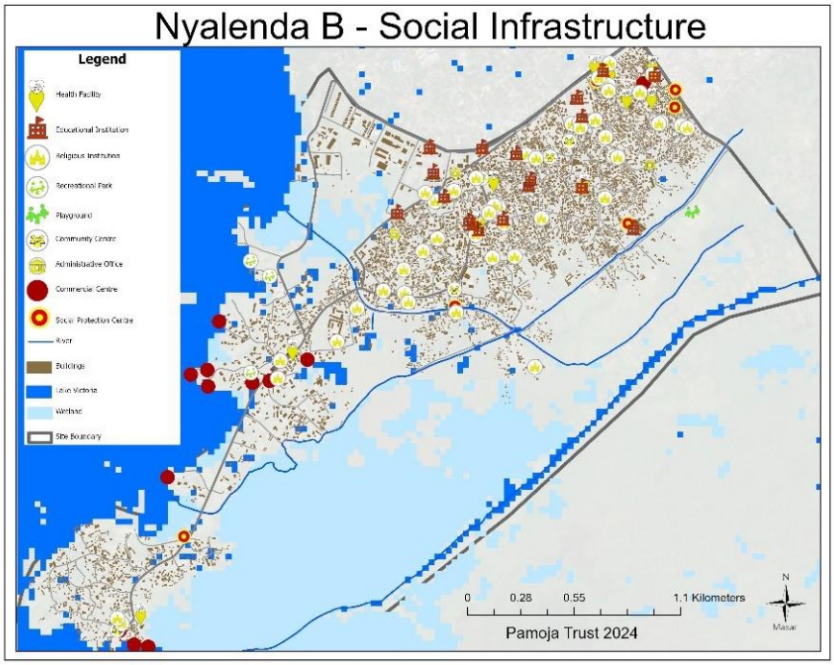


Figure 16: Map of existing Nyalenda B social infrastructure

· Education

There is a gap in knowledge and understanding of climate risks and hazards, which are also shaped by cultural perceptions. Previously, the older generation that inhabited the area from the 1900s to the early 2000s held traditional knowledge of the landscape, including an understanding of wetlands and how to manage and use the land sustainably. However, as the older population declines and new residents buy land in the settlement, this valuable local knowledge is gradually disappearing. This loss has led to the degradation of natural flood regulation ecosystems—such as wetlands, floodplains, and vegetation near the lake and rivers—reducing the area's natural capacity to absorb excess water.

The only public educational facilities in the ward are Joel Omino Primary and Secondary Schools and Nanga Primary and Secondary Schools. Located in a flood-prone area, Nanga Primary and Secondary Schools frequently experience flooding. As designated emergency holding sites, their location and the lack of flood mitigation measures make them unsafe during extreme flooding events. Therefore, adequate resources should be allocated to enhance their flood resilience, ensuring they remain reliable emergency shelters for the community

· Health and well being

There is a notable inadequate availability of public health facilities within the settlement, which restricts access to essential heath care and even where present quality and reliability of the care services is dissatisfying. Nyalenda B has two major Public health facilities, Dunga Dispensary , located at a flood prone area and Nyalenda Health centre . Nanga health centre is one of the popular facilities that is however, a private facility.

Like Dunga, the facility is located at a flood prone area and during the heavy rainfall events, health service provision at this facility and at Dunga dispensary is disrupted as there is inability to access health services. These effects cascade to individuals that require special medical attention i.e. children, pregnant women, the disabled who at a time of such eventualities may need additional response assistance. During the heavy rainfall seasons and flooding events, public health concerns are on the rise common health issues reported in the area include malaria, respiratory infections, and waterborne diseases due to environmental conditions within the settlement.

Additionally, the vulnerability is further manifested in the disrupted functionality of the community based medical care programs i.e. the critical services provided by the Community Health Promoters (CHP) that spearhead health services at the community levels through i.e. delivering medication to the sick, conducting vaccination programs with flooding and heavy rainfalls, the CHPs experience difficulties accessing medical facilities and households to provide services.
In the context of extreme temperatures, community members with underlying medical conditions especially diabetes experience increased

· Cultural Dimensions

Nyalenda B is characterized by deeply rooted cultural values regarding adaptation to climate change, primarily held by an older generation that has been dwindling in numbers over the years. As noted in previous sections, this older generation employed various strategies to address the impacts of climate change and reduce vulnerabilities. Unfortunately, this valuable knowledge is being lost due to changing

demographics and migration trends.

While there are community networks and grassroots organizations (CBOs) that promote local climate mitigation practices, there is a significant gap in mainstreaming risk management and fostering a culture of climate change adaptation. Additionally, certain negative cultural beliefs contribute to the community's vulnerability to climate impacts. For instance, some families are strongly attached to their ancestral homes and are reluctant to evacuate during flooding emergencies, which puts them at greater risk.

· Institutional and Governance Dimensions

Nyalenda B is a ward under the County Government of Kisumu, with the Environment Department leading efforts related to climate adaptation and risk mitigation. In addition to this overarching governance, local community structures such as nyumba kumi, land committees, and the recently established Ward Climate Change and Planning Committee play a role in these efforts.

However, the effectiveness of these governance institutions in promoting adaptation and risk mitigation has yet to improve due to capacity gaps and limited resources. There is also a lack of adequate community-based structures and systems for managing natural resources and land use. These institutional factors are crucial for adaptation, as they significantly influence the social distribution of vulnerability and shape the community's capacity to adapt.

The government has established policy directions and attempts to enforce land use management practices aimed at conserving riparian lands and wetlands. However, due to the freehold nature of the land and challenges in enforcement, compliance is often lacking. Miji Kumi, a community structure that could assist the government in enforcement efforts, also suffers from limited capacity.

In Nyalenda B, various social networks, community bonds, and organizing structures exist that help buffer the impacts of extreme rainfall events. These networks foster social cohesion, enabling

residents to act collectively and reduce vulnerability. However, increased migration and changes within the social class contribute to diminished cohesion in the settlement

3.3.3. Economic Dimensions

· Work and livelihoods

In Nyalenda B, residents have various sources of livelihood, which are divided into:

1. Informal businesses: accounting for 80% of employment

2. Formal employment: accounting for 20% of employment

Most residents rely on ecosystem services—particularly provisioning and cultural services to sustain their livelihoods. Key activities include:

- **Fishing:** Primarily conducted around the Dunga unit
- **Farming:** Concentrated in the Kapuothe areas
- **Recreation and Tourism:** Focused mainly around the Dunga unit

Additionally, a portion of the population engages in small businesses, selling household goods, commodities, and services through juakali businesses, street vending, boda boda (motorcycle taxi) services, hair styling, and other informal trades. Many products sold in these small businesses are also derived from ecosystem services.

Impact of Climate Change on Livelihoods

Recurring climate change risks disrupt various economic activities in Nyalenda B, challenging the residents' ability to sustain their livelihoods. The most affected activities include:

· Fishing

Flooding hampers fishing activities, as breeding sites are disturbed by floodwaters and solid waste. Fish collection points and markets suffer from heavy rainfall and flooding, impacting household incomes for those involved in fishing, including fish cage operators who experience losses during floods.

· Farming

Along the River Nyamasaria, some community members grow vegetables; however, heavy rains frequently disrupt these activities.

Flooding forces some farmlands to be abandoned, leading to encroachment by reeds. Livestock is also impacted, with animals often washed away or contracting diseases, especially in the Nam Thoi area.

· **Small Businesses Selling Household Goods, Commodities, and Services**

These enterprises are severely impacted by flooding, as their operating areas can become inaccessible or are destroyed by floodwaters.

· **Rent Income**

Flooding displaces both renters and homeowners, weakening and often destroying housing infrastructure. As a result, landlords lose rental income.

Figure 17: Informal businesses

Figure 18: Image of livestock keeping both for commercial and subsistence use

3.4. Nyalenda B Losses and Damages resulting from Impacts of Climate Change

From the assessment and engagements with the communities of Nyalenda B, and against the background of the vulnerability trends, it is established that climate change impacts have led to both economic and non-economic losses and damages in the settlement.

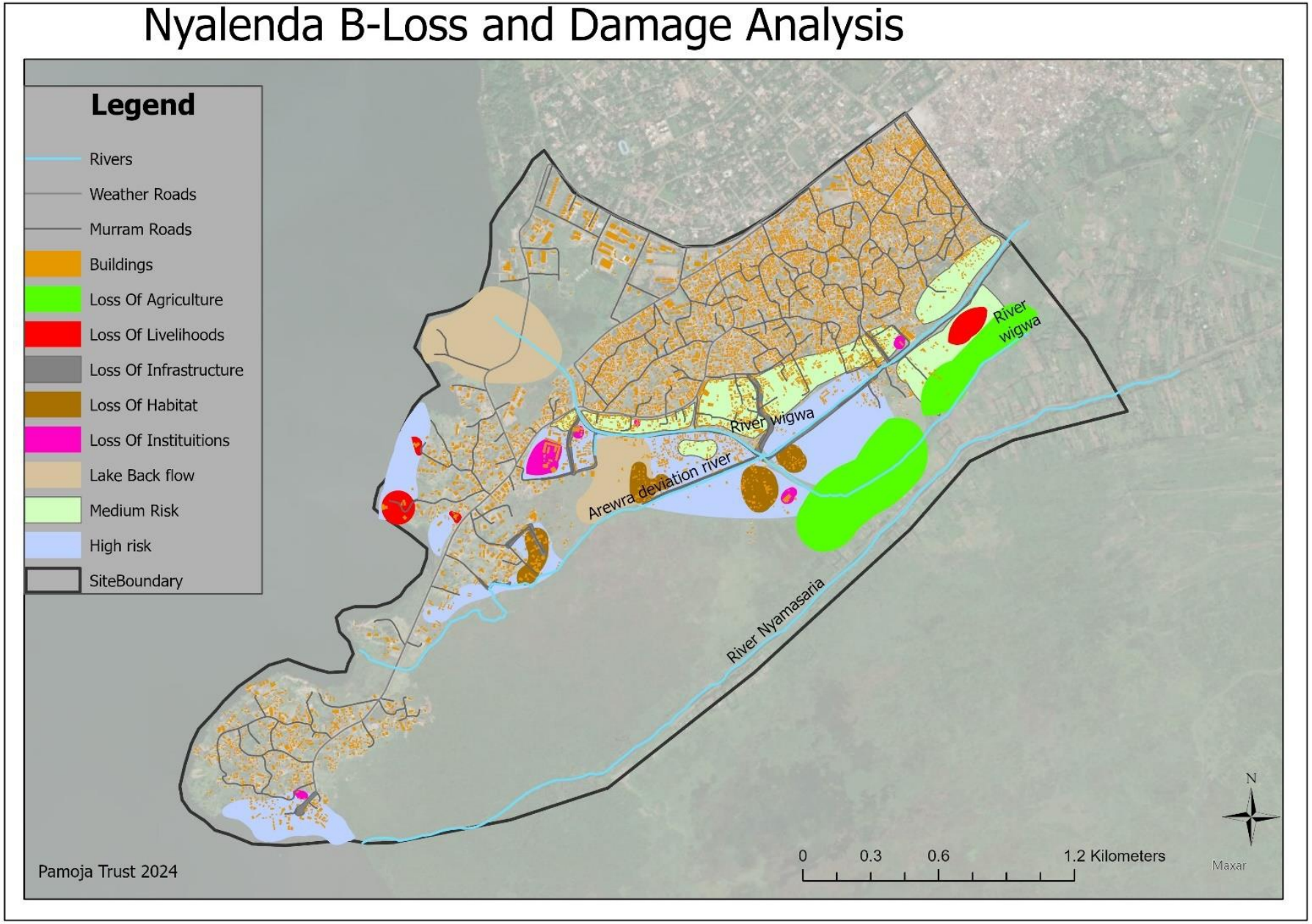


Figure 19: Map showing existing losses and damages in Nyalenda B with Flood Risk Areas

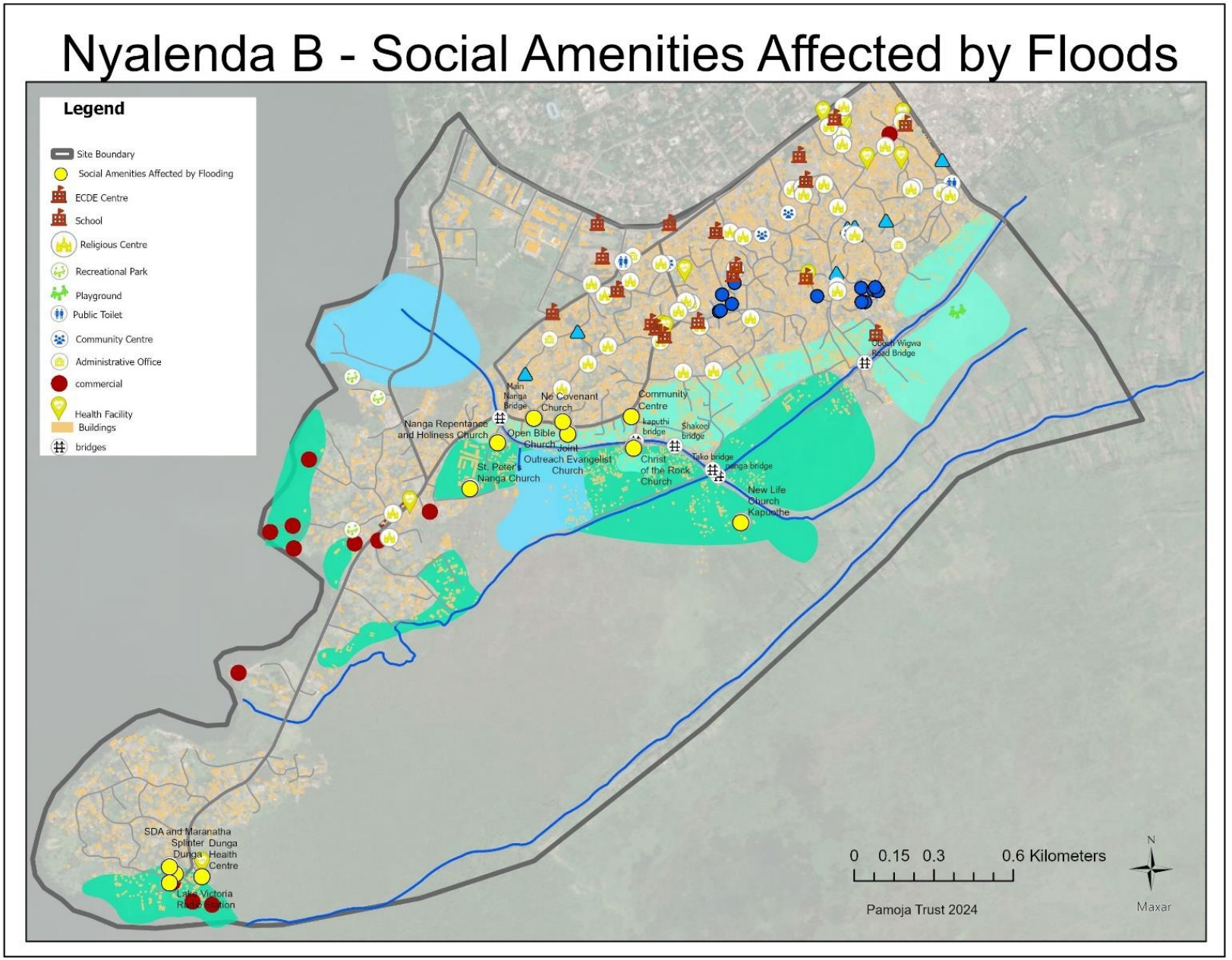


Figure 20: Map showing key social infrastructure situated at flood risk areas and affected by flooding events

3.4.1. Economic losses

Thematic area	Sector	Losses and damages	Manifestations of the damages	Images
Social sectors	Health	**1 facility partially destroyed** Dunga dispensary – public level 2 facility, partial damage	a) The hospital sewer system was destroyed b) The hospital sewer system was destroyed. c) The hospital developed cracks d) The hospital exterior painting was destroyed	
	Education	**2 education facilities partially destroyed** Nanga primary and secondary school	a) Playing field destroyed. b) Fence destroyed c) Electricity poles d) Books and uniforms destroyed e) Classrooms and washrooms damaged	

	Housing	**73 homes destroyed by the flooding events.** · Brick, mud and wattle houses around Nanga Kapuothe destroyed. · At dunga: houses were submerged along kiboko bay and board walk. · Part of kilo: some of the houses are affected by water and some destroyed.	a) Permanent houses partially destroyed. b) Sinking/ submerging of houses c) Cracking of houses d) Semi-permanent and mud and wattle homes completely destroyed. e) Toilets were also destroyed in this process.	 

	Culture	**27 Native trees near the lake were partially destroyed** i.e. The fig trees , euphorbia , cactus,cyprus, jakaranda and baobab **113 Grave sites were sub-merged**	a) The roots and barks of the trees were water-logged and after some time the trees began getting faint. b) Some of the graves remain untraceable to date. c) The graves sunk and people are unable to tell where the graves are.	
	Religious/ social institutions	**8 churches partially destroyed** i.e. Kapuothe ; Harvesters' ministry, Anglican, Baptist, Catholic SDA 1 church fully destroyed	a) Destruction of church walls. b) Destruction of an entire structure c) Destruction of wall paintings. d) Loss of church furniture	

Productive secte	Agriculture	**119 farmlands fully destroyed and 60 farmlands partially destroyed** Farmlands affected adjacent to river nyamasaria at kapuothe, namthoi. **26 fishponds fully destroyed Fishponds around nanga kapuothe areas** **(10) 50.5X5fish cages (each**	a) In the farmlands, crops such as maize, yams, vegetables, banana, cassava were destroyed, the farmlands got invaded by reeds. b) The fish ponds were fully submerged leading to loss of fish and some dying The poultry, goats, cows, sheep this was around ... area a) The destruction of trees manifested by the tree barks rotting and weakened trees stabilities leading to their	  

		holding upto 5000 fish) were completely destroyed at Dunga unit area **Some household's live stocks were completely** destroyed i.e. In Kapuothe area poultry was most affected. **1437 trees destroyed** This is around nanga kapuothe and nanga namthoi		

	Tourism	1 tourist site partially destroyed. Board walk sanctuary at dunga unit	A section of the Board walk recreation facility was submerged.	
	Commerce and trade	**Informal businesses structures partially destroyed.** · This included mpesa shops, boutiques, salons and small hotels/motels at Nanga kapuothe area and Dunga area.	Some business structures were fully submerged at Dunga beach area.	

		· Around Dunga area, business thriving because of the fishing activities were also affected. **2 major hotels were partially destroyed** · This included Dunga sanctuaryand Impala hotel	a) The roots and barks of the trees were water-logged and after some time the trees began getting faint. b) Some of the graves remain untraceable to date. c) The graves sunk and people are unable to tell where the graves are.	
Infrastructure sectors	Water and sanitation	Water connection pipes sewer lines and manholes were partially destroyed by flooding.	The manholes were filled with water and got blocked there was witnessed increased spread of contagious disesases.	

		· This happened across the entire settlement Households toilets were partially destroyed. · This was mainly at Nanga Kapuothe	Toilet structures were completely destroyed.	 
	Transportation	**8. Murrams roads were partially destroyed.** this included: · Kapuothe - nanga bridge road · Block –	a) Some of the existing tarmacked roads remained flooded for an extended period, which caused the road infrastructure to loosen and deteriorate.	

		kobunga road · Impala – hippo road. · Nanga bridge-shakeel bridge road · Covenant road · Got-owak – 5 ways roads · Western-wigwa road · Dunga – kasarani road. **3 foot bridges partially destroyed** **Uhuru -ridge** o kajakambare bridge Aleowra bridge	b) All weather roads structures in the settlement were weakened making them more susceptible to damage from vehicle and human traffic. c) Degradation and collapse of foot bridges after the rotting of the structure.	

	Energy and electricity	**5 electricity poles and 3 flood lights partially destroyed.** These were: · Kapuothe flood light · Victory floodlight Dunga flood light	b) All weather roads structures in the settlement were weakened making them more susceptible to damage from vehicle and human traffic. c) Degradation and collapse of foot bridges after the rotting of the structure.	

3.4.2. Non Economic Losses

Category	Sub-Category	Losses and Damages
Human life and livelihood	Lives	Individuals died because of shocks resulting from the losses and destructions they had experienced.
	Physical health	There was a noticeable increase in the spread of diseases and infections, including waterborne diseases, respiratory conditions, and vector-borne diseases such as malaria. Mobility and support from community systems, such as Community Health Promoters, were significantly reduced due to challenges in accessing health facilities and reaching people's homes. Residents faced difficulties in accessing basic services, as the destruction of road infrastructure and social amenities, including the Dunga dispensary, hindered their ability to obtain necessary health services.
	Mental health	Individuals who had experienced multiple displacement were left traumatized Psychological torture, due to loss of assets and this led to cascading effects including family separation
	Well – being	Displaced individuals were compelled to leave behind the comforts of their homes and the stable lives they had grown accustomed to.

	Livelihoods	Families were unable to provide for themselves due to the destruction of businesses, leaving those dependent on farming and fishing without resources and exposed to food insecurity. Vegetable and fish vendors found themselves without access to vegetables and fish for retail. Many women, who rely on informal structures to sell goods, were unable to provide food for their families, resulting in cascading effects such as insufficient funds for basic needs like school fees and rent.
Cultural Heritage and Meaningful practices	Home, sense of place	Those who owned homes were compelled to leave and seek rental accommodations, while some had to share alternative living spaces with other households.
	Territory	People were forced to relocate, leading some to sell their ancestral homes, to which they had strong emotional attachments
Social and Intrinsic Values	Dignity, agency, identity, security	The dignity of individuals is often tied to their financial status; men experienced a loss of dignity due to a lack of income and resources, affecting their self-esteem and social standing. Women who lived in well-furnished homes had to move into temporary accommodations and this brought a sense of shame. The necessity of sharing rental spaces affected personal relationships and conjugal rights.

Social and Intrinsic Values	Social capital; Social cohesion;	The displacement led to weakened social cohesion within the community, resulting in the separation of family members and community residents.
	Education	School absenteeism increased due to relocations and inaccessibility of the school, compounded by government orders to close schools, which altered the use of schools and access to education. Consequently, learning timeframes were significantly shortened.
	Mobility	Due to the destruction of road and amenities, the community members lost consistent access to educational and health services i.e. Nanga primary school and Dunga Dispensary.
Bio-diversity and Ecosystem services	Species, habitats	Submersion of breeding grounds along the riverbanks and the lake due to backflows disrupted fish reproduction cycles over time certain fish species have become difficult to find i.e. uma-bagras, Sire, Okoko, Ningu, and Kunga, There was spread of invasive species such as the Abuoro plant due to the heavy rainfalls and lake overflow this contributed to the affected fish breeding grounds and threatens local bio-diversity. Rising water levels have driven certain animal species, such as snakes, from water banks to the shore, posing increased risks to residents and altering natural habitats.

4.0. Case Study 2: Manyatta B Informal Settlement

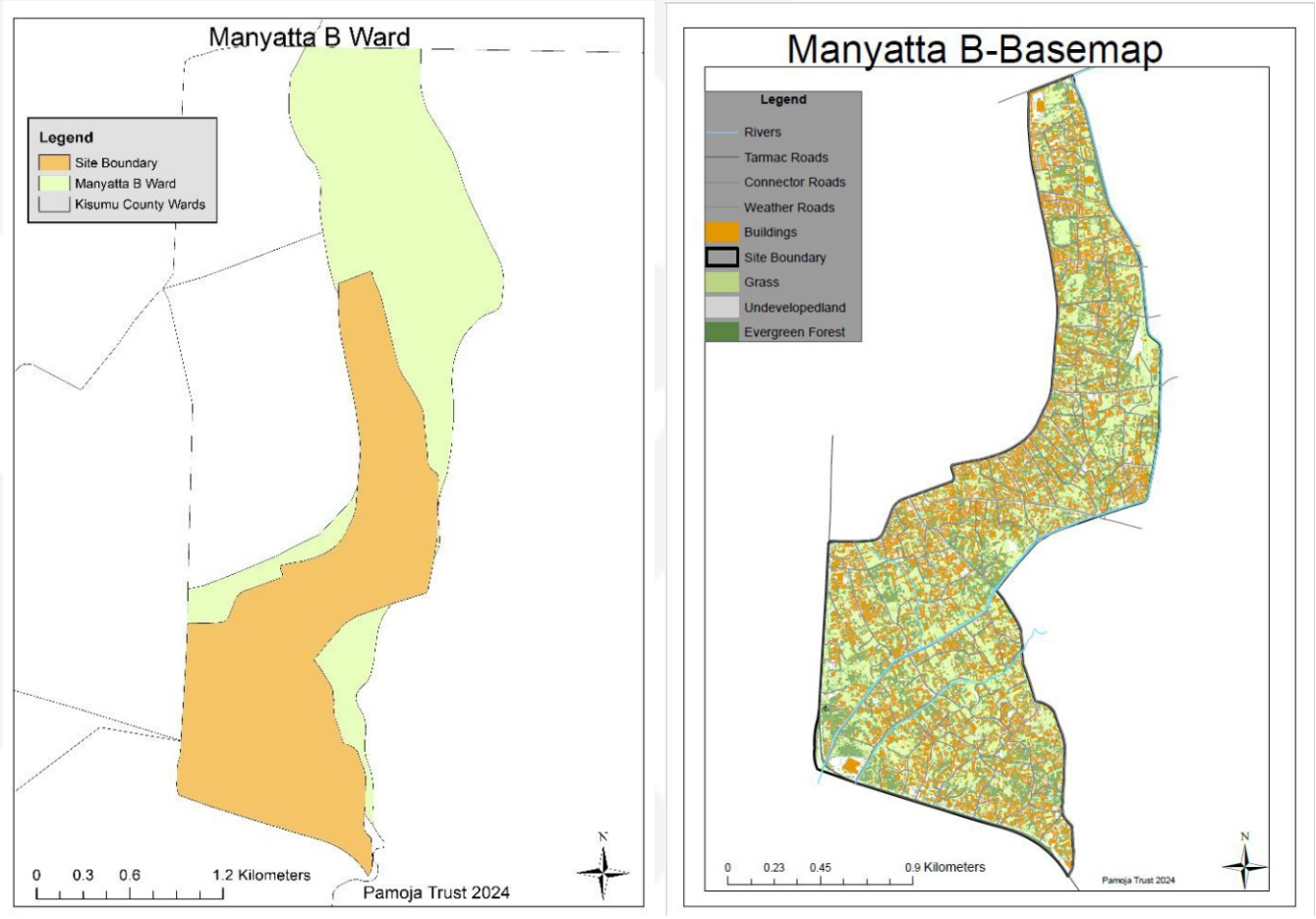


Figure 21: Base map of Manyatta B settlement detailing the built environment and natural resources

4.1. History of the Settlement

Manyatta B Land was formerly a wetland popularly known by the people as Siany (meaning wetland in luo) and was later reclaimed into an informal settlement. The area has been experiencing increasing population growth due to rural-urban migration and the growth of Kisumu City. The known indigenous of Manyatta B are Kanyakwar people, occupying upper , Lower Kanyakwar and Gesoko community units(described at the introduction section of this document).Kanyakwar people hail from Alego at Kogelo.

The Kasagam people are believed came from a place called Sagam in Luanda, Maseno who later came up to Karateng' Lela area. Due to high urbanization rate in Kisumu City, most people migrated to the area as either tenants or land buyers who have since become landlords in the area. Gesoko community unit is mainly inhabited by the native Luo community and the migrants from Gusii land in such of better job opportunities.

The settlement abuts River Nyamasaria and is traversed by River Auji.The major conservation sites within the settlement are River Auji which draws its water from Kondele and River Nyamasaria (Uhuru)which is known for fishing and supporting farming activities. River Auji was initially a canal constructed by the world bank in 1986 to drain excess storm water in the area during the rainy season. It passes through six wards including Kajulu, Migosi, Central Kolwa, Manyatta B and Nyalenda A and B.

4.2. Climate Hazards and Slow-Onset Events

Manyatta B settlement experiences both slow-onset and extreme climate change events. The most common risks identified during the assessment include flooding during rainy season further exacerbated by storm water runoff from upstream, extreme high temperatures, Strong winds and pro-longed dry seasons.

Event	Event type	Event Period	Manifestation
Extreme Hazard	Flash Floods	Most extreme 2023 -2024	Flooding due to heavy rainfalls leading to the overflow of River Auji and River Nyamasaria mostly affecting Lower Kanyakwar and Gesoko community units.
Slow onset events	Urban Heat Island	2019- 2024	Increased warm temperatures during the days and nighttime
	Increased rainfall patterns	2018-2024	Increased noticeable water levels rise of River Nyamasaria. initially the river was a stream in the 1930's. Overtime there has been increased soil erosion, the land has lost its fertility.

	Loss of Bio-diversity	Past 40 years	The fish species have been getting extinct over time i.e. mud fish, okoko, adela species.
	Strong winds	Since 2023 - 2024	After the prolonged dry seasons, the community has been experiencing certain strong winds, this has also been experienced randomly as a result of changing weather patterns.

4.3. Manyatta B Dimensions and Trends of Vulnerability and Exposure to Climate Change Impacts and Extreme Hazards

Manyatta B settlement experiences both slow-onset and extreme climate change events. The most common risks identified during the assessment include flooding during rainy season further exacerbated by storm water runoff from upstream, extreme high temperatures, Strong winds and pro-longed dry seasons.

4.3.1. Environmental Dimensions

· Physical Location

Manyatta B informal settlement is situated on the lower terrain of Kisumu City, rendering it particularly vulnerable to flood hazards. The settlement is characterized by significant natural features, including rivers, streams, and water springs, with River Auji being the primary waterway.

Originally constructed as a canal to drain water from the surrounding waterlogged areas, River Auji has become increasingly prone to overflowing due to excessive rainfall in recent times. The flooding situation is further exacerbated when stormwaters from the higher elevations of the city flow down into the settlement, overwhelming its drainage capacity(the topography of the area is as shown in the figure 22.

Additionally, Manyatta B experiences the Urban Heat Island Effect, which leads to extreme high temperatures. Compounding these challenges, the settlement faces prolonged dry seasons, resulting in drought conditions that further threaten the community's resilience and access to essential resources.

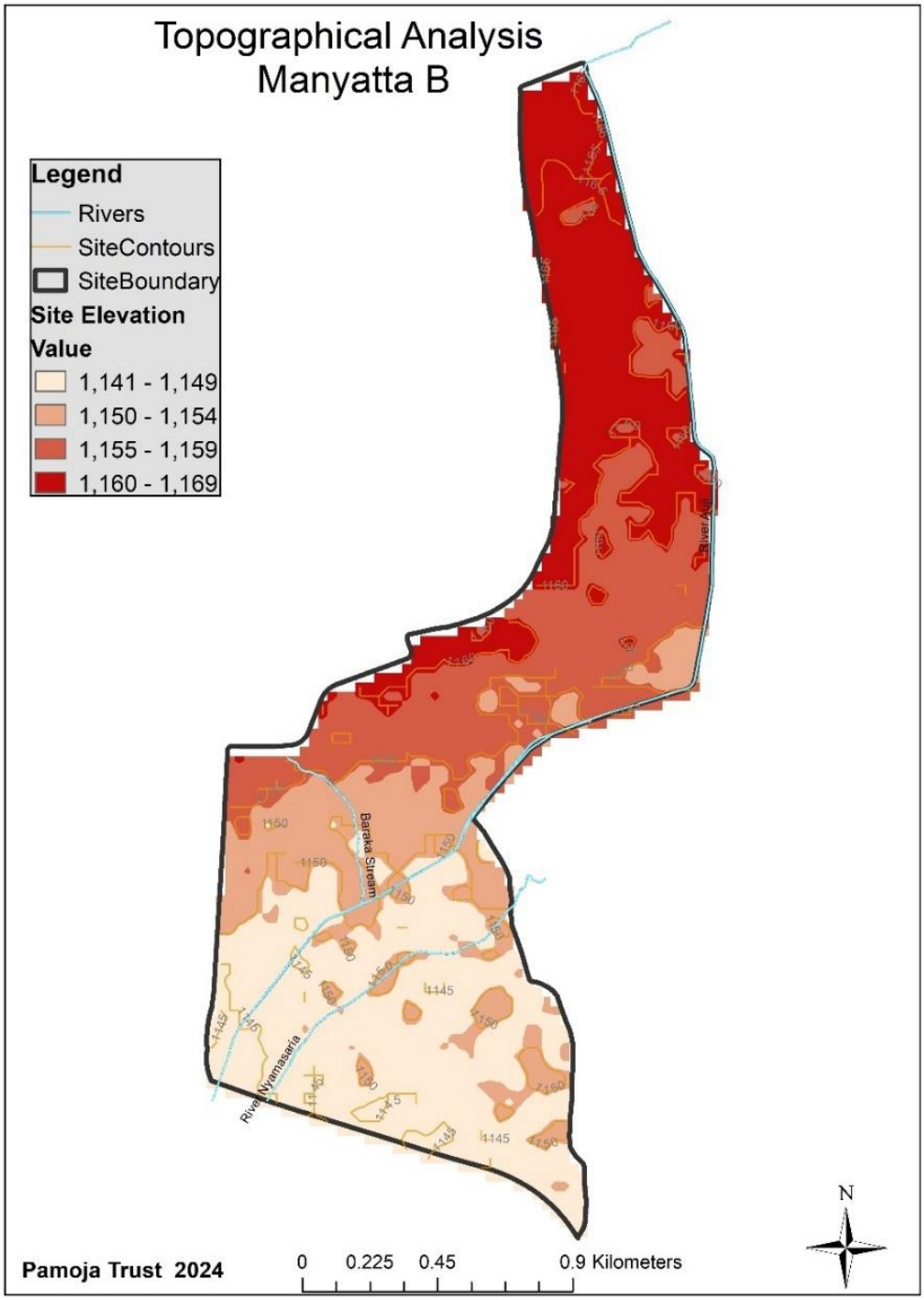


Figure 22: Manyatta B topographical map

· Wet land encroachment

Originally characterized by swampy terrain, the area has transformed dramatically due to urbanization and population growth. The settlement is home to various streams and water springs, as well as underground water sources. However, human occupation in this previously swampy region has increased residents' exposure to flood hazards. The combination of natural water features and anthropogenic changes has created a unique environment that continues to evolve, impacting the

community's vulnerability to climate-related risks.

Figure 23: Image of an encroached wetland

· Soil Typology

Manyatta B's soil is predominantly clay, which retains water effectively. This characteristic increases the likelihood of flooding occurrences, making the settlement more vulnerable to climate change impacts. The clayey soil's inability to drain excess water exacerbates flooding during heavy rainfall, leading to hazardous living conditions and heightened exposure to related risks.

Figure 24: Image of cracked clay soil

· Informal Settlement Pattern and un-development trajectory

Just like Nyalenda B, Manyatta B is an unplanned area experiencing rapid urbanization, which exacerbates its vulnerability to disaster risks. Its informal settlement status leads to poor infrastructure development, environmental degradation, and a lack of institutional coordination. There is insufficient attention to infrastructure maintenance and adaptation to meet potential climate extremes.

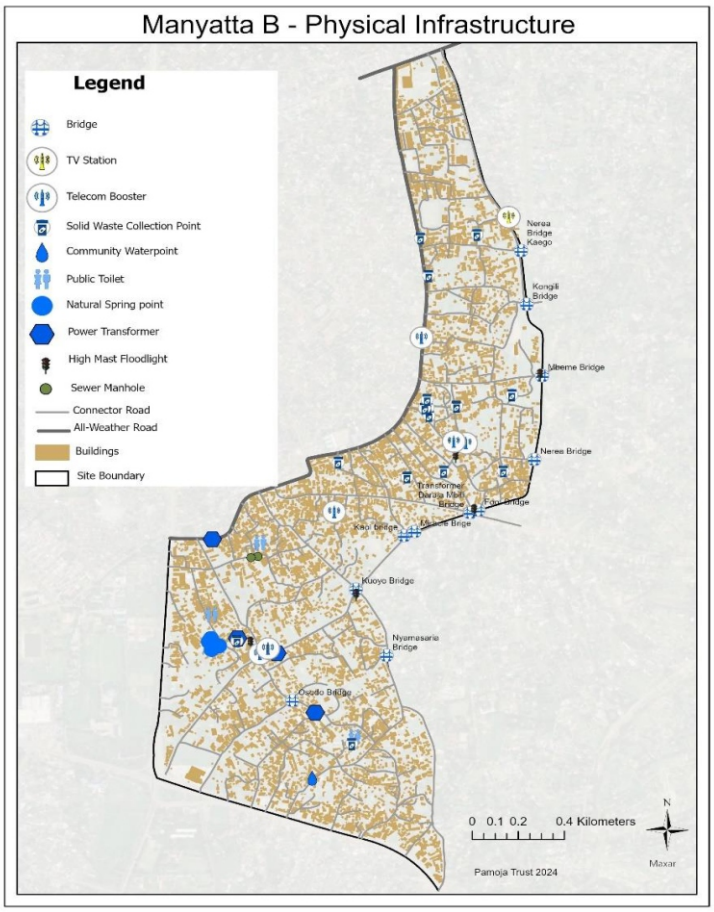


Figure 25: Map depicting the physical infrastructure in Manyatta B

Additionally, low government investment in infrastructure and services further compounds these challenges, making the community highly dependent on informal settlement improvement programs, such as the Kenya Informal Settlement Improvement Program (KISIP).

· Presence and lack of presence of Physical Infrastructure

a) Roads

Manyatta B is accessible via Kisumu Bypass Road and Baraka-Kibos Road, which border the settlement. While several marrum roads facilitate movement within the area, most of these roads are poorly maintained, posing significant accessibility challenges, especially during adverse weather conditions like heavy rains. During such events, roads often become flooded and damaged, making navigation difficult for residents who frequently rely on footpaths and informal routes.

These alternative pathways can be treacherous due to the terrain and seasonal flooding. Currently, some roads are being upgraded through the Kenya Informal Settlement Improvement Program (KISIP II), which aims to enhance accessibility and connectivity within the settlement.

This project includes the upgrading of key roads, such as Wandiege Walgudha Road, Hombe Yellow Bridge Kasawino Road, Transformer Daraja Mbili Koyango Road, and Kaego-Nerea Bridge Road to bitumen standards, as well as the construction of storm drainage channels and sewer connections. Additionally, KISIP II is developing Kasawino Market in the Central Kuoyo unit, which will further improve infrastructure and resilience against climate impacts.

b) Bridges

Manyatta B settlement is home to several bridges, including Nerea Bridge, Ongili Bridge, Judea Bridge, Mbeme Bridge, Kuoyo Bridge, Osodo Bridge, Miracle Bridge, Daraja Mbili Bridge, and Kaol Bridge, which facilitate movement across the rivers and streams that traverse the area. However, many of these bridges become impassable during the rainy season, highlighting the need for urgent upgrades.

The poor condition of these structures significantly hampers accessibility, as movement between different points within the settlement is often disrupted when flooding occurs or during heavy rainfall. This vulnerability underscores the necessity for improved infrastructure to enhance connectivity and ensure the safety of residents in the face of climate impacts.

Figure 26: Image of bridge in Manyatta B

c) Water and sanitation

The status of water and sanitation facilities in Manyatta B is critically poor, significantly increasing the community's exposure to waterborne diseases, particularly during the heavy rainfall seasons. Residents rely on the Kisumu Water and Sewerage Company (KIWASCO), as well as private vendors and companies, for their clean water supply.

However, access to safe drinking water is limited, with many individuals depending on informal vendors or community water taps that may not consistently meet safety standards. Additionally, Rivers Auji and Nyamasaria are utilized for other domestic purposes and agricultural activities, further complicating water quality issues. For sanitation, residents predominantly use pit latrines and shared toilets, as the settlement lacks a proper sewer connection.

Consequently, liquid waste is often discharged into open drains and directly into Rivers Auji and Nyamasaria, posing serious public health risks and contributing to the spread of waterborne diseases such as cholera and dysentery, especially during flooding events. The encroachment of riparian lands exacerbates water contamination, accentuating the community's vulnerability to climate change impacts.

Figure 27: Image depicting Liquid waste disposal in a river

d) Storm water

In Manyatta B, stormwater management poses a significant concern, driven by the settlement's geographical and environmental characteristics. Majority of the storm water from Kisumu City drains into Manyatta B, given that it is part of the lowest elevation sites of Kisumu city.

Figure 28: Image of blocked drainage facility

Waste management

Solid waste management in Manyatta B is a critical issue that adversely affects both public health and the environment. Rapid urbanization and population growth have resulted in increased waste generation, while the inadequate waste management infrastructure struggles to keep pace. Although there are designated formal solid waste collection points, they are non-functional, forcing residents to rely on informal disposal methods. As a result, much of the solid waste is dumped into

rivers, streams, or drainage channels, leading to significant blockages. The most prevalent waste disposal method in the settlement is burning, which not only contributes to air pollution but also poses serious health risks. The accumulation of waste, such as disposable diapers, obstructs waterways, exacerbating flooding hazards and increasing the community's vulnerability to climate-related impacts.

4.3.2. Social Dimensions

· Demography

Manyatta B is increasingly vulnerable to climate change impacts due to ongoing migration and the influx of new residents purchasing land in ecologically fragile areas, such as the Soko streams in both the lower and upper Kanyakwar Komer regions, which were previously ponds. The structures being erected in these sensitive areas are particularly at risk of flooding hazards.

Women bear the brunt of extreme heat events, suffering the most from adverse effects, while children are also affected, often experiencing rashes and heat-related illnesses. Furthermore, the rising population has led to a surge in housing development, characterized by improper planning and substandard construction practices. This combination of factors amplifies the community's exposure to climate change risks.

· Social Groups

In Manyatta B, approximately 70% of residents are renters, with only 30% owning their structures. The predominant housing typology consists of semi-permanent and temporary houses, which account for about 83% of the settlement's dwellings. Only around 27% of the housing stock is classified as permanent. Common construction materials include iron sheets, mud and wattle, bricks, concrete blocks, stones, and wood.

The overall structural integrity of these homes is moderate, with roughly 67% of the structures rated as such, while about 33% are considered poor in quality according to resident feedback. When flooding occurs, these inadequately built homes are often destroyed, resulting in complete displacement of their occupants.Like Nyalenda B, women-headed households face heightened vulnerabilities as they navigate

the dual challenges of seeking daily wages to support their families while also managing caregiving responsibilities for their children. This situation exacerbates their exposure to the impacts of flooding, further compromising their resilience to climate change.

Figure 29: Mud and wattle houses in Manyatta B

· **Formal and informal knowledge**

A gap exists in the community's knowledge capacities regarding the interpretation of climate risks and hazards, which are often shaped by cultural understanding. The older generation, who occupied this land from the 1900s through the early 2000s, held traditional knowledge of the terrain, including the location of wetlands and sustainable ways to utilize the land.

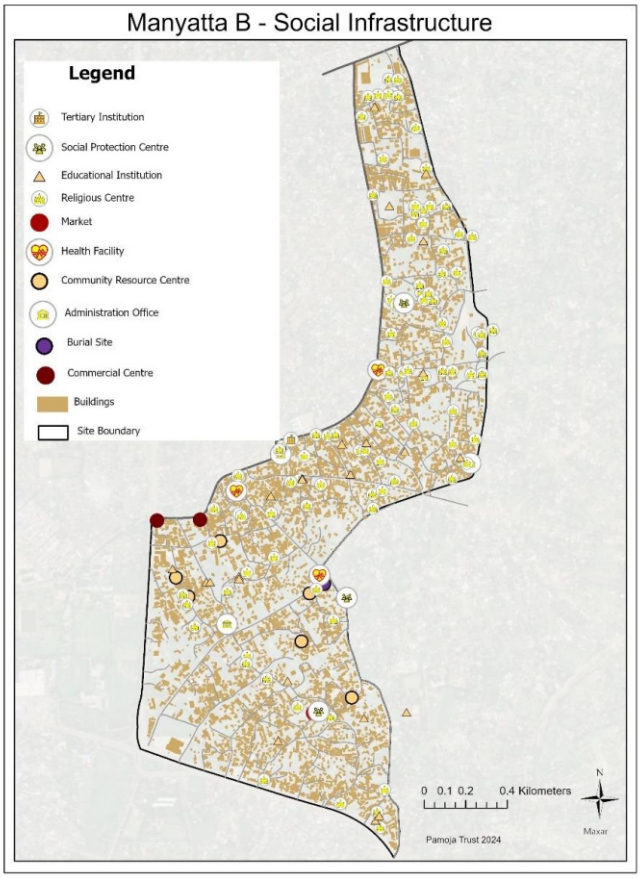


Figure 30: Map of existing social infrastructure in Manyatta B settlement

However, as the population of older residents declines and new individuals continue to purchase land in Manyatta B, this local knowledge is gradually eroding. This erosion of indigenous knowledge has contributed to the degradation of natural flood-regulation systems, such as wetlands and riverside vegetation. Consequently, the area's natural capacity to absorb excess water is diminishing, increasing its vulnerability to climate change impacts.

· Education

Manyatta B is home to approximately 24 primary schools and Early Childhood Development Education (ECDE) centers, yet it has only one public school, Wandiege Public School. Unfortunately, this school is situated in a flood-prone area. During the most recent flooding event, classrooms were inundated, rendering the facility unable to serve as a rescue center for displaced residents. This situation relays the urgent need to strengthen the school's structures and enhance its capacity to function as an emergency shelter during future flooding events.

· Health and well being

Manyatta B faces significant challenges in healthcare access due to the limited number of health facilities available to its residents. The existing facilities include Magadi Medical Clinic, Kuoyo Health Centre, and Homeland Medical Centre. However, Kuoyo Health Centre, the largest public facility, is situated in a flood-prone area. During heavy rainfall events, the provision of health services at this facility is severely disrupted, making it difficult for residents to access essential medical care.

This situation is particularly concerning for vulnerable populations, including children, pregnant women, and individuals with disabilities, who may require urgent medical attention during such emergencies. Common health issues reported in the area include malaria, respiratory infections, and waterborne diseases, which are exacerbated by the environmental conditions within the settlement.

Figure 31: Image of Child playing in the flood waters

· Cultural Dimensions

In Manyatta B, deeply rooted cultural values regarding climate change adaptation are held primarily by the older generation, whose numbers have diminished over the years. This older generation employed various strategies to cope with climate change impacts and reduce vulnerabilities.

Unfortunately, this invaluable knowledge is gradually being lost due to shifting demographics and migration trends. For example, traditional homesteads were designed with drainage systems, reflecting an understanding of local water management. In agriculture, practices such as planting sisal were employed to manage water flow effectively. They also utilized a building technique known as "ndiri," which involved constructing slabs to prevent water from entering homes, demonstrating their knowledge of soil types and drainage.

The wetlands surrounding Manyatta B were traditionally used for grazing livestock and provided vital resources, such as the unique Onduong'o tree for firewood and hunting grounds for birds and hares.
While locally based climate mitigation initiatives are now being spearheaded by community networks and community-based organizations (CBOs), there remains a significant gap in mainstreaming risk management and promoting a culture of climate change adaptation among the community.

· Institutional and Governance Dimensions

Manyatta B falls under the jurisdiction of the Kisumu County Government, with the county's Environment Department leading on climate adaptation and risk mitigation. Alongside this county oversight, several local community governance structures exist, including the Nyumba Kumi network, peace committees, disaster response committees, landlord-tenant committees, Community Health Promoters, Monitoring and Evaluation committees, and the newly established Ward Climate Change and Planning Committee.

However, these structures face significant challenges, such as limited capacity, resource constraints, and inadequate prioritization of sustainability projects. This has restricted their effectiveness in promot-

ing adaptation and risk mitigation measures. Moreover, there are insufficient community-based governance systems for natural resource management and land use, though these institutional factors play a key role in shaping adaptation capacities and influencing community vulnerability.

While formal disaster response infrastructure is lacking, the community has developed informal mechanisms and initiatives to improve resilience, including disaster preparedness training, awareness programs, and designating safe evacuation points within the settlement. During flooding events, residents typically seek refuge in safer areas like local religious centers and schools. However, expanding these community-led efforts and reinforcing them with formal support could substantially enhance the community's climate resilience.

4.3.3. Economic Dimensions

· Livelihoods

In Manyatta B, informal businesses constitute around 80% of income-generating activities, with formal businesses making up the remaining 20%. Climate change-induced risks significantly impact these informal employment activities that can be categorized under informal trade, farming, waste collection and sorting. Additionally informal businesses, which are common throughout the settlement, often encroach on roadways and block drainage systems, further exacerbating flooding vulnerability and disrupting local livelihoods.

Figure 32: Image of an informal business structure

4.4. Manyatta B Losses and Damages resulting from Impacts of Climate Change

From the assessment and engagements with the communities of Manyatta B, and against the background of the vulnerability trends, it is established that climate change impacts have led to both economic and non-economic losses and damages in the settlement. Climate change loss and damage do occur in the settlement and some of the notable losses and damages include;

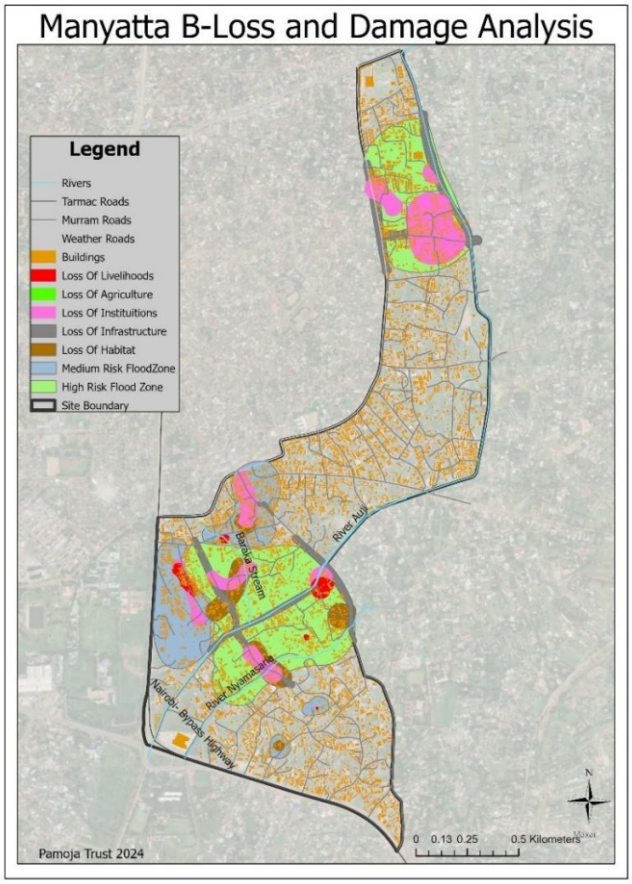


Figure 34: Map showing losses and damages in Manyatta B settlement with flood risk areas

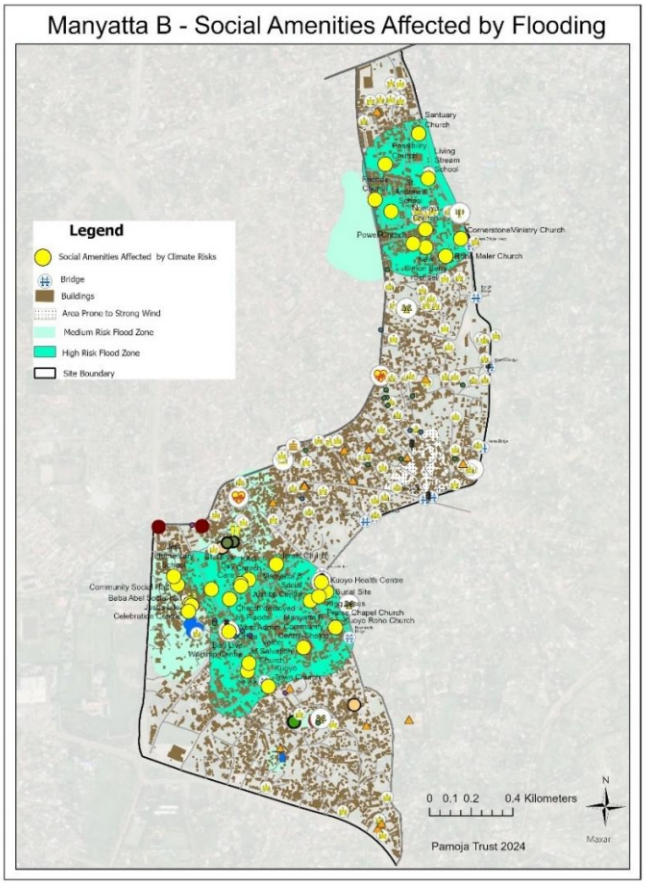


Figure 33: Map showing social amenities affected as a result of flooding

4.4.1. Economic losses

Thematic area	Sector	Losses and damages	Manifestations of the damages	Images
Social sectors	Health	**1 health facility partially destroyed** · Kuoyo health facility, level 3 facility	a) The hospital developed cracks b) The hospital exterior painting was destroyed	
	Education	**5 education facilities partially destroyed and 1 fully destroyed (Bridge International School at Koyang'o)** · Wandiege Primary School · Simon New	a) Complete destruction of the entire classes' structures b) Compounds destruction c) Sewer and Drainages destruction d) Painting of the class walls e) School furniture partially destroyed	

		berry · Living stream deliverance · Bridge International · Glorious school	e) School furniture partially destroyed	
	Housing	....homes destroyed by flooding events · Along River Auji most of the mud houses are located at this section and these were affected, alongside these were permanent structures.	a) Permanent houses partially destroyed. b) Sinking/ submerging of houses c) Cracking of houses d) Semi-permanent and mud and wattle homes completely destroyed. e) Toilets were also destroyed in this process.	

		· At Kuoyo unit, most houses up to 96% semi - permanent are semi permanent and this is where the houses were most affected. · At Gesoko area, more of semi permanent structures were destroyed as compared to the permanent units. · At Lower Kanyakwar Unit, more Semi perma-		

	Housing	nent structures destroyed as compared to the permanent units. · At upper Kanyakwar more permanent structures were destroyed as compared to the semi-permanent structures.		
	Culture	· Grave sites were affected at Kuoyo, Upper and lower Kanyakwar.		

Productive Sectors	Agriculture	**Full and Partial destruction of vegetable gardens at households.** · Poultry fully and in some instances partially destroyed.		
	Industries	**1 industry partially damaged CFAO Kenya**	The walls and compound of the facility was destroyed. Some of the vehicles were partially damaged.	

	Commerce and Trade	· Mama Mboga stalls (informal vegetable stalls) fully destroyed. · Formal business structures i.e. at Car wash area and Koyango area were partially destroyed. Omena (Dried Fish) selling business was affected		
Infrastructure Sectors	Water and Sanitation	… Water connection pipes ,sewer lines ,pit latrines and manholes were partially	Pit latrines were filled with water making them inaccessible and uncondusive for human use.	

	Water and Sanitation	destroyed. · Serwer line- Gudka,Gesoko , koyango · Water pipes- Gesoko, Koyango, · Open man-holes in the same areas	Some of the pit latrines structures were fully destroyed.	
	Transport ation	**2 tarmacked roads destroyed** these were: · Magadi Catholic cen-tre– Buttertoast Road · Sije – car wash tar-macked road		

		Other roads which are murram roads destroyed included; · Othech-Maduk road · Cfao- Kuoyo health centre road · Ghorofa Chafu - pawremo road · St Paul-Koyango road · Mama Moraa-Kasawino road · Mbeme Junction-Auji bridge road		

	Energy and Electricity	3 electricity poles were destroyed at Gesoko area 1 Transformer was destroyed at Hombe area		

4.4.2. Non Economic losses

Category	Sub-Category	Losses and Damages
Human life and livelihood	Lives	The community experienced tragic loss of life, with four individuals swept away by floodwaters,
	Physical health	People were infected by vector borne, water borne and infectious diseases which led to burdened families with health costs.
	Mental health	The community experienced profound psychological effects due to climate-induced disruptions, leading to heightened levels of trauma and stress among residents. The stress of coping with these challenges resulted in an increase in lifestyle diseases, such as hypertension and diabetes.
	Well – being	Residents of cheaper homes, priced at around 1,000 shillings, suffered total losses of their houses and were left unable to afford alternative rental options, forcing many to migrate. Those who lived in more stable homes also experienced destruction, compelling them to relocate to semi-permanent housing. Additionally, homeowners found themselves in a position where they had to transition to renting, further illustrating the widespread impact of housing loss within the community.

	Livelihoods	Landlords experienced a loss of tenants as individuals migrated away from the area.
	Education	There was an increase in school dropouts, psychological disturbances, and rising rates of teenage pregnancy, all of which contributed to difficulties in accessing education.
Cultural Heritage and meaningful places	Indegenous Knowledge	There was migration of some members of the older generation due to flooding and extreme heat. The loss of biodiversity connected to the history of the Manyatta community led to the disappearance of traditional knowledge associated with these ecological aspects.
	Traditional ways of life	The irregular weather patterns disrupted how the community interprets seasonal changes and engages in social activities. These changes have also affected traditional practices, particularly those related to harvesting and planting seasons.
	Home, sense of place	People were forced to relocate to higher grounds, losing not only their physical residences but also the sense of belonging and identity tied to their community. The migration led to loss of connection to their ancestral lands and disrupted the social fabric that bonded the community to their environment.

Social and Intrinsic Values	Dignity, agency, identity, security	There was an escalation of Gender Based Violence resulting from the stresses of extreme weather events, resource scarcity and displacement leading to violence and loss of dignity especially for women.
	Social capital; Social cohesion; community	There was migration of individuals and the loss of lives which led to a significant reduction in social capital and social cohesion within the community. As families separated, the once strong ties that bound them were weakened, creating a sense of disconnection and isolation
	Mobility	As a result of migration, community members had to travel longer distances to access livelihood locations. Families were forced to travel further to reach work, leading to lost income and increased transportation costs.
Bio-diversity and Ecosystem services	Species, habitats	Several vegetable varieties in Manyatta B have become extinct due to the changing weather patterns diminishing the community's access to diverse food sources. The populations of Onyoso (ants) and Ongogo (grasshoppers) declined because of changing weather patterns declined, affecting access to food security and ecosystem balance. As a result of flooding and waste filtration due to storm water drainage certain fish species over time have been lost at River Auji and River Nyamasaria.

5.0. Coping and Adaptive capacities in Nyalenda B and Manyatta B settlements

Nyalenda B and Manyatta B both exhibit strengths and weaknesses in its coping and adaptive capacities regarding climate change.

5.1. Capacity to recover and Change

For both residents, there is evidence of existing capacities to recover and change in response to climate change impacts these manifest as follows:

1. Existence of community Social Networks and Savings Groups

There is a high reliance on community-based networks and savings groups, such as merry-go-rounds and gender-specific groups that help the residents recover from climate-induced impacts and adapt to financial and social challenges, this works as an immediate crisis response post an event and often times the support is not very sufficient to works as a long term recovery strategy.

2. Assistance from Relatives

Religious Organizations, and CBOs: These sources provide support, helping residents to re-establish stability after a climate event. They facilitate recovery by restoring essential needs.

3. Government Social Safety Nets

Government provides assistance, such as temporary housing, bursaries, cash transfers, food distribution, and school feeding programs, to serve as recovery aid. Although not always sufficient, these programs aim to restore essential services and provide financial relief.

Adaptive capacities the community relies on are;

4. River deviation

In Nyalenda B the effort is used as a strategy to manage water flow and mitigate flood risks; however, the practice has, in some cases, proved maladaptive i.e. in the case of destabilizing riverbanks of River Nyamasaria which has led to intensified flood risks during extreme weather events.

5. River Desiltation as a Temporary Solution

While river desiltation has proven effective in managing water flow, it remains an unsustainable solution for Nyalenda's river such as River Nyamasaria (Uhuru) and River Auji in Manyatta B settlements. The county faces ongoing challenges, as resources must be repeatedly allocated to desilt these rivers, competing with other urgent priorities. Despite these efforts, stormwater continually impacts the rivers, reversing desiltation gains and highlighting the need for more sustainable, long-term solutions to manage stormwater and river health.

5.2. Capacity to Anticipate Risk

Nyalenda B and Manyatta B, shows some levels of capacity to anticipate risk by community and county government efforts to conduct public awareness Campaigns where there is some levels of education of community members about climate risks, and proactive measures to reduce exposure, like moving away from the wetlands during the heavy rainfall seasons.

6.0. Conclusion and Recommendations

6.1. Conclusion

The profiling exercise on Manyatta B and Nyalenda B settlements underscores the critical need for targeted climate resilience and adaptive strategies tailored to informal settlements in Kenya, particularly in the face of increasing climate change impacts. These settlements, characterized by vulnerable infrastructures, economic fragility, and high exposure to climate risks, endure severe economic and non-economic losses, with lasting impacts on residents' lives, livelihoods, and overall community stability.

The findings highlight the urgent necessity of integrating informal settlements into climate adaptation policies, such as the Loss and Damage Fund, which could provide direct financial support to affected households, establish microfinance programs to help rebuild informal businesses, and promote sustainable, community-centered resilience strategies.

6.2. Recommendations

Based on the profiling exercise the following recommendations can be deduced.

1. Comprehensive Loss and Damage Assessments

There is a need to conduct detailed household-level assessments to capture the full scope of losses and damages, enabling eligibility for targeted relief from the Loss and Damage Fund. Utilize data, as provided in this report, to advocate for policy changes, resource allocation, and to position informal settlements as integral components of climate resilience efforts

2. Development of Climate-Resilient Infrastructure

There is a need to prioritize the creation of flood-resistant facilities, sustainable housing, and green infrastructure to enhance resilience against climate impacts.

3. Preservation and Enhancement of Cultural Knowledge

A need is presented on recognition and support of local cultural knowledge on adaptation practices to strengthen the community's adaptive capacity.

4. Conservation of Natural Buffers and Strengthening Governance

There is a need to implement conservation efforts for natural buffers while reinforcing community governance and capacity-building initiatives.

5. Community-Led Actions for Climate Resilience

There is need to promote coordinated, community-led initiatives to address climate-induced losses and damages, aiming to enhance the resilience and quality of life for residents in Manyatta B and Nyalenda B.

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