

AUTHORS & ACKNOWLEDGEMENTS

THIS REPORT WAS DEVELOPED BY

Akiba Mashinani Trust (AMT)

This **People’s Adaptation Plan for Makongeni Informal Settlement** builds upon the Makongeni Situational Analysis Report and integrates findings from a **Climate Risk Assessment by SUEZ Consulting**. The plan was developed under the **People’s Adaptation Planning Framework**, financed by the **Global Centre on Adaptation (GCA)** through the **Africa Adaptation Acceleration Program**, and implemented for the **County Government of Homa Bay** as part of the **Local Physical and Land Use Development Plan (LPLUDP)**.

Contributors

Authors: Rex OTIENO, David MUSAU, and Edward THEURI

Supervised By: Charles OBONDO, Fredrick WAREGA, Maureen MUSYA,

Reviewed By: Victor ORINDI, Khushboo KHATRA, Alexandra HILLESHEIM, Estelle ROUHAUD, Amélie AGNEL, Georgina ANDRE

Descriptions	Details
--------------	---------

Sector	Locally Led Adaptation, Urban Planning & Climate Resilience
---------------	---

Region	Kenya, Africa
---------------	---------------

Keywords	Community-driven planning, Climate resilience, Urban informal settlements, Water supply, Sanitation, Housing, Disaster risk reduction, Livelihoods, Participatory governance
-----------------	--

Acknowledgements

We gratefully acknowledge the **Akiba Mashinani Trust (AMT)** team for steering the participatory planning process and guiding community engagement throughout this plan. Special appreciation goes to the **Global Center on Adaptation (GCA)** for financing and technical guidance, and to the **County Government of Homa Bay** for its leadership and coordination.

We extend sincere thanks to the **local Civil Society Organizations** that provided sector-specific data and insights, enriching the plan’s analysis. We also acknowledge the **Climate Risk Assessment conducted by SUEZ Consulting**, which offered critical climate-hazard data complementary to the situational analysis; their contribution is deeply appreciated.

The plan benefitted from the cooperation of **local leadership including chiefs and assistant chiefs**, whose support facilitated community mobilisation. We are grateful to the various **directorates within the County Government and Homa Bay Municipality** for their collaboration and technical inputs.

Finally, we thank the residents of **Makongeni Informal Settlement** and the community enumerators whose participation and lived experiences shaped this plan. Their collective efforts have enabled the creation of a truly **people-centred adaptation strategy**, positioning Sofia for a more resilient future.

EXECUTIVE SUMMARY

The Makongeni People’s Adaptation Plan is a locally led, data-driven framework that combines climate resilience and integrated urban planning to guide the sustainable development of Makongeni Informal Settlement within Homa Bay Municipality. Developed by Akiba Mashinani Trust (AMT) with financing from the Global Centre on Adaptation (GCA) and technical collaboration from SUEZ Consulting and the County Government of Homa Bay, the Plan provides a roadmap for transforming Makongeni into a safer, greener, and more inclusive urban community.

The Plan is grounded in two foundational studies: the Makongeni Situational Analysis Report and the Homa Bay Rapid Climate Risk Assessment (RCRA). The Situational Analysis offers a detailed profile of Makongeni’s physical, social, and economic conditions—highlighting persistent challenges such as insecure land tenure, overcrowded and substandard housing, poor sanitation, and limited access to essential infrastructure and services. The RCRA, conducted by SUEZ Consulting in 2025, applied hydrological modelling and climate projections to identify key hazards—particularly flooding, erosion, and heat stress. The study revealed that flood depths of up to one metre are now common during heavy rains, damaging homes, contaminating water sources, and disrupting livelihoods. It also underscored the settlement’s vulnerability due to inadequate drainage, high reliance on pit latrines, and low connectivity to sewer and water networks.

Building on these findings, the People’s Adaptation Plan extends beyond climate adaptation to serve as a comprehensive urban development blueprint. It integrates environmental resilience with planning interventions in housing, infrastructure, livelihoods, and governance. Its five objectives are to identify and map local risks and opportunities; enable community-led prioritization of interventions; strengthen resilience and basic service delivery; integrate adaptation measures into county and municipal planning; and mobilize sustainable financing. These objectives are guided by six principles—participation, equity, local knowledge, resilience, transparency, and sustainability—which ensure that all actions are community-owned and inclusive.

Through extensive community consultations, key priorities were identified across multiple sectors. Short-term actions focus on cleaning and rehabilitating drains, expanding water kiosks, installing solar-powered streetlights, and constructing flood-resilient communal sanitation blocks. Medium-term interventions include rainwater harvesting, resilient building materials, and waste recycling enterprises to create green jobs. Long-term strategies propose integrated stormwater systems, nature-based flood control, secure tenure regularization, and sustainable housing upgrades.

Implementation will be coordinated through the County Government of Homa Bay in collaboration with the Ward Climate Change Planning Committee (WCCPC) and aligned with other county and national frameworks such as KISIP II, Financing Locally Led Climate Action (FLLoCA), and the Homa Bay County Climate Change Act (2022). The financing strategy combines county allocations, community contributions, and devolved climate funds, reinforced by participatory monitoring and transparent governance mechanisms.

In essence, the Makongeni People’s Adaptation Plan translates scientific evidence from the RCRA and the Situational Analysis into locally driven, actionable solutions. By bridging urban planning and climate resilience, it provides a model for inclusive, community-centered urban transformation—ensuring that Makongeni evolves into a well-planned, climate-smart settlement that embodies the principles of sustainable and equitable urban development in Homa Bay County and beyond.

TABLE OF CONTENTS

AUTHORS & ACKNOWLEDGEMENTS	II
EXECUTIVE SUMMARY.....	III
TABLE OF CONTENTS.....	IV
LIST OF MAPS	III
LIST OF FIGURES.....	III
LIST OF TABLES	III
1 INTRODUCTION.....	1
1.1 Background and Rationale	1
1.1.1 Climate risk factors.....	1
1.1.2 Why is a locally led adaptation plan needed? 2	
1.2 Objectives of the People's Adaptation Plan 3	
1.2.1 Objective 1: Climate Risk Identification 3	
1.2.2 Objective 2: Community-led Prioritization.....	3
1.2.3 Objective 3: Resilience Enhancement .3	
1.2.4 Objective 4: Integration with Local Development Plans.....	3
1.2.5 Objective 5: Resource Mobilization and Implementation	3
1.3 Principles Guiding the Process.....	3
1.3.1 Participation and Inclusion.....	4
1.3.2 Equity and Justice.....	4
1.3.3 Local Knowledge and Innovation	4
1.3.4 Resilience Building	4
1.3.5 Accountability and Transparency	5
1.3.6 Sustainability.....	5
1.4 Geographic and Administrative Scope ...	5
1.4.1 Geographic boundaries	5
1.4.2 Administrative context	7
1.5 Alignment with County, National and Global Frameworks.....	9
1.5.1 County Level.....	9
1.5.2 National Level.....	10
1.5.3 Global Level	10
1.6 Methodology Overview	11
1.6.1 Situational Analysis Approach.....	11
1.6.2 Rapid Climate Risk Assessment (RCRA) Approach.....	11
1.6.3 Integration and Synthesis.....	11

2 COMMUNITY PROFILING GUIDELINES.....	13
2.1 Demographic & Socio-Economic Overview.....	13
2.1.1 Population Size & Composition.....	13
2.1.2 Socio-Economic Indicators.....	15
2.1.3 Vulnerable Groups	15
2.1.4 Economic Activities	16
2.1.5 Settlement Pattern	16
2.1.6 Housing Types and Conditions	16
2.1.7 Land Use & Spatial Organization	16
2.1.8 Land Tenure	17
2.2 Livelihood Systems and Vulnerabilities 18	
2.2.1 Primary Livelihoods	18
2.2.2 Vulnerability of Livelihoods	19
2.2.3 Social Safety Nets and Support Systems 20	
2.2.4 Access to Resources	20
2.3 Infrastructure and Services Baseline (WASH, Housing, Roads, Drainage, Energy, Health).....	21
2.3.1 Water, Sanitation, and Hygiene (WASH) 21	
2.3.2 Housing and Shelter	23
2.3.3 Roads and Transport	23
2.3.4 Drainage Systems.....	24
2.3.5 Energy Access	25
2.3.6 Health Infrastructure and Services ...25	
2.4 Land Use and Physical Planning Analysis 26	
2.4.1 Existing Land Use Overview.....	26
2.4.2 Settlement Morphology and Spatial Patterns 26	
2.4.3 Land Tenure and Ownership Constraints	27
2.4.4 Physical Planning Gaps and Challenges 27	
2.4.5 Environmental Constraints and Land Suitability.....	28
2.5 Local Governance and Existing Community Structures	28
2.5.1 Governance Framework	28
2.5.2 Community Organizations and Leadership	29
2.5.3 Participation in Decision-Making	29
2.5.4 Conflict Resolution Mechanisms.....	30
2.5.5 Strategic Planning Opportunities.....	31

3 CLIMATE RISK ASSESSMENT & VULNERABILITY ANALYSIS 32

3.1	Climate Hazard Identification.....	32
3.1.1	Climate Profile Hazard Makongeni ...	32
3.1.2	Identification of Hazards Based on Data	33
3.2	Vulnerability Analysis.....	33
3.3	Exposure and Sensitivity Mapping.....	34
3.3.1	Spatial Vulnerability Mapping	34
3.3.2	Asset Mapping	35
3.4	Sensitivity to Climate Change Impacts .	36
3.5	Interactions Between Hazard, Exposure, and Vulnerability (Climate Risk Framework)	36
3.6	Capacity to Adapt.....	37
3.7	Climate Vulnerability Index (CVI) and Risk Prioritization.....	37
3.8	Risk Scenarios and Projected Climate Change Impacts.....	38
3.8.1	Develop Risk Scenarios.....	38
3.8.2	Projected Climate Change Impacts..	39

4 VISIONING & COMMUNITY PRIORITIZATION . 40

4.1	Community-Driven Visioning Workshops	40
4.1.1	Engagement Process	40
4.1.2	Focus Areas for Visioning.....	40
4.1.3	Documentation and Reporting	41
4.2	Participatory Mapping of Aspirations and Risks	41
4.2.1	Mapping Process.....	41
4.2.2	Tools and Techniques	41
4.2.3	Collaboration	41
4.3	Criteria for Prioritizing Adaptation Options	41
4.3.1	Equity Check: Do Priorities Benefit the Most Vulnerable?	41
4.3.2	Feasibility of Implementation	42
4.3.3	Direct Link to Identified Climate Risks	42
4.3.4	Co-benefits of Interventions.....	42
4.3.5	Social and Political Acceptability	43
4.4	Priority Areas of Intervention (Short, Medium, Long-Term)	43
4.4.1	Short-Term Interventions.....	43
4.4.2	Medium-Term Interventions.....	44
4.4.3	Long-Term Interventions	44
4.4.4	Action Plan Development	46

5 INTERVENTION STRATEGIES FOR CLIMATE RESILIENCE..... 48

5.1	Water, Sanitation & Hygiene (WASH) Interventions	48
5.1.1	Climate-Proofing Water Infrastructure	48
5.1.2	Rainwater Harvesting and Water Conservation	48
5.1.3	Watershed Management and Tree Planting	49
5.1.4	Climate-Resilient Wastewater Treatment Systems	49
5.2	Energy and Renewable Solutions.....	50
5.2.1	Solar Energy Applications	50
5.2.2	Biogas and Waste-to-Energy Initiatives	50
5.2.3	Energy-Efficient WASH Infrastructure	51
5.2.4	Promotion of Clean Cooking Technologies.....	51
5.3	Climate-Resilient housing Interventions	52
5.3.1	Building Practices	52
5.3.2	Regulatory Frameworks	52
5.3.3	Access to Secure Land Tenure	53
5.4	Livelihood Diversification & Social Protection.....	54
5.4.1	Diversification of Income Sources	54
5.4.2	Strengthening Community Safety Nets	54
5.4.3	Social Protection and Public Works ..	54
5.5	Green Infrastructure & Nature-based Solutions (NbS) Interventions – Makongeni Settlement.....	55
5.5.1	Ecosystem Services Enhancement...55	
5.5.2	Nature-Based Infrastructure Development	55
5.5.3	Bioretention and Urban Cooling.....	55
5.5.4	Community Co-Management of Green Assets	56
5.6	Mobility & Access Interventions	56
5.7	Governance & Institutional Strengthening	56

6 INSTITUTIONAL FRAMEWORK & ROLES..... 58

6.1	Stakeholder Roles & Responsibilities....	58
6.2	Coordination Mechanisms	59
6.3	Integration with Development Planning & Budgeting	59

7 MONITORING, EVALUATION, AND LEARNING (MEL) 60

7.1	Community-Defined Indicators	60
7.2	MEL Tools & Methodologies.....	60

7.3	Feedback Loops & Adaptive Management	61	8.5.1	Kenya Informal Settlements Improvement Project (KISIP II)	66
8	FINANCING THE ADAPTATION PLAN	64	8.5.2	Financing Locally Led Climate Action (FLLoCA)	66
8.1	Community Contributions	64	8.5.3	County-Level and Partner Initiatives	66
8.2	County Budget Alignment	65	8.5.4	Community-Led and Civil Society Initiatives	67
8.3	External Funding	65	8.5.5	Coordination Mechanism	67
8.4	Tracking & Transparency Mechanisms	65	9	CONCLUSION	68
8.5	Coordination with Ongoing Programs and Projects	66		REFERENCES	69

List Of Maps

Map 1 Makongeni Informal Settlement.....	6	Map 5 Building Footprint	17
Map 2 National Context.....	7	Map 6 Transportation Network	24
Map 3 County Context.....	8	Map 7 Land Use Plan.....	45
Map 4 Municipal Context	9		

List Of Figures

Figure 1 Gender-Age Distribution	14	Figure 6 Solid Waste Management.....	22
Figure 2 Household Head Gender Distribution	14	Figure 7 Land Tenure.....	27
Figure 3 Occupancy Status.....	18	Figure 8 Community Proposals.....	30
Figure 4 Occupation	19	Figure 9 Makongeni Exposure Map	35
Figure 5 Solid Waste Management.....	22		

List Of Tables

Table 1 Population Size	13	Table 5 Flooding Comparative Analysis.....	38
Table 2 Distance to Water Sources	21	Table 6 Implementation Framework	46
Table 3 Distance to Nearest Medical Facility	25	Table 7 Monitoring and Evaluation	61
Table 4 Insurance Cover.....	25	Table 8 Financial Adaptation Plan	64

1 INTRODUCTION

1.1 Background and Rationale

The development of this People's Adaptation Plan builds directly on two complementary studies: the Shauri Yako Situational Analysis Report and the Homa Bay Rapid Climate Risk Assessment (RCRA) Report (Field Research, 2025; Suez Consulting, 2025). The Situational Analysis provides the baseline evidence on the settlement's physical, social, and infrastructural conditions, while the RCRA Report offers a detailed examination of climate hazards, vulnerabilities, and exposure patterns. Together, these documents constitute the primary empirical foundation of this Plan, ensuring that its strategies are grounded in field-validated data and aligned with the broader climate-resilience framework for Homa Bay Municipality.

Makongeni is among the three vulnerable informal settlements in Homa Bay Municipality. It has evolved due to a combination of socio-economic and environmental factors, particularly rural-urban migration, insecure land tenure, and the demand for affordable housing. It is a densely populated informal settlement located in Asego sub-location, bordering Lake Victoria. With an estimated population of 3,260 residents and a population density of 3,260 persons per square kilometer, the settlement is marked by high levels of vulnerability across socio-economic, infrastructural, and environmental dimensions.

Initially, Makongeni was characterized by informal structures built on unplanned land, with limited access to basic infrastructure and services. Residents settled on available land parcels without formal tenure, leading to a pattern of unregulated development. Over time, the population grew as more people migrated to the area in search of work in industries such as fishing, transportation, construction, and small-scale trade. Currently the settlement is characterized by overcrowded households, unregulated land use, and limited access to basic services such as water, sanitation, electricity, and waste management. A significant proportion of residents rely on informal livelihoods, including fishing, small-scale trade, casual labour, construction, and boda-boda transport. Household income levels remain low, with many families living below the poverty line.

1.1.1 Climate risk factors

Makongeni Informal Settlement faces a complex array of intensifying climate-related hazards, driven by its geographical setting, steep terrain, and limited infrastructure. These factors combine to heighten exposure to extreme weather events such as floods, heat stress, and droughts, all of which are increasingly frequent and severe across Homa Bay Municipality (RCRA, 2025). The settlement's location on the slopes of Got Rabuor creates fast surface runoff during heavy rainfall, while its dense, unplanned housing patterns and absence of engineered drainage systems increase vulnerability to flooding and erosion (RCRA, 2025).

Flooding is the most persistent and disruptive hazard in Makongeni. During the rainy seasons, blocked drains, erosion channels, and encroachments into riparian zones cause extensive water stagnation. The hydrological modelling undertaken through the Rapid Climate Risk Assessment confirmed that the C19 road and Makongeni Primary School precinct are among the most flood-prone areas, with water depths exceeding 20 cm during both 1-in-10 and 1-in-100-year flood events (RCRA, 2025). Beyond damaging homes and roads, floods also lead to contamination of pit latrines and open waste drains, significantly increasing the risk of waterborne diseases such as cholera and dysentery (RCRA, 2025).

Heat stress and rising surface temperatures represent another growing hazard. The widespread use of iron sheet roofing, combined with minimal vegetation cover, contributes to the Urban Heat Island effect, as noted in the Homa Bay People's Led Local Physical and Land Use Plan (PL-LPLUDP, 2025). These conditions intensify discomfort and health risks, particularly for vulnerable groups such as children, the elderly, and those living in congested dwellings with poor ventilation. The Rapid Climate Risk Assessment further projects that the number of days exceeding 35°C in Homa Bay could double by mid-century, and heatwave durations may increase by up to 98 days (RCRA, 2025).

Water scarcity during dry seasons compounds these challenges. Despite the settlement's proximity to Lake

Victoria, erratic rainfall and extended dry spells often limit access to safe water. The RCRA and Makongeni situational data reveal that when droughts occur, residents are forced to purchase water from vendors at inflated prices, sometimes reaching KSh 30 per jerrycan, while others resort to unsafe sources (RCRA, 2025; Makongeni Situational Analysis, 2025). The People's Adaptation Plan emphasizes the need for resilient water infrastructure and locally managed distribution points to address these inequities ((PL-LPLUDP, 2025).

The social and economic impacts of these hazards are most acutely felt by vulnerable groups—women, children, the elderly, and informal workers—whose livelihoods and health are directly affected by extreme weather events. Floods frequently disrupt school attendance and access to health services, while drought conditions undermine local markets and food security (RCRA, 2025). Housing structures, mostly built with non-durable materials, remain particularly susceptible to both floods and heat, reinforcing cycles of vulnerability and poverty (PL-LPLUDP, 2025).

Adaptation capacity in Makongeni remains limited. The absence of a functional drainage system, lack of early warning mechanisms, and minimal access to clean water and waste management services leave residents exposed to climate shocks (RCRA, 2025). To strengthen resilience, the Homa Bay People's Adaptation Plan proposes a combination of interventions: the establishment of a community-based early warning and disaster management system (Action No. 2), the construction of climate-resilient drainage systems in flood-prone areas (Action No. 3), the use of nature-based flood mitigation measures such as green corridors and bioretention areas (Action No. 4), and the promotion of resilient building materials (Action No. 5).

These actions, when implemented collectively, would align with Homa Bay County's Climate Change Act (2022) and its Local Physical and Land Use Development Plan, providing a pathway toward long-term climate adaptation and inclusive urban resilience.

1.1.2 Why is a locally led adaptation plan needed?

Top-down planning has failed to reach the realities of life in Makongeni Settlement. Past interventions focused on isolated infrastructure upgrades but lacked holistic integration with community needs or spatial vulnerabilities. The lived climate risks have shown that; one-size-fits-all solutions do not work; the community needs localized micro-scale, infrastructure solutions tailored to terrain, tenure patterns, social structures and community needs.

Communities already practice various forms of adaptation. Residents use sandbags to prevent

floodwater from entering homes, move to higher grounds during heavy rains, and engage in rainwater harvesting. Nonetheless, these practices lack proper technical reinforcement and financial support. In many cases, the measures are reactive rather than preventive, offering only temporary protection against increasingly severe events (RCRA, 2025). Without formalized drainage infrastructure, community efforts are easily overwhelmed during intense rainfall, while poor waste management further reduces the effectiveness of improvised flood barriers (PL-LPLUDP, 2025).

Some residents have also begun elevating pit latrines or constructing makeshift channels to redirect stormwater, yet such coping mechanisms remain unsustainable over time and may inadvertently worsen erosion and sanitation risks (RCRA, 2025). Similarly, small-scale rainwater harvesting provides a vital source of water during dry periods, but storage capacity and water quality remain limited due to the absence of standardized systems and maintenance support (Makongeni Situational Analysis, 2025). Strengthening these local initiatives through technical training, material assistance, and integration with county-level adaptation actions—such as nature-based flood control and community early warning systems—would transform current coping mechanisms into sustainable resilience strategies (PAP, 2025)

The PAP plays a crucial role in guiding both immediate and long-term interventions, while aligning with the People's Adaptation- Local Physical and Land Use Development Plan (PA-LPLUDP) for Homa Bay Municipality. Its purpose is to ensure that planning, investment, and decision-making are firmly grounded in accurate data and community realities, while also being inclusive and climate-responsive. By addressing the specific risks and challenges identified in Makongeni, the plan sets out actionable pathways for reducing vulnerability, strengthening local capacities, and promoting sustainable urban development. It prioritizes:

- **Climate risk management** – identifying and addressing hazards such as flooding, heatwaves, and droughts.
- **Service delivery improvements** – tackling gaps in drainage, water supply, sanitation, housing, and waste management.
- **Socio-economic resilience** – supporting livelihoods for low-income households, informal workers, and other vulnerable groups.
- **Environmental sustainability** – promoting nature-based solutions, greener infrastructure, and ecosystem restoration.

Through these approaches, the PAP moves beyond assessment to provide a roadmap for action, one that enhances spatial equity, strengthens economic

opportunities, and builds resilience against climate shocks. The plan also ensures alignment with county and national climate change priorities while remaining rooted in local knowledge and community participation. In this way, the Plan for Makongeni is not only a tool for risk reduction but also a driver of inclusive and sustainable urban development, enabling Homa Bay Municipality to manage urban growth challenges while safeguarding the well-being of its most vulnerable residents.

1.2 Objectives of the People's Adaptation Plan

The People's Adaptation Plan for Makongeni aims to provide a clear, community-led roadmap for responding to the settlement's growing climate risks and vulnerabilities. It is grounded in the lived experiences of residents and aligned with local and national planning priorities. The objectives below will guide the planning, implementation and monitoring of all proposed adaptation strategies.

1.2.1 Objective 1: Climate Risk Identification

The climate risks facing Makongeni such as flooding, heat stress, and water scarcity, have been comprehensively assessed and mapped through community-led processes and GIS-based vulnerability analysis. These assessments have identified priority hotspots and outlined the most urgent interventions needed to reduce risk. The next phase focuses on operationalizing these findings through targeted implementation of adaptation measures, guided by the Rapid Climate Risk Assessment (RCRA) and the People's Adaptation Plan for Homa Bay Municipality

1.2.2 Objective 2: Community-led Prioritization

This objective focuses on empowering the Makongeni community to take a leading role in identifying and prioritizing adaptation actions. Through inclusive consultations, focus group discussions, and participatory planning workshops, residents particularly women, youth, and persons with disabilities—defined the most pressing climate challenges, including recurrent flooding, inadequate drainage, heat stress, and unreliable access to clean water. This bottom-up prioritization process, grounded in the principles of Locally Led Climate Adaptation (LLCA), ensures that interventions are technically sound, socially accepted, and responsive to local realities.

1.2.3 Objective 3: Resilience Enhancement

To develop and promote strategies that strengthen the adaptive capacity of the community, with particular focus on women, youth, and the elderly. This includes improving access to resilient infrastructure, climate-smart livelihoods, disaster preparedness systems, and social safety nets.

1.2.4 Objective 4: Integration with Local Development Plans

This objective focuses on ensuring that the outcomes of the climate risk assessment and community-led prioritization are fully integrated into existing county and municipal development frameworks to promote long-term sustainability and policy alignment. By linking the findings from the Rapid Climate Risk Assessment (RCRA) and the Homa Bay People's Adaptation Plan (PAP) with the Homa Bay County Integrated Development Plan (CIDP) and the Local Physical and Land Use Development Plan (LPLUDP), the goal is to mainstream climate adaptation into spatial planning, infrastructure investment, and service delivery systems

1.2.5 Objective 5: Resource Mobilization and Implementation

This objective aims to facilitate the mobilization of financial, technical, and institutional resources necessary to implement the prioritized climate adaptation actions in Makongeni. While the Rapid Climate Risk Assessment (RCRA) and the Homa Bay People's Adaptation Plan (PAP) have identified key interventions—such as drainage improvements, resilient building materials, and community-based early warning systems—their success now depends on securing adequate and sustained funding to move from planning to action. Resource mobilization is therefore central to ensuring that proposed interventions are not only implemented but also maintained over time. This involves leveraging county budget allocations, aligning with the Homa Bay County Integrated Development Plan (CIDP), and tapping into external sources such as the Climate Change Fund, development partners, private sector investment, and community-based financing mechanisms.

1.3 Principles Guiding the Process

The development of the Makongeni People's Adaptation Plan is guided by six foundational principles that ensure the process is community-centred, equitable, informed by lived experiences and designed for long-term sustainability. These principles have shaped how the

plan was co-created and how it will be implemented, monitored and sustained over time.

1.3.1 Participation and Inclusion

The Plan is founded on the principle that effective climate adaptation must begin with the people most affected. Participation in Makongeni has been intentionally inclusive, involving a wide range of community members across age, gender, and ability. Women and youth played a central role throughout the process, particularly during the household enumeration and data collection phases, where they served as community enumerators and facilitators. Their involvement not only enhanced the accuracy and trustworthiness of local data but also ensured that gender and intergenerational perspectives were embedded in the understanding of vulnerability and adaptive capacity. The planning process began with community-level household enumerations and continued through a series of participatory engagements, including focus group discussions, participatory mapping, sectoral dialogues, and a community-wide validation workshop, all designed to ensure that local voices shaped the priorities and outcomes of the adaptation plan.

During the validation workshop held on 1 April 2025, more than 50 residents of Makongeni took part, organized into three distinct groups to ensure inclusive representation: women, youth and (PWDs), and men and elders. These groups provided sector-specific insights into climate impacts, existing coping strategies, and adaptation priorities. Community voices were also captured through risk mapping exercises and plenary feedback sessions.

This inclusive approach not only improved the quality of data collected but also created a sense of ownership among participants. Special effort was made to ensure that vulnerable groups—especially women, youth, and PWDs—had safe spaces to share their lived experiences and propose context-specific solutions.

1.3.2 Equity and Justice

The principle of equity and justice ensures that climate adaptation interventions do not reinforce or deepen existing social inequalities. In Shauri Yako, climate risks such as flooding, heatwaves, and water scarcity disproportionately affect low-income households, informal traders, women-headed families, and persons with limited mobility or access to services

This Plan recognizes that adaptation is not just a technical or environmental challenge it is also a matter of fairness. Therefore, adaptation strategies have been explicitly designed to prioritize the needs of those who

are most vulnerable. For example, interventions targeting improved water access and sanitation will be implemented first in areas most prone to flooding and with the least infrastructure coverage. Safeguards have also been built into the planning framework to prevent the benefits of adaptation from being captured by wealthier or better-connected groups within the settlement.

1.3.3 Local Knowledge and Innovation

Local knowledge and innovation are essential to designing practical and effective adaptation measures. Throughout the planning process, the Plan has valued and integrated the traditional coping strategies and lived experiences of Shauri Yako residents. Elders, long-term residents, and community leaders have contributed historical perspectives on flooding patterns, heat stress periods, and shifts in fish stocks insights that complement scientific climate data.

Residents have also demonstrated a range of grassroots adaptation practices, including the use of sandbags to elevate house foundations during floods, manual irrigation of kitchen gardens during droughts, and temporary relocation to higher ground during extreme rainfall events. These examples illustrate the community's capacity for innovation and resilience. The People's Adaptation Plan builds upon these practices, formalizing them into structured interventions supported by technical assistance and policy integration.

1.3.4 Resilience Building

The People's Adaptation Plan adopts a holistic understanding of resilience that goes beyond infrastructure. While flood defenses, drainage systems, and improved housing form a core part of the plan, equal emphasis is placed on strengthening the social fabric and institutional capacity of the community. This includes supporting local organizations, youth groups, and women's collectives that play vital roles in service provision, information sharing, and collective action.

The Plan proposes the establishment of a joint community–county implementation committee to oversee project delivery, ensure community priorities remain central, and serve as a bridge to local government structures. It also promotes education and training programs focused on climate awareness, green skills, and disaster preparedness. In doing so, the Plan aims to build long-term adaptive capacity that is embedded within the community's governance and development systems.

1.3.5 Accountability and Transparency

Transparency and accountability are essential to the credibility and success of the People’s Adaptation Plan. To ensure public trust, all stages of the Plan have been documented and shared with the community through feedback sessions, digital tools, and printed summaries.

The implementation phase of the People’s Adaptation Plan will include mechanisms for ongoing public reporting, including community noticeboards, WhatsApp-based updates and quarterly community review meetings. In addition, the planned establishment of local information hubs will help residents track the progress of adaptation actions and raise concerns or suggestions. By embedding community oversight into the Plan’s governance structure, the Plan ensures that decision-makers are held accountable, and that implementation remains aligned with community priorities.

1.3.6 Sustainability

The long-term success of adaptation depends on the sustainability of interventions environmentally, economically and socially. The Plan through the RCRA promotes nature-based solutions such as; tree planting, bioswales, and vegetated drainage corridors to manage flood risk and reduce urban heat. These approaches not only address immediate climate hazards but also enhance biodiversity, improve air quality, and create community green spaces. This aligns with the internationally recognized need to include biodiversity and ecosystems into climate strategies

Economic sustainability is supported through local job creation in adaptation-related sectors, such as the construction of water kiosks, maintenance of sanitation blocks, and management of waste collection systems. Social sustainability is built through community

ownership and local stewardship of shared infrastructure.

By anchoring adaptation actions within local institutions and promoting inclusive benefit-sharing, the Plan ensures that its impacts will endure beyond the lifespan of individual projects or donor cycles.

1.4 Geographic and Administrative Scope

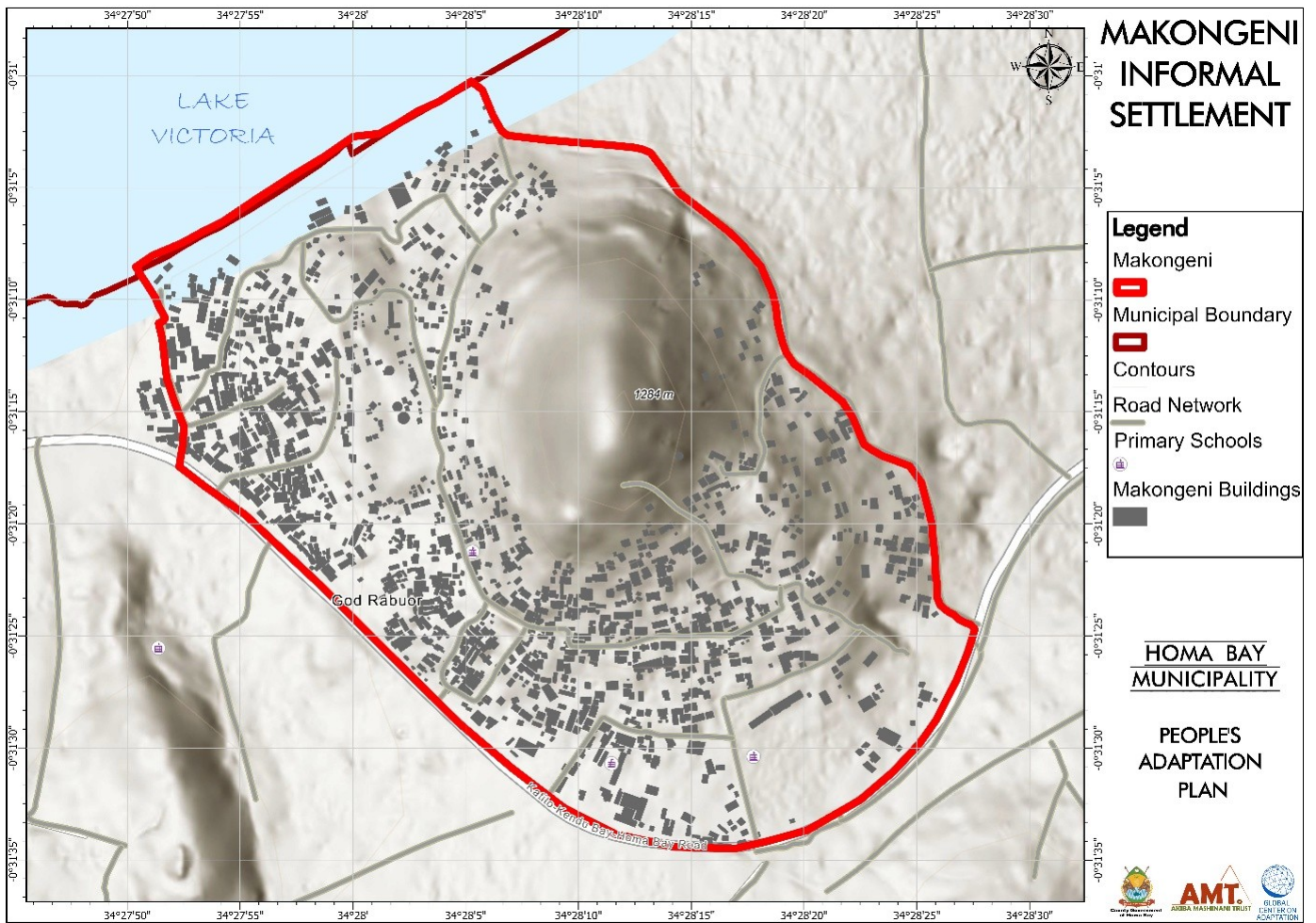
1.4.1 Geographic boundaries

The People’s Adaptation Plan focuses specifically on the Makongeni informal settlement, located in Asego sub-location, within the administrative boundaries of Homa Bay Municipality, Homa Bay County. Makongeni is situated at the northern edge of the municipality, adjacent to the shoreline of Lake Victoria.

The geographic extent of Makongeni is generally defined by the following features:

- North: Bordered by the Lake Victoria shoreline, with low-lying flood-prone areas extending into the lake buffer zone.
- South: Neighboring the Homa Bay Town CBD, with linkage to the main Municipal market separated from the CBD by the Main Homabay – Kendu C19 Road
- West: Connected to Sofia settlement.
- East: Adjacent to open peri-urban land and minor access roads that link Makongeni to the other parts of Asego Sub-location.

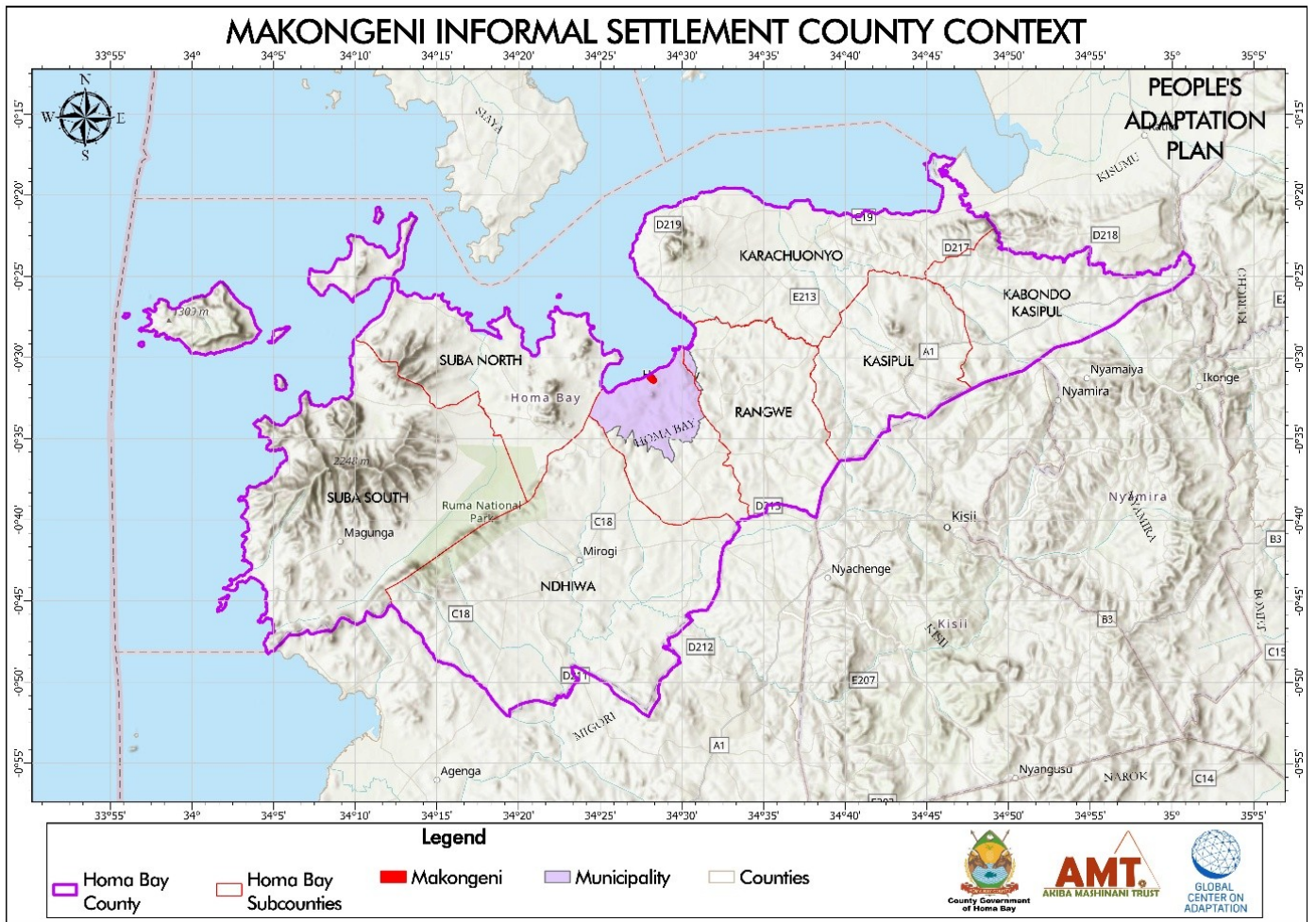
The settlement is densely built, with a patchwork of temporary and semi-permanent structures occupying land previously designated as riparian, floodplain, or informal tenure zones. Access is primarily through informal footpaths and secondary roads that become impassable during the rainy season.



Map 1 Makongeni Informal Settlement

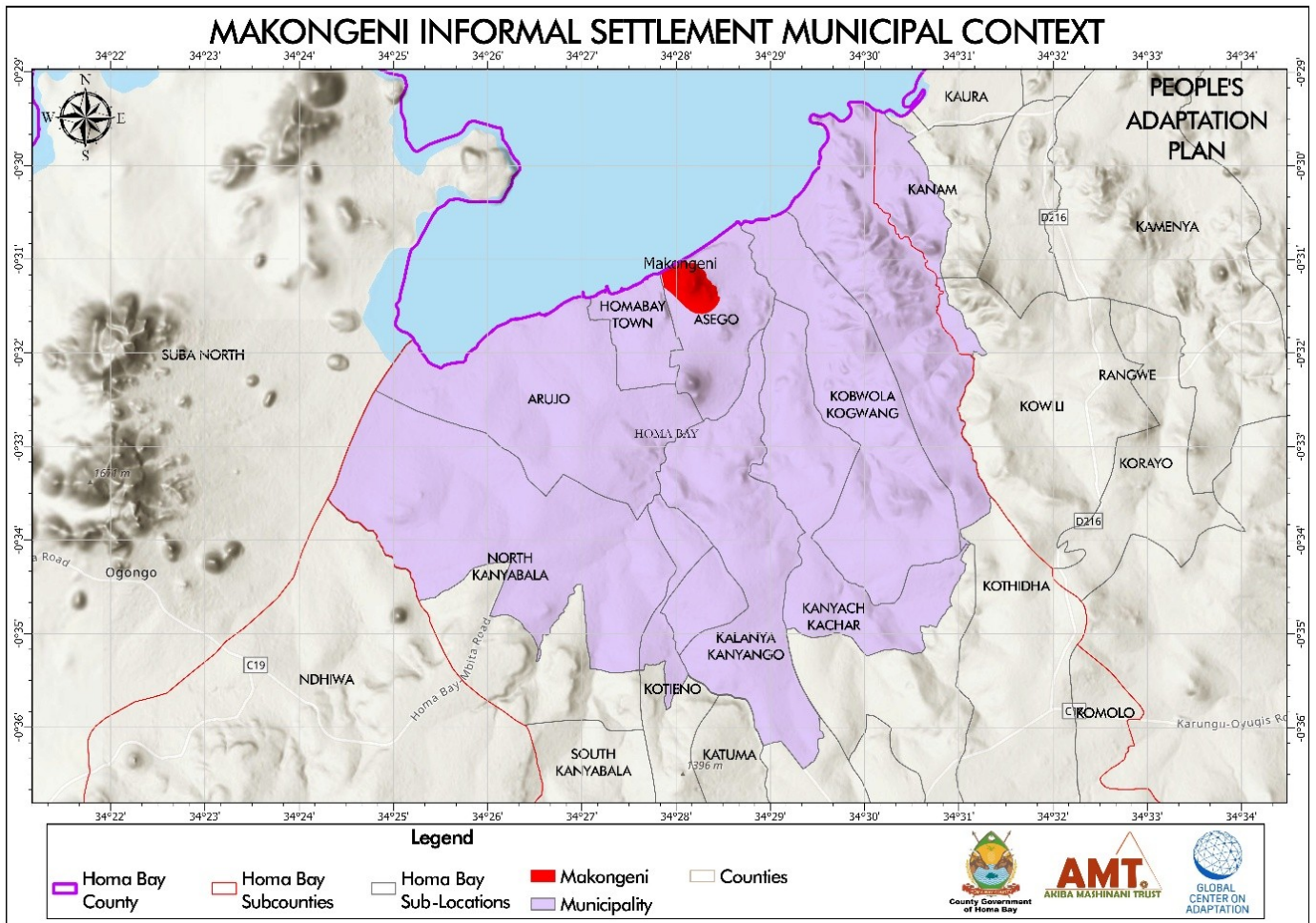
While the focus of this Plan is Makongeni itself, many of the adaptation challenges particularly around drainage, flooding, water access, and informal housing are shared across the three settlements. Hence, coordination with adjacent planning efforts in Sofia and Makongeni will be

essential for cross-settlement infrastructure solutions, mobility planning, and disaster preparedness.



Map 3 County Context

In the urban development framework, Makongeni falls under the jurisdiction of the **Homa Bay Municipality**, which oversees planning, infrastructure coordination, and service provision across the town’s urban core and its peripheral informal settlements.



Map 4 Municipal Context

1.5 Alignment with County, National and Global Frameworks

The Makongeni People’s Adaptation Plan is designed to complement and strengthen existing planning and climate policy frameworks across multiple levels of governance from the County, National and Global scales. Its strategies are intentionally aligned to support broader resilience-building goals while ensuring that grassroots perspectives inform formal planning and implementation.

1.5.1 County Level

At the county level, this Plan aligns directly with several key development and climate policy instruments of Homa Bay County:

County Integrated Development Plan (CIDP III, 2023–2027): The People’s Adaptation Plan contributes to the CIDP’s priority areas, including improving water access, expanding urban infrastructure, enhancing climate resilience, and reducing vulnerabilities in informal settlements. Adaptation actions proposed—such as drainage upgrades, green spaces, and climate-

responsive housing support the CIDP’s objective of sustainable urban growth and inclusive service delivery.

County Climate Change Action Plan (CCCAP): The People’s Adaptation Plan operationalizes the CCCAP at the settlement level by focusing on localized risk reduction, ecosystem-based adaptation, and community-led resilience. It helps translate county climate targets into implementable actions within vulnerable urban neighborhoods like Makongeni.

Urban Development and Land Use Planning Strategies: The People’s Adaptation Plan supports the goals of the Local Physical and Land Use Development Plan (LPLUDP) for Homa Bay Municipality by incorporating participatory zoning, incremental upgrading, and nature-based planning tools. It also complements proposed strategies under the Municipal Investment Plans and aligns with climate-smart urban design principles outlined in the county spatial planning framework.

The Homa Bay County Climate Change Act (2022): The People’s Adaptation Plan aligns directly with this Act’s provisions by operationalizing the Act’s principles at the settlement level. It translates county-level policy commitments into localized actions through participatory risk assessments, community-led prioritization, and integration with the County Integrated

Development Plan (CIDP) and Local Physical and Land Use Development Plan (LPLUDP). By grounding adaptation efforts in community participation and evidence-based planning, the Plan reinforces the County Climate Change Act's goal of building resilience through inclusive governance, decentralized decision-making, and sustainable resources

Through this alignment, the People's Adaptation Plan ensures that community priorities are mainstreamed into county-level budgets, investment pipelines, and institutional coordination mechanisms.

1.5.2 National Level

At the national level, the PAP is consistent with Kenya's key climate adaptation and development policies:

National Climate Change Action Plan (NCCAP, 2023–2027 and beyond): The People's Adaptation Plan contributes to priority action areas of the NCCAP such as enhancing climate resilience in the urban sector, improving water and sanitation systems, and empowering vulnerable populations through community-led adaptation.

National Adaptation Plan (NAP, 2015–2030): The Plan supports the NAP's aim of reducing vulnerability and enhancing the adaptive capacity of communities by implementing targeted interventions in sectors such as water, housing, urban planning, and disaster risk management.

Climate Risk Assessment Guidelines and Climate-Smart Agriculture Strategy: While not an agricultural plan, The People's Adaptation Plan aligns with national guidance by integrating climate risk assessments (flood zones, heat islands, drainage mapping) and promoting resilience in food access and informal market systems, which are vital for urban food security.

Kenya's Nationally Determined Contributions (NDCs) under the Paris Agreement: The People's Adaptation Plan offers a localized pathway for achieving national climate targets by:

- Reducing emissions from unregulated waste and energy use in informal settlements.
- Supporting adaptation actions that protect public health, livelihoods, and infrastructure.
- Demonstrating the viability of locally led, bottom-up climate planning within Kenya's devolved governance system.

1.5.3 Global Level

Globally, the People's Adaptation Plan reinforces Kenya's commitments to several international frameworks focused on climate action, sustainable development, and disaster resilience:

UN Sustainable Development Goals (SDGs): The People's Adaptation Plan contributes to the achievement of multiple Sustainable Development Goals (SDGs) at two complementary levels. At the core, it directly advances SDG 13 on Climate Action and SDG 11 on Sustainable Cities and Communities, by strengthening local resilience, reducing climate-related risks, and promoting inclusive, safe, and sustainable urban development. Through its community-led approach, the Plan operationalizes climate adaptation at the settlement level, translating global goals into locally driven actions that enhance preparedness and adaptive capacity.

At the implementation level, the defined actions within the Plan also contribute to several interlinked SDGs. For instance, interventions to improve water access, drainage, and sanitation directly support SDG 6 on Clean Water and Sanitation, ensuring safe, reliable, and equitable water services. Efforts to reduce vulnerability and build resilient livelihoods align with SDG 1 on No Poverty, while improved housing and drainage infrastructure contribute to SDG 9 on Industry, Innovation, and Infrastructure. Additionally, the Plan's emphasis on reducing waterborne diseases and improving environmental health supports SDG 3 on Good Health and Well-being. Collectively, these integrated actions illustrate how localized climate adaptation in Makongeni not only strengthens resilience to climate impacts but also drives progress across multiple dimensions of sustainable development.

Sendai Framework for Disaster Risk Reduction (2015–2030): The People's Adaptation Plan supports Sendai's emphasis on locally managed disaster risk reduction through hazard mapping, community training, and neighborhood-level early warning and preparedness strategies.

Paris Agreement 2015: The Makongeni People's Adaptation Plan aligns closely with the Paris Agreement particularly its goals on enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change. The Agreement emphasizes the importance of locally led and participatory approaches to adaptation, principles that are at the heart of this Plan. By conducting community-based climate risk assessments, prioritizing locally relevant adaptation actions, and integrating these into county development planning, the Plan contributes directly to Kenya's

Nationally Determined Contributions (NDCs), which call for decentralized and community-driven climate resilience strategies. Moreover, the Plan operationalizes Article 7 of the Paris Agreement, which underscores adaptation as a global responsibility to protect people, livelihoods, and ecosystems.

Locally Led Adaptation (LLA) Principles: Developed by the Global Commission on Adaptation and endorsed by global adaptation actors, the LLA Principles call for subsidiarity, local ownership, and transparency. The People’s Adaptation Plan embodies these principles by:

- Prioritizing local leadership and decision-making power.
- Using community data and co-created solutions.
- Embedding mechanisms for accountability and feedback throughout implementation.

By aligning with these global frameworks, the Plan positions Makongeni not only as a site of local resilience-building but also as a model for community-driven climate adaptation that contributes to Kenya’s international commitments.

1.6 Methodology Overview

The People’s Adaptation Plan is grounded in a participatory and evidence-based process that integrates technical analysis with community engagement. The Methodology brings together two complementary streams of inquiry; **The Makongeni Situational Analysis** and the **Homa Bay Rapid Climate Risk Assessment (RCRA)**, conducted in early 2025 under the *Homa Bay Urban Resilience Initiative*. Together these form the analytical foundation for the adaptation priorities and actions presented in this Plan.

1.6.1 Situational Analysis Approach

The Makongeni Situational Analysis Report (Field Survey, 2025) provided the social, economic, and physical baseline for the settlement. The analysis employed a combination of **household surveys, direct field observation, spatial mapping, and focus group consultations** to document living conditions, service access, infrastructure gaps, and environmental challenges.

Data collection was led by community enumerators trained by Akiba Mashinani Trust (AMT) and Homa Bay Municipality, ensuring inclusivity and local knowledge integration. Surveys captured information on population demographics, household income, water and sanitation access, housing typologies, waste management, and mobility. Spatial data were collected through GPS

mapping of key features—such as drainage networks, public spaces, and flood-prone areas—verified through transect walks across the settlement.

Qualitative insights were drawn from semi-structured interviews and small group discussions with residents, landlords, traders, and local leaders, enabling the analysis to capture the lived realities behind the statistics. This approach ensured that the situational profile reflected both the measurable conditions and the social dynamics shaping vulnerability in Makongeni.

1.6.2 Rapid Climate Risk Assessment (RCRA) Approach

The *Homa Bay Rapid Climate Risk Assessment (RCRA) Report (2025)* provided the climate hazard and exposure dimension of the analysis. The RCRA combined **hydrological modelling, geospatial analysis, and participatory validation workshops** to identify climate-related risks specific to informal settlements within Homa Bay Municipality, with Makongeni as one of the focal sites.

Hydrological and hydraulic models were developed to simulate flood behavior under different rainfall scenarios, assessing variations in flood depth, velocity, and extent for 1-in-10 and 1-in-100-year events. These models were supported by topographical data, soil characteristics, and land-use mapping. Climate projections for temperature, rainfall intensity, and seasonal variability were drawn from CORDEX-Africa datasets and validated with Kenya Meteorological Department (KMD) data.

Community validation workshops followed, engaging residents in mapping flood hotspots, drainage blockages, and climate-related damages to housing, roads, and social infrastructure. These participatory sessions ensured that the technical outputs reflected local experience and that scientific risk modelling was grounded in lived evidence.

1.6.3 Integration and Synthesis

The findings of both analyses were consolidated to inform the *Makongeni People’s Adaptation Plan*. The Situational Analysis defined the **baseline conditions**—demographics, services, housing, and land-use patterns—while the RCRA identified the **climate hazards and exposure pathways** affecting those systems. Together, they formed a comprehensive picture of vulnerability at both household and settlement scale.

These insights were then validated and expanded through the **community visioning and prioritization process** described in Chapter 4. During these sessions, residents reviewed analytical findings, refined risk maps,

and co-developed adaptation priorities based on both technical evidence and local priorities. This integrated approach ensured that the Plan is not only scientifically sound but also locally owned and contextually grounded.

2 COMMUNITY PROFILING GUIDELINES

A significant portion of the data presented in this section was collected through locally led household enumerations conducted by trained community members within Makongeni. This approach ensured that the information gathered was accurate, context-specific, and reflective of residents lived realities. By involving local enumerators many of whom were women and youth the process enhanced trust, participation, and ownership of the data while strengthening community capacity in evidence-based planning. The locally led methodology also aligns with the principles of Locally Led Adaptation (LLA), ensuring that community voices directly inform the profiling, analysis, and subsequent planning interventions for climate resilience and inclusive urban development.

2.1 Demographic & Socio-Economic Overview

2.1.1 Population Size & Composition

Makongeni informal settlement exhibits a high population density of 3,260 persons/km², indicating extreme congestion within its 1 km² area. This congestion has resulted in overburdened infrastructure, inadequate sanitation, and limited access to essential services like healthcare, clean water, and waste management.

Table 1 Population Size

Total Population	Area km ²	Population Density	Households	Average Household Size
3,260	1	3,260 persons/km ²	1,147	3

With 1,147 households and an average household size of 3, Makongeni has a relatively smaller household size compared to national urban averages. This could indicate the presence of single-person households, child-headed families, or fragmented family units due to economic struggles or migration patterns. The high number of households within a small area also indicates housing challenges, where most residents likely live in overcrowded, semi-permanent structures with inadequate facilities. This situation raises concerns about the overall quality of life, as space constraints may exacerbate issues such as poor ventilation, lack of privacy, and increased transmission of diseases.

The household composition in Makongeni reflects a predominantly youthful population, with a significant concentration of individuals in the younger and working-age brackets. The distribution of age groups within households indicates that a large portion of residents are children and young adults, highlighting the presence of numerous families with dependents.

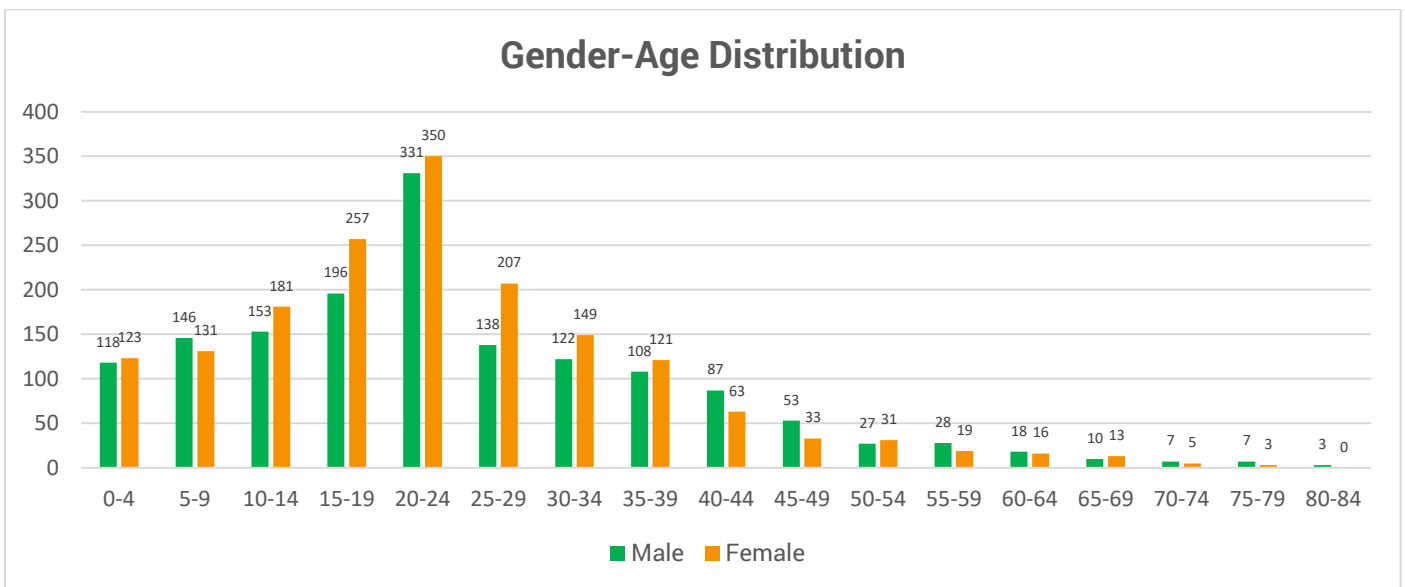


Figure 1 Gender-Age Distribution

The age distribution graph illustrates the population structure by age and gender, showing a distinctly youthful demographic. The largest proportion of the population falls within the 20–24 age group, with 350 males (17.3%) and 331 females (16.4%), followed closely by the 15–19 group, which has 257 males (12.7%) and 196 females (9.7%), and the 25–29 group with 207 females (10.3%) and 138 males (6.8%). This concentration in the younger age cohorts indicates a high dependency ratio and a strong labour force potential in the near future.

From ages 0–14, both males and females remain relatively balanced, with 118 males (5.8%) and 123 females (6.1%) in the 0–4 group, and small variations through ages 5–9 and 10–14. This reflects steady birth rates and minimal gender disparity among children. The population peaks sharply from 15–29 years, then begins to decline gradually across older age categories. For instance, the 35–39 group has 108 males (5.3%) and 121 females (6.0%), while the 45–49 group drops to 63 males (3.1%) and 33 females (1.6%).

Beyond age 50, the population declines steeply. The 50–54 group shows 27 males (1.3%) and 31 females (1.5%), while the elderly categories—70 years and above—each represent less than 1% of the total population, with only 7–10 individuals per age band. Overall, the distribution reveals a broad-based, pyramid-like population structure, typical of developing urban areas, dominated by young people and few elderly. The slightly higher number of males in the prime working-age groups suggests possible male-dominated migration to Makongeni for employment opportunities.

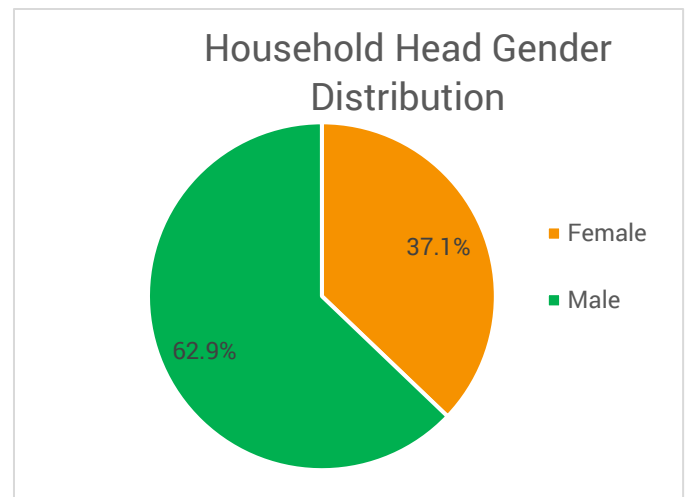


Figure 2 Household Head Gender Distribution

The chart shows that 62.9% of households are male-headed, while 37.1% are female-headed. This indicates that men are the predominant heads of households, which is consistent with national and regional trends where male-headed households tend to outnumber female-headed ones. However, the proportion of female household heads is also significant, suggesting a notable presence of women-led families, possibly due to widowhood, migration, or single-parent households.

The relatively high percentage of female-headed households highlights important social and economic implications for urban planning and development. Female-headed households are often more vulnerable to economic instability, housing insecurity, and limited access to resources such as credit, land, and employment opportunities. This underscores the need for gender-responsive planning that integrates women’s participation in decision-making and provides targeted support in housing, livelihoods, and social protection.

Ensuring equitable access to services and economic opportunities for female-headed households will be essential to achieving inclusive and sustainable development in Makongeni.

2.1.2 Socio-Economic Indicators

Makongeni's socio-economic context reflects broader urban informality trends. Residents primarily engage in informal livelihoods such as petty trade, boda-boda transport, artisanal work, fishing, and casual labour in construction or domestic services. Formal employment opportunities remain scarce, particularly for youth and women, leading to high unemployment and income insecurity. Household income levels are generally low, with many families surviving on less than KES 10,000 per month, leaving a large proportion below the poverty line. This financial uncertainty makes households highly vulnerable to shocks such as rising food prices, floods, or health emergencies.

Education levels vary, with most children enrolled in primary school due to government free primary education, but transition to secondary and tertiary institutions remains limited. Many youths drop out of school early due to financial constraints, teenage pregnancies, or the need to contribute to household income. This results in a cycle where young people lack the skills and qualifications necessary to access stable, well-paying jobs, thereby reinforcing reliance on the informal sector.

Access to basic services such as piped water, sanitation, waste management, and healthcare remains limited and inconsistent. Water supply is unreliable, forcing many households to rely on vendors at higher costs, while sanitation is largely through shared pit latrines that are often poorly maintained. Solid waste disposal is irregular, with open dumping common in parts of the settlement. Health services are available through a mix of under-resourced public facilities and costly private chemists, but access to quality care is uneven. Preventable diseases such as malaria, diarrhea, and respiratory infections remain common, affecting productivity and well-being.

Overall, the general well-being of Makongeni residents is low, shaped by poverty, overcrowded housing, insecure tenure, and weak infrastructure. Migration—both rural-urban and intra-urban—continues to fuel population growth, with many residents drawn to Makongeni's proximity to fishing zones, markets, and affordable (though insecure) housing. This evolving socio-demographic landscape underscores the urgency for participatory, adaptive planning strategies that align infrastructure, social services, and economic opportunities with the needs of a growing and youthful

population, while deliberately addressing the vulnerabilities of marginalized groups.

2.1.3 Vulnerable Groups

For vulnerable groups—including elderly residents, people with disabilities, child-headed families, expectant mothers, and infants—living conditions in Makongeni pose heightened risks that compound their social and economic exclusion. Elderly residents often live in poverty, dependent on family support or meagre pensions, yet face limited access to healthcare services. Age-related health issues such as chronic illnesses, vision impairment, and reduced mobility are worsened by poor sanitation, lack of nearby clinics, and the inability to afford medication.

People with disabilities (PWDs) encounter daily barriers due to the lack of accessible infrastructure, such as narrow, unpaved roads and inadequate sanitation facilities. Many are excluded from employment opportunities, relying instead on family members or community goodwill. Their limited mobility makes it difficult to access water points, health centres, or education facilities, further deepening their marginalization.

Child-headed households and orphans are particularly vulnerable as they often lack stable sources of income and adult guidance. Many children are forced into casual labour, street vending, or domestic work to sustain their families, exposing them to exploitation, abuse, and interrupted schooling. Overcrowded housing conditions and poor nutrition further threaten their physical and emotional development.

Expectant mothers and infants face severe maternal and child health risks. Limited access to antenatal care, skilled birth attendants, and postnatal services increases the likelihood of maternal mortality and complications during childbirth. Infants are highly susceptible to malnutrition, waterborne diseases, and respiratory infections due to unsanitary living environments and inadequate healthcare access.

Children living in overcrowded households experience constrained access to education, as lack of study space and financial hardship contribute to high school dropout rates. Inadequate nutrition weakens their health, making them more vulnerable to preventable diseases. Socially, many children face neglect or are at risk of early marriages, child labour, and exploitation, especially when family structures are disrupted by poverty or migration.

Overall, these vulnerabilities highlight the urgent need for targeted interventions such as accessible healthcare, inclusive infrastructure, nutrition support, social protection programs, and education support

systems. Addressing the challenges of these groups is central to ensuring that adaptation and development strategies are equitable, inclusive, and sustainable.

2.1.4 Economic Activities

Makongeni's local economy is predominantly informal, with 37% of household heads engaged in self-employment, mainly operating small-scale businesses, market stalls, food kiosks, and freelance services such as tailoring or repair work (Field Research, 2025). This dominance of informal entrepreneurship reflects both the residents' resilience and their limited access to formal employment opportunities. Casual labor accounts for 23% of livelihoods, largely comprising construction work, transportation (including boda boda operations), and short-term wage jobs that are highly dependent on weather conditions and urban mobility. Formal employment represents 22% of household heads, primarily in teaching, healthcare, and office-based work, typically occupied by individuals with higher education levels and more stable income sources.

Meanwhile, trade-related activities constitute 8%, supporting local markets through small-scale retail and food vending, while agriculture—including fishing, livestock keeping, and small urban farming—accounts for 7%, reflecting the settlement's proximity to Lake Victoria but also the limited space for cultivation. A small share, 3%, is engaged in artisan work such as carpentry, tailoring, and handicrafts. This economic composition underscores the structural vulnerability of Makongeni's residents—most livelihoods are informal, low-paying, and climate-sensitive. Flooding disrupts trade and transport, while heat stress and drought conditions reduce productivity and increase living costs. Strengthening climate resilience in Makongeni therefore requires targeted support for informal businesses, access to affordable credit, and the promotion of diversified, climate-resilient income opportunities that safeguard both livelihoods and local economic stability.

2.1.5 Settlement Pattern

Makongeni is a high-density informal settlement, characterized by unplanned housing structures and limited infrastructure. The spatial distribution is largely unregulated, with structures built in close proximity, leading to overcrowding and poor living conditions. Unlike formal urban areas, which have planned roads, drainage, and amenities, Makongeni faces irregular land use, inadequate waste management, and limited access to essential services such as clean water and sanitation.

The presence of Got Rabuor significantly shapes settlement patterns by limiting the amount of buildable land, as its steep and rocky slopes make construction

and infrastructure development difficult. Consequently, residents are forced to concentrate housing, businesses, and amenities around the base of the hill where the land is relatively flat and accessible. This clustering leads to congestion, as the available space is inadequate to accommodate the growing population, while the hill itself restricts expansion and creates uneven settlement distribution. In addition, narrow pathways and limited road networks around the hill further constrain movement and accessibility, compounding the problem of overcrowding at its foothills.

Over time, Makongeni has experienced rapid growth, driven by rural-to-urban migration, population increase, and limited affordable housing in formal areas. While planned urban settlements grow through structured expansion, informal settlements expand spontaneously, often without legal land tenure, leading to conflicts over land ownership and evictions. The increasing demand for low-cost housing and employment opportunities in urban centers has contributed to the continuous expansion of Makongeni and similar settlements.

2.1.6 Housing Types and Conditions

Housing in Makongeni is predominantly semi-permanent and temporary, constructed from corrugated iron sheets, mud walls, and timber offcuts, while a minority of households occupy more durable stone or brick structures with iron sheet roofing. Most houses are single-room units rented out to tenants, reflecting high demand for affordable accommodation among low-income earners. Overcrowding is common, with families of larger than 3 often sharing a single room, leading to poor ventilation, limited privacy, and heightened risks of communicable diseases such as tuberculosis and respiratory infections.

The quality of housing is generally poor due to lack of adherence to construction standards, inadequate foundations, and use of substandard building materials. Structures are highly vulnerable to flooding, fire outbreaks, and seasonal storms, which cause frequent displacement and loss of property.

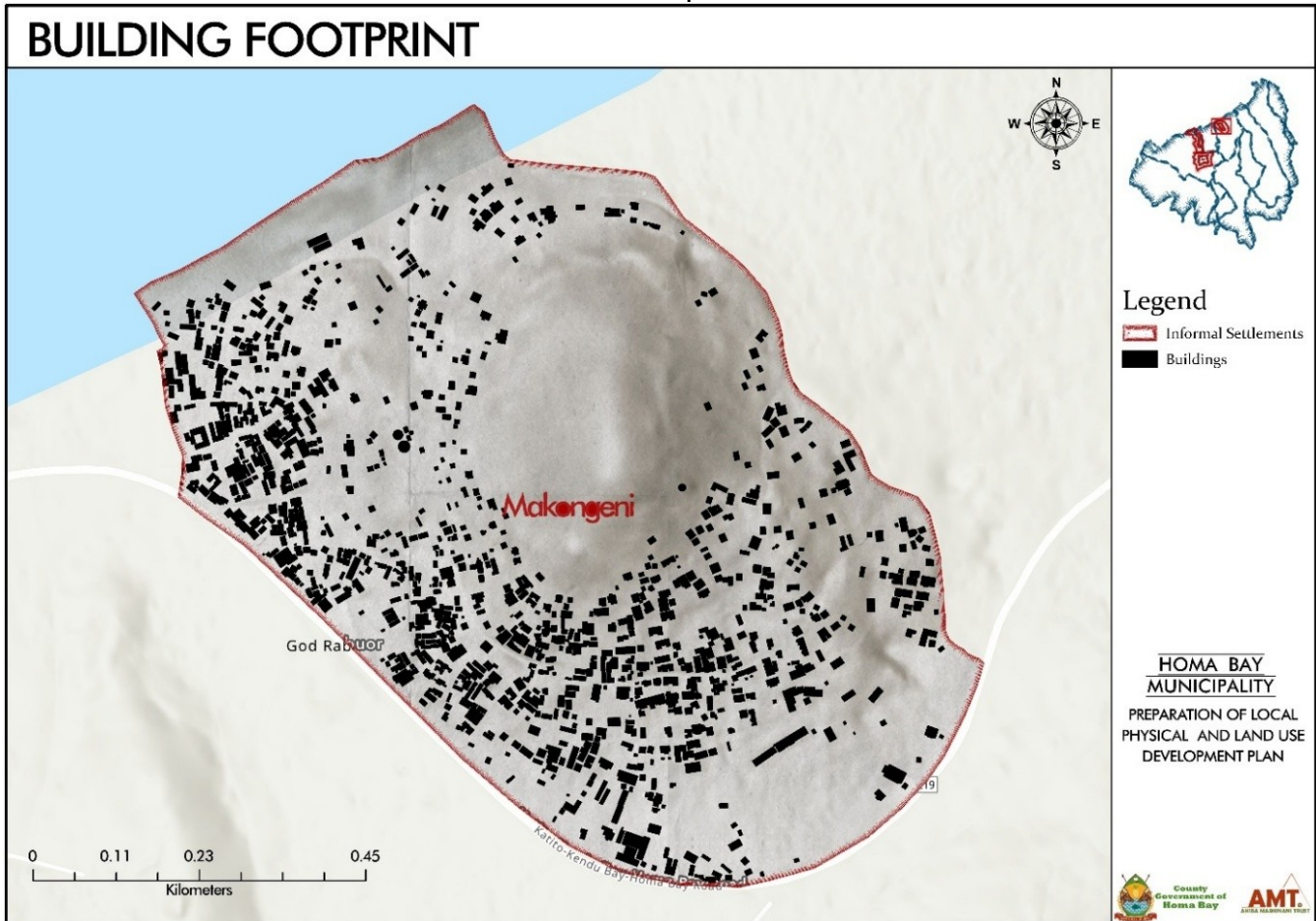
2.1.7 Land Use & Spatial Organization

Makongeni's land use is characterized by unplanned mixed-use development, where residential housing, informal businesses, small-scale workshops, and social amenities exist side by side without clear zoning or spatial order. Residential areas are tightly packed, with narrow footpaths functioning as access routes. Informal commercial activities (kiosks, open-air stalls, boda-boda stages) are concentrated along main access roads and near market spaces, while light artisanal work

(metalwork, carpentry, and tailoring) is often conducted within residential courtyards.

There is minimal provision of recreational or institutional land, with schools and health facilities often overcrowded or operating from limited parcels. Road

reserves and drainage channels have been encroached upon by housing and commercial activities, reducing mobility and creating blockages during floods. Public utilities such as water points and waste collection sites are insufficient, leading to over-reliance on informal service providers.



Map 5 Building Footprint

The absence of planned open spaces contributes to overcrowding, while the clustering of housing without buffer zones increases vulnerability to fires and floods. The organic growth of the settlement, driven by rapid population increase and rural-urban migration, has intensified land pressure and undermined environmental management.

2.1.8 Land Tenure

Land access in Makongeni is shaped by insecure tenure, informal rental arrangements, and frequent disputes. The majority of residents are tenants renting from

absentee landlords who subdivide plots into multiple single-room units. Rent is relatively affordable, attracting migrants and low-income households, but the lack of legal tenure discourages investments in durable housing and infrastructure.

Ownership is concentrated in the hands of a few landlords, while the majority of residents lack legal claim to the land they occupy. This creates power imbalances, with tenants having little influence over housing improvements or land-use decisions. Informal subdivision has produced irregular plots without proper documentation, further complicating land governance and enforcement of planning standards.

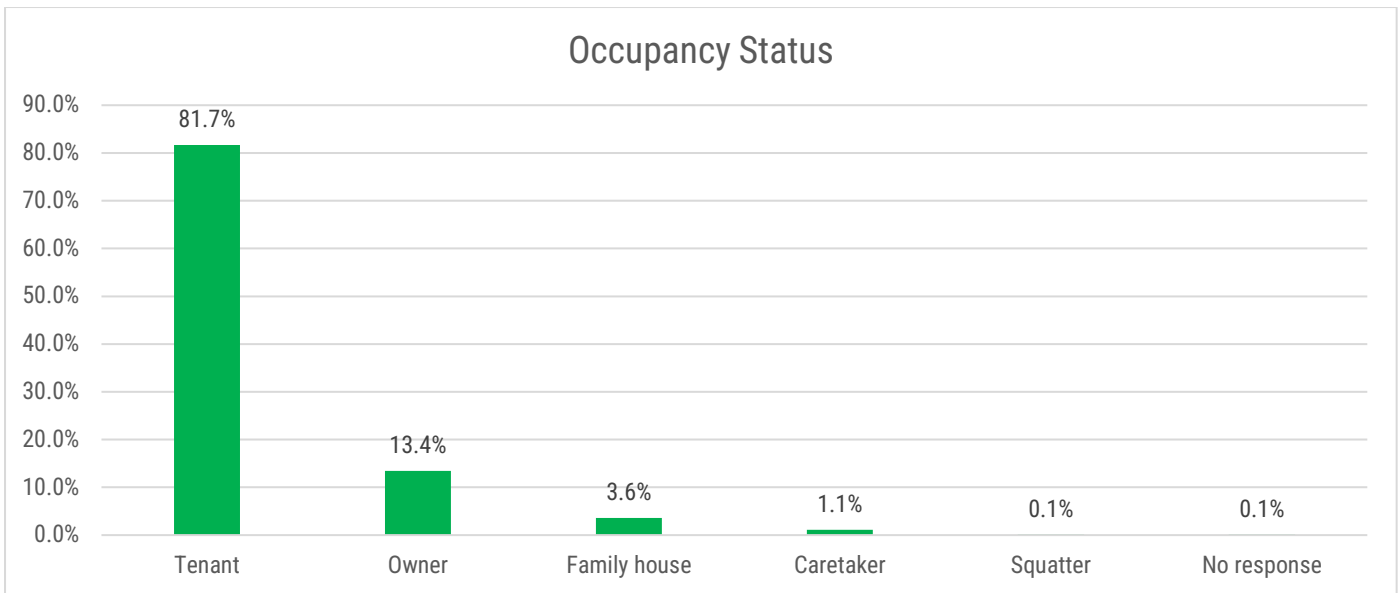


Figure 3 Occupancy Status

Disputes between landlords and tenants are common, often over rental terms, evictions, or land boundaries. These conflicts are mostly resolved through chiefs or elders, but lack of legal backing weakens enforcement. Land scarcity within the settlement further drives overcrowding, with limited options for expansion or relocation. Encroachment into flood-prone and riparian zones reflects the desperation for space but increases exposure to climate risks.

2.2 Livelihood Systems and Vulnerabilities

Residents in these settlements depend predominantly on informal, climate-sensitive livelihoods. The main activities include fishing and fish trading, boda boda transport, petty trade, casual construction work, and small-scale vending. Women are especially active in fish processing and small trading, while men often engage in fishing, transport, or casual labor. These activities provide immediate income but are highly precarious, offering little protection against shocks

2.2.1 Primary Livelihoods

The graph on occupation in Makongeni reveals a community whose livelihoods are heavily shaped by dependency and informal work patterns, typical of many low-income urban settlements.

A significant portion of the population over half (53.6%)—consists of dependents, mainly full-time students (27.6%) and children (26.0%). This indicates a young population structure with a high dependency ratio, placing economic pressure on the limited number of income earners within households.

Among the working-age population, self-employment mostly through small businesses and informal trading represents the largest active livelihood category at 12.6%. This reflects the entrepreneurial character of residents who rely on small-scale enterprises such as vending, fish trading, or household-based businesses to meet daily needs.

The unemployed make up 11.1%, signalling widespread job insecurity and limited access to formal employment opportunities. Many residents also depend on casual labour (7.7%), including construction and other daily wage jobs, underscoring the prevalence of unstable and low-paying work.

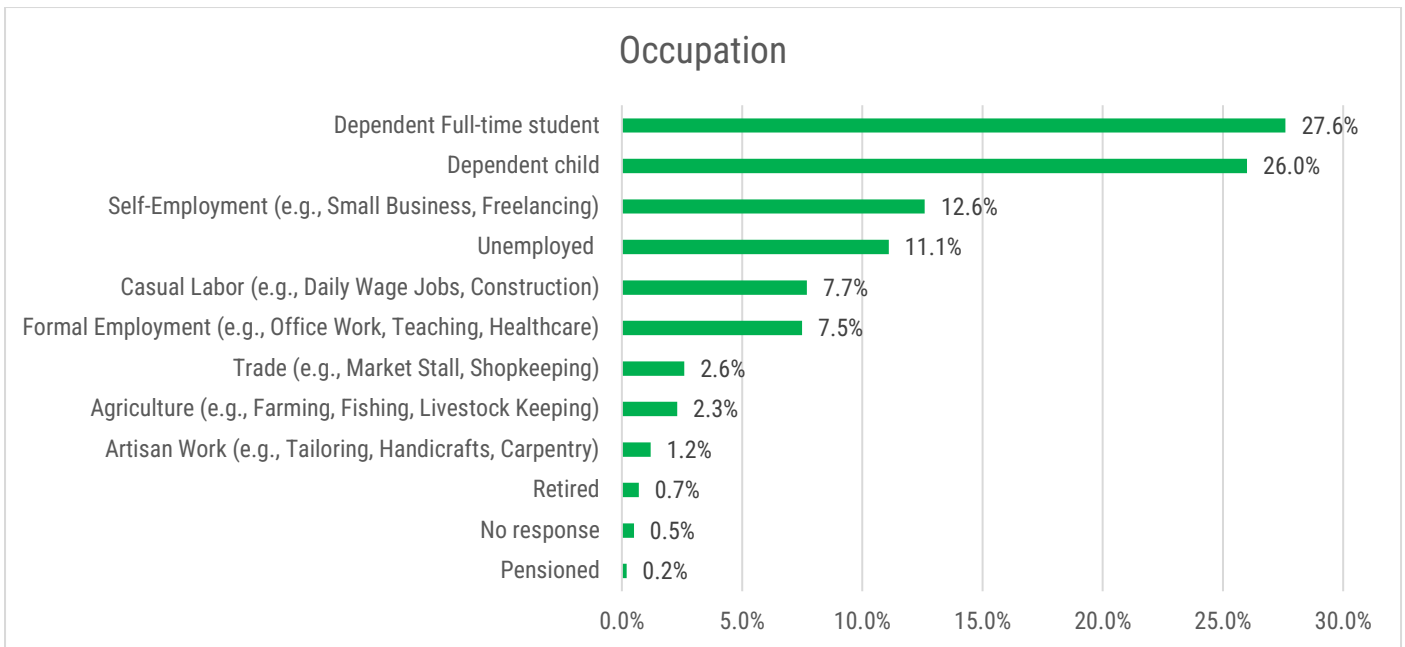


Figure 4 Occupation

Only 7.5% of respondents reported being in formal employment, a reminder that secure, salaried jobs are rare in Makongeni's socio-economic landscape. Traditional occupations like trade (2.6%), agriculture and fishing (2.3%), and artisan work (1.2%) still exist but play a relatively minor role, largely due to space constraints and urbanization pressures.

Overall, the data paints a picture of a settlement with high dependency, weak formal job markets, and reliance on informal, climate-sensitive livelihoods. This structure makes households particularly vulnerable to economic shocks and environmental hazards such as flooding or drought, which can disrupt informal work and reduce household resilience. These findings align with the People's Adaptation Plan for Makongeni, which highlights informal employment, casual labour, and small-scale trade as the community's primary livelihood systems, all of which are highly exposed to climate risks and market fluctuations.

2.2.2 Vulnerability of Livelihoods

The livelihoods represented in figure 4 are deeply intertwined with a range of environmental and socio-economic vulnerabilities that shape the daily realities of residents in Makongeni and similar settlements. Frequent flooding remains one of the most persistent threats, repeatedly destroying market stalls, cutting off roads, and disrupting the fish trade and transport networks on which many depend. These floods often halt the daily incomes of traders, riders, and casual workers, while also contaminating water sources and damaging household assets. The result is a cycle of loss and recovery that continually undermines economic stability.

Periods of heat and drought bring a different but equally severe strain. During dry spells, reduced fish catches, limited water availability, and rising food prices stretch household budgets to breaking point. The widespread use of low-quality iron-sheet housing intensifies indoor heat, reducing comfort and productivity—especially for home-based workers who already face precarious earnings. Meanwhile, erosion and landslides pose physical risks to both livelihoods and safety. In Makongeni, the steep slopes near Got Abuor Hill are particularly vulnerable, with erosion damaging paths, houses, and small business spaces, further isolating residents and constraining mobility.

These environmental pressures intersect with deep-rooted social vulnerabilities. Women-headed households and persons with disabilities are often the hardest hit, facing compounded disadvantages due to limited access to credit, insecure land tenure, and weak social protection systems. These factors reinforce poverty traps, leaving many residents unable to invest in more resilient livelihoods or safer housing.

The relationship between occupation and vulnerability is clear: as dependency on informal, climate-exposed work increases, so does exposure to risk. Areas dominated by daily-wage earners and informal traders—such as Shauri Yako and Makongeni—exhibit particularly high levels of livelihood insecurity, where even small climatic events can have major economic repercussions. In comparison, communities with slightly more diversified economies, such as Sofia, experience somewhat lower vulnerability, though they remain constrained by poor infrastructure and limited access to essential services.

To address these challenges, the People's Adaptation Plans for Homa Bay emphasize the need for diversification and resilience-building strategies. Priority

actions include the promotion of resilient building materials and improved drainage systems to safeguard homes and workspaces; the expansion of early warning systems and micro-enterprise support, particularly targeting women and youth; and the integration of nature-based flood mitigation measures—such as bioretention areas and green corridors—to protect economic hubs like Shauri Yako market. Together, these strategies aim to strengthen community resilience, reduce vulnerability, and create a more stable foundation for livelihoods in the face of intensifying climate and economic pressures.

2.2.3 Social Safety Nets and Support Systems

In the absence of formal welfare programs or structured economic support from the state, Makongeni residents rely primarily on community-based coping mechanisms to withstand economic shocks such as income loss, price fluctuations, or business disruptions. These informal social safety nets—particularly chamas (rotating savings and credit groups), youth associations, and church-based welfare groups—serve as the first line of defense during crises. Members contribute small amounts of money daily or weekly, creating a collective fund used to assist one another in meeting urgent expenses such as rent, school fees, or restocking small businesses after losses.

Focus group discussions in Makongeni indicate that these mutual support systems play a critical role in sustaining livelihoods, especially for women traders and casual laborers whose incomes are irregular and climate-sensitive. However, their capacity is limited; when floods or prolonged dry spells affect the entire community, the same support networks become overstretched, as everyone faces simultaneous hardship.

Borrowing from friends, neighbors, or rural relatives is another common strategy, though remittances are typically small, unpredictable, and inadequate to cushion households against prolonged income loss. Some residents also turn to informal moneylenders, but the high interest rates often lead to spiraling debt and deeper vulnerability. The situational analysis underscores that without access to formal financial instruments—such as micro-insurance, affordable credit, or government-backed emergency funds—Makongeni households remain extremely exposed to livelihood shocks. During recent flooding events, for instance, many families were forced to reduce food intake, withdraw children from school, or defer medical care simply to survive, revealing how fragile and unsustainable existing coping mechanisms are in the face of recurrent climate and economic stress.

Addressing this vulnerability calls for a deliberate strengthening of both formal and community-based resilience systems. Expanding access to affordable microfinance, cooperative savings schemes, and climate risk insurance could help stabilize household economies during shocks. The County Government and development partners could also support community-based revolving funds tied to livelihood diversification and post-disaster recovery programs. Capacity building for local savings groups, especially women and youth cooperatives, would enhance financial literacy and improve loan management. By combining community solidarity with institutional support, Makongeni can begin to shift from reactive coping toward proactive economic resilience, reducing the long-term impacts of floods, market disruptions, and other shocks.

2.2.4 Access to Resources

Access to essential resources in Makongeni is shaped by structural inequalities and limited affordability, leaving many households vulnerable. The household survey shows that 81.7% of residents are tenants, while only 13.4% own their homes, underscoring the lack of secure land tenure. Gender disparities remain sharp: just 32% of women own land compared to 68% of men, reflecting systemic barriers to women's economic empowerment and asset ownership. Financial access is equally constrained, with 46.2% of households depending on informal savings groups (chamas) as their primary fallback mechanism, while fewer than 8.3% have access to formal credit or insurance services.

Water and sanitation further highlight these inequities. Despite the presence of HOMAWASCO, the official water and sanitation service provider for Homa Bay Municipality, access to piped water within Makongeni remains limited and uneven. Only 29.4% of households reported having direct connections, while the majority—over 61.7%—still rely on water vendors, purchasing water at inflated prices that can reach KSh 30 for a 20-litre jerrycan during periods of shortage. This reliance on informal supply chains reflects not only infrastructural gaps but also inconsistent service delivery and inadequate coverage by HOMAWASCO within informal settlements. Consequently, many residents face chronic water insecurity, compounded by the financial burden of purchasing water at rates far higher than those paid by formally connected households. Strengthening water infrastructure, expanding last-mile connections, and upgrading informal distribution networks would help reduce these disparities and ensure more equitable access to safe and affordable water across Makongeni.

Sanitation facilities are similarly inadequate, with 87.6% of households relying on pit latrines, most of them shared and operating on a pay-per-use basis. Natural resources such as wetlands and riparian zones are

frequently encroached upon for settlement expansion, making them unreliable for food production or flood protection. Women, who disproportionately shoulder water collection and caregiving roles, and youth migrants, who face limited land rights and unstable incomes, are particularly disadvantaged in resource access. This combination of weak tenure systems, poor access to clean water, and fragile financial mechanisms underscores the urgent need to strengthen equitable access to resources in Makongeni as a cornerstone of climate adaptation.

2.3 Infrastructure and Services Baseline (WASH, Housing, Roads, Drainage, Energy, Health)

2.3.1 Water, Sanitation, and Hygiene (WASH)

Access to clean and reliable water in Makongeni remains a significant challenge for most households. The primary sources of water are shared communal taps, informal vendors, shallow wells, and Lake Victoria. While piped water connections exist in some areas, supply is irregular and often rationed, forcing many families to depend on costly vendors or untreated water sources. This situation raises concerns about water quality, as contamination is common, especially in low-lying flood-prone sections where backflow and poor drainage compromise safety. In terms of proximity, households without direct access to piped connections often walk considerable distances to reach communal points or purchase water, further straining their limited resources.

Nearly half of households (43%) are able to fetch water within a five-minute walk, reflecting relatively good proximity to water points for a significant share of residents. An additional 26% access water within five to ten minutes, which is still considered reasonable but may place a daily burden on vulnerable groups such as children, the elderly, and persons with disabilities. A smaller proportion, about 14%, spend between ten- to-fifteen-minutes walking to a water source, while 4% face even longer commutes of over fifteen minutes. In contrast, only 13% of households have the convenience

of in-house taps, representing the highest service level but one enjoyed by a minority.

These figures reveal important disparities in water access. While the majority of residents can reach water within ten minutes, nearly one in five households still experience longer commutes, which can translate into significant time and energy loss, particularly in large households or during periods of high demand. Long commutes also increase vulnerability during crises such as droughts, floods, or health emergencies, when access to safe and reliable water becomes even more critical. Moreover, the small proportion of residents with household taps underlines inequality in service delivery, suggesting that water infrastructure investments have not been equitably distributed across the settlement.

Table 2 Distance to Water Sources

Water Source distance from the house	Percentage of Households
Between 200m and 500m (5 to 10 minutes' walk)	26.5%
Between 500m and 1km (10 to 15 minutes' walk)	13.9%
Less than 200m (less than 5 minutes' walk)	43.2%
More than 1 km (more than 15 minutes' walk)	3.6%
No response	0.1%
Tap is in my house	12.7%
Total	100.00%

Sanitation facilities are similarly inadequate, with most households relying on shared pit latrines, which are often poorly constructed and lack proper waste disposal systems. Sewage infrastructure is largely absent, and during floods, overflowing pit latrines and blocked drains pose severe health risks, including outbreaks of waterborne diseases such as cholera and typhoid. Hygiene practices are constrained by limited access to affordable soap and clean water, making handwashing and safe waste management inconsistent. The lack of an integrated sewage and solid waste management system further compounds these risks, leaving Makongeni highly vulnerable to sanitation-related climate and public health shocks.

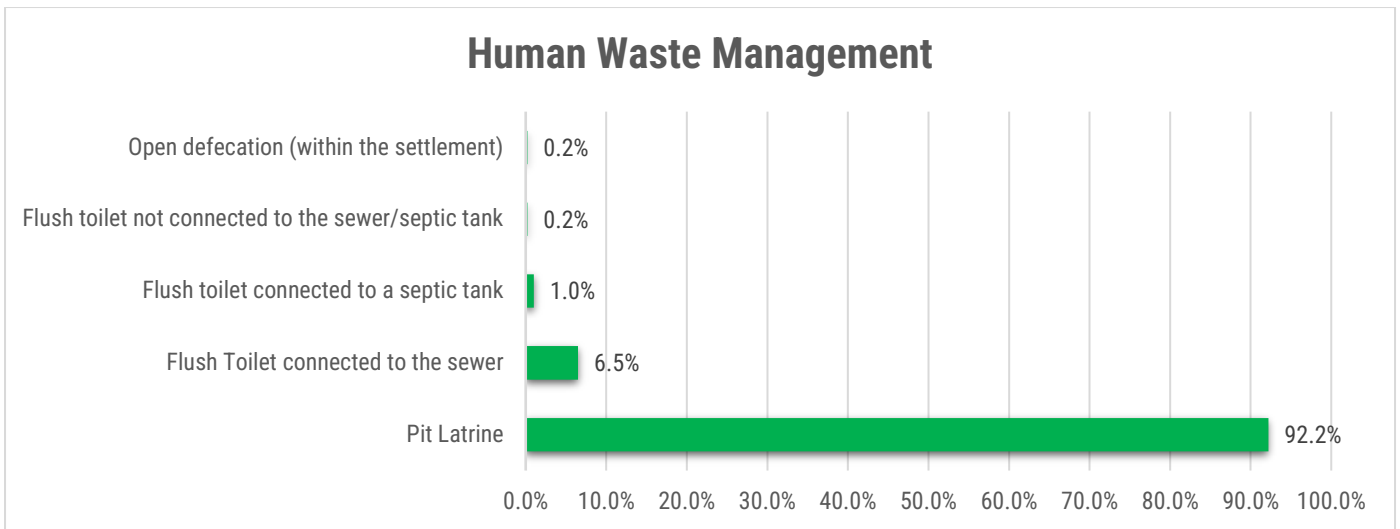


Figure 5 Solid Waste Management

The graph presents a clear picture of sanitation practices within the settlement, showing that pit latrines overwhelmingly dominate as the primary form of sanitation. With 92.2% of households relying on pit latrines, this facility type forms the backbone of the community’s sanitation system. In stark contrast, only 6.5% of households use flush toilets connected to a sewer, while a further 1% depend on flush toilets linked to septic tanks.

Other forms of sanitation are almost negligible, with only 0.2% of residents practicing open defecation within the settlement and another 0.2% using flush toilets that are

not connected to either sewer systems or septic tanks. This indicates that while the settlement has extremely low levels of open defecation, sanitation options are highly skewed toward basic pit latrine use, with only a small minority having access to more advanced and reliable toilet systems.

Sanitation is largely informal and dominated by rudimentary facilities. The prevalence of pit latrines reflects both the accessibility of this option and the limited reach of sewer or septic-based systems, with only a small proportion of residents able to access improved sanitation infrastructure.

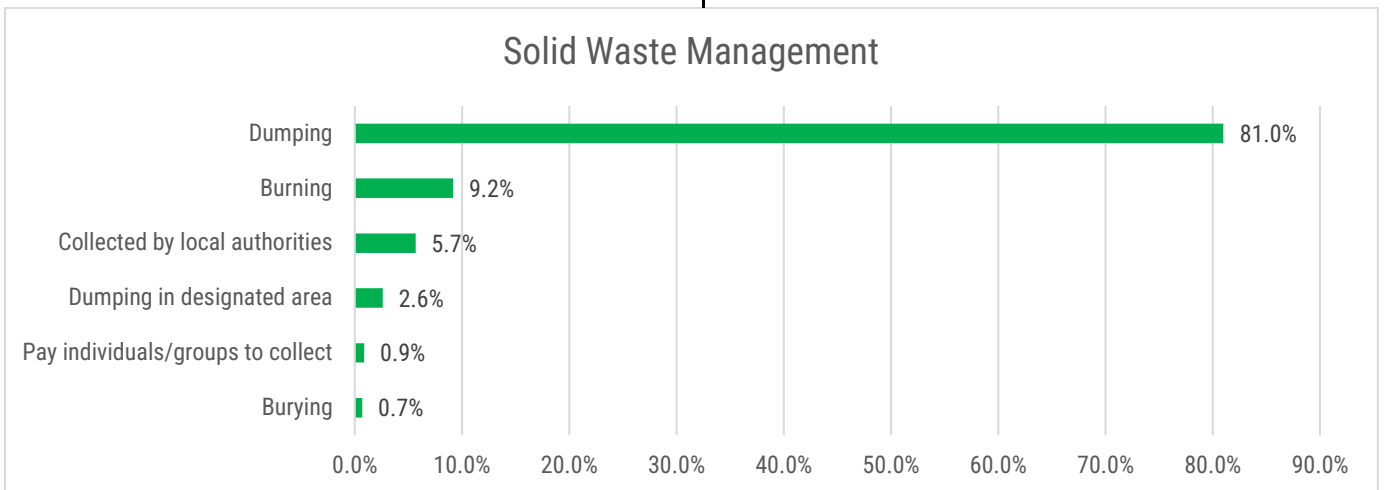


Figure 6 Solid Waste Management

Hygiene practices in Makongeni are severely undermined by poor solid waste management systems. As shown in the graph, an overwhelming 81.0% of households dispose of waste through open dumping, often in undesignated sites such as roadside drains, riverbanks, and vacant plots. Another 9.2% burn their waste, while only 5.7% benefit from collection by local authorities. A small fraction of households, less than 4%, use designated dumping areas, pay informal collectors, or bury their waste. These practices not only degrade the settlement’s living environment but also have far-

reaching implications for health, flooding, and climate resilience.

Findings from the Rapid Climate Risk Assessment (RCRA) indicate that unmanaged waste significantly contributes to the blocking of drainage channels, intensifying the frequency and severity of floods in low-lying areas like Makongeni and Shauri Yako. When drains are clogged with plastic and organic waste, even moderate rainfall can cause extensive waterlogging, damaging homes, contaminating water sources, and

spreading diseases such as cholera, typhoid, and diarrhoea. The widespread practice of burning waste releases carbon emissions and toxic particulates, worsening air quality and contributing to urban heat accumulation, a growing climate-related health hazard in densely populated settlements.

Together, these factors paint a picture of an overwhelmed and informal waste management system that not only undermines hygiene but also amplifies climate risks. Addressing this challenge requires integrated solutions such as community-based waste collection cooperatives, and the promotion of climate resilient waste management approaches, including composting and recycling. Strengthening institutional coordination and public awareness can further ensure that solid waste management in Makongeni evolves from a public health liability into a pillar of environmental and climate resilience.

2.3.2 Housing and Shelter

Housing conditions in Makongeni mirror the broader socioeconomic realities of low-income urban residents and reveal the compounded risks of unplanned settlement growth. The vast majority of households, 81.7%, live in rented units, while only 13.4% are homeowners. Smaller proportions reside in family houses (3.6%) or serve as caretakers (1.1%). This strong dependence on rental housing underscores the limited tenure security in the settlement and the inability of most residents to make long term structural improvements to their homes.

Shelter types are predominantly semi permanent structures made of iron sheets, which are commonly used for both roofing and walls. While these materials are affordable and easy to assemble, they perform poorly in the face of climatic stress. They retain heat during the day, making homes uncomfortably hot, and offer little insulation or protection from heavy rain, thereby heightening vulnerability to flooding and fire outbreaks. More durable materials, such as cement plastered walls or reinforced concrete roofs, are rare, and the limited adoption of climate resilient building techniques reflects both financial constraints and insecure land tenure, which discourages investment in permanent structures.

Rental costs are largely within a low-income bracket, reinforcing the precarious affordability versus quality trade off faced by residents. Based on the survey, 39.8% of tenants pay between KSh 1,000–2,000 per month, 55.2% pay KSh 2,001–5,000, and only 7.1% pay above KSh 5,000. While this makes housing accessible to those with limited or unstable income, it also indicates that most residents occupy cramped, poorly serviced units that fall below acceptable living standards.

Overcrowding remains a serious concern. Although the average household size is about three people, most families live in single room or two room dwellings, with larger families of five to ten people often forced to share the same confined spaces. This not only reduces privacy but also increases exposure to indoor air pollution, particularly where cooking is done indoors using charcoal or kerosene.

Housing vulnerability is further heightened by insecure tenure and location in flood prone zones. Informal construction practices, weak foundations, and inadequate drainage systems leave homes exposed to recurrent flooding, erosion, and heat stress. According to the Rapid Climate Risk Assessment (RCRA), poor housing quality and location amplify disaster risks and increase recovery costs for tenants who already lack financial buffers. Women headed households are especially disadvantaged due to persistent gender gaps in land ownership, which limit their ability to access or improve secure housing.

Overall, housing in Makongeni provides essential low cost shelter for the municipality's urban poor but remains structurally weak, overcrowded, and highly vulnerable to climate hazards. Addressing these challenges calls for incremental upgrading programs, community driven housing improvement initiatives, and stronger enforcement of resilient building standards. Expanding access to affordable credit and promoting the use of locally produced, climate resilient building materials could help residents gradually transition toward safer and more sustainable housing over time.

2.3.3 Roads and Transport

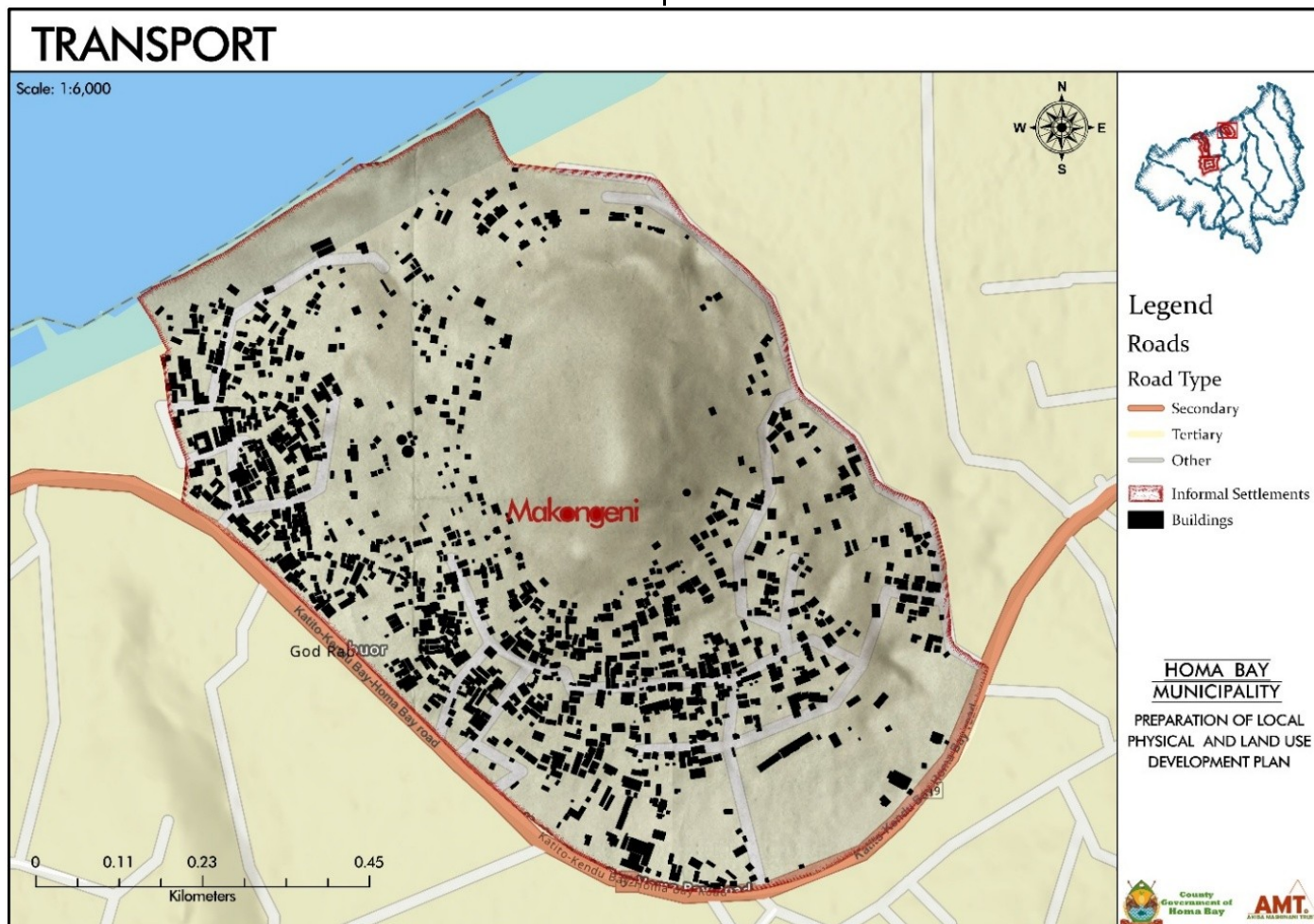
The transport network in Makongeni informal settlement is dominated by earth roads, making it highly vulnerable to seasonal weather conditions. Across the general area, 49.0% of the road network consists of main motorable tracks, while 38.5% comprises footpaths and other tracks, which serve as crucial routes for pedestrian movement. Dry-weather roads account for 8.5%, meaning that a significant portion of the network becomes impassable during the rainy season. Additionally, only 3.6% of roads are classified as all-weather roads, with a mix of loose and bound surfaces, indicating limited road durability and resilience to harsh weather conditions.

In terms of material composition, 89.3% of roads in the settlement are earthen, reinforcing the susceptibility of transport infrastructure to seasonal disruptions. The presence of murram roads is relatively low at 9.9%, offering somewhat better durability compared to earth roads, while tarmac roads constitute less than 1% of the total road network. The scarcity of tarmac surfaces highlights the inadequate road infrastructure, which

hinders economic activities, emergency response, and daily movement.

The poor condition of earth roads and dry-weather tracks significantly affects accessibility, particularly during wet seasons. Flooded and muddy roads limit

movement to essential services, workplaces, and markets, forcing residents to rely on boda bodas (motorcycle taxis) as the primary mode of last-mile transport. However, the increased reliance on boda bodas raises transport costs, further exacerbating economic constraints for low-income households.



Map 6 Transportation Network

Addressing these transport challenges requires urgent investment in road infrastructure. The upgrading of roads to all-weather surfaces, expansion of drainage systems, and implementation of regular maintenance schedules will enhance mobility and improve economic opportunities. Additionally, investments in non-motorized transport infrastructure, such as footpaths and pedestrian-friendly road networks, would ensure safer and more reliable movement within the settlement.

2.3.4 Drainage Systems

Drainage infrastructure in Makongeni is largely inadequate, leaving the settlement highly exposed to flooding and related hazards. The existing system consists mainly of informal, shallow, and unlined drains that are poorly planned and often constructed by residents as coping mechanisms. These drains are frequently clogged with solid waste due to the absence of a structured solid waste management system,

preventing proper water flow during heavy rains. As a result, stormwater stagnates in residential areas, particularly in low-lying zones, creating breeding grounds for disease vectors such as mosquitoes and increasing the risk of outbreaks of malaria and waterborne diseases.

During extreme weather events, runoff from surrounding areas and backflow from Lake Victoria further overwhelm the weak drainage network, leading to frequent flash floods that damage homes, contaminate water sources, and disrupt livelihoods. The lack of integrated, well-designed stormwater channels and flood protection structures means that households rely heavily on temporary measures such as digging makeshift trenches to redirect water. Without significant investment in sustainable and eco-friendly drainage solutions, Makongeni will continue to face recurring flooding challenges that undermine both housing security and public health.

2.3.5 Energy Access

Energy access in Makongeni remains limited and uneven, reflecting the wider infrastructural gaps of informal settlements. While grid electricity is available in parts of the settlement, only about 38–42% of households are connected to the national grid, with many relying on informal or illegal connections that pose safety risks such as electrocution and frequent power outages. The unreliability of formal supply forces households to seek alternative sources, often at higher costs.

Cooking energy is a major challenge. The majority of households, estimated at over 70%, depend on charcoal and firewood as their primary cooking fuels. These fuels contribute to deforestation, indoor air pollution, and respiratory health problems, especially for women and children who spend more time near cooking spaces. Cleaner energy options such as liquefied petroleum gas (LPG) or biogas remain unaffordable for most households, with less than 10% of residents reporting regular LPG use.

Lighting patterns show similar disparities. Although grid-connected households use electric bulbs, a large proportion of non-connected households depend on kerosene lamps or solar lanterns. About 25% of households rely on kerosene for lighting, despite its high cost and health hazards, while small-scale adoption of solar systems has emerged, supported by community savings groups and donor programs. However, the scale of solar uptake remains modest, with fewer than 15% of households having reliable solar home systems.

The high reliance on biomass fuels and kerosene not only undermines health and environmental sustainability but also keeps energy costs disproportionately high for low-income residents. Household surveys show that families in Makongeni spend an average of KSh 1,000–1,500 per month on charcoal and firewood, accounting for nearly 20% of income in some low-earning households. This expenditure competes directly with spending on food, rent, and education, perpetuating economic vulnerability.

2.3.6 Health Infrastructure and Services

Healthcare access in Makongeni is defined by strong dependence on public facilities, limited alternatives, and the persistent burden of both infectious and chronic diseases. Most residents rely on the public health system for treatment, with only a small number using private or community-based clinics. The concentration of patients in public hospitals often results in long queues, delayed consultations, and frequent drug shortages, particularly during peak illness periods.

These challenges are compounded by limited outreach services and inadequate infrastructure in informal settlements, which reduce the efficiency of service delivery.

Accessibility to medical facilities varies significantly across the settlement. Survey data shows that only 9% of households are within 500 meters of a health facility, while 26% are between 500 meters and one kilometer away, and 28% must walk between one and two kilometers. Another 32% live between two and five kilometers from care centers, and 5% are located more than five kilometers away. This means that a large proportion of residents travel long distances to access health services, creating serious barriers in emergency cases. Pregnant women, children, the elderly, and persons with disabilities are particularly affected, as delays in reaching facilities can result in preventable complications.

Table 3 Distance to Nearest Medical Facility

Distance to Nearest Medical Facility	Percentage (%)
Less than 500m (10 minutes' walk or less)	9%
Between 500m to 1km (10 to 15 minutes' walk)	26%
Between 1km to 2km (15 to 25 minutes' walk)	28%
Between 2km to 5km (25 minutes to 1 hour walk)	32%
More than 5km (more than a 1 hour walk)	5%

The settlement's disease burden reflects its environmental and economic vulnerabilities. Malaria remains the most common illness due to stagnant water and poor drainage, followed by diarrheal diseases, skin infections, and periodic cholera outbreaks during flooding. At the same time, noncommunicable diseases such as hypertension, diabetes, and asthma are increasingly reported, linked to poor diet, indoor air pollution, and limited access to preventive care.

Health insurance coverage in Makongeni remains low. The majority of residents, 65%, have no form of insurance, while 33% are covered by the National Health Insurance Fund (NHIF), and only 2% have employer or privately purchased insurance. This low coverage forces most households to pay out of pocket for care, often delaying treatment until illness becomes severe.

Table 4 Insurance Cover

Insurance Cover	Percentage (%)
None	65%

National Government Funded (e.g. SHIF)		33%
Employer insurance	provided	1%
Privately Insurance	Purchased	1%

Overall, Makongeni’s healthcare landscape is shaped by overstretched public facilities, low insurance coverage, and unequal access to services. The combination of long distances, overcrowding, and inadequate resources leaves residents vulnerable to everyday health risks as well as climate-related hazards. Improving health outcomes will require strengthening local health infrastructure, expanding NHIF enrollment through community outreach, improving drainage to reduce malaria and waterborne diseases, and ensuring that primary healthcare services are available within walking distance for all households.

2.4 Land Use and Physical Planning Analysis

2.4.1 Existing Land Use Overview

The existing land use pattern in Makongeni reflects a dense, predominantly residential settlement with limited space for other urban functions. According to the situational analysis and Rapid Climate Risk Assessment, about 81.6 percent of the land in Makongeni is used for residential purposes, mainly comprising single-family houses, rental units, and informal structures that accommodate low- and middle-income households. This dominance of residential use is closely tied to rapid population growth, rural–urban migration, and the demand for affordable housing within Homa Bay Municipality.

Commercial areas occupy roughly 8.9 percent of the land, supporting retail shops, small markets, and service enterprises that sustain the local economy. Educational and industrial uses each account for about 1.6 and 1.9 percent respectively, indicating limited institutional presence and modest economic diversification through small-scale manufacturing and workshops. Public-purpose facilities, including administrative offices, religious institutions, and social centers, take up 2.3 percent of the land, while public utilities and mixed-use plots each represent about 0.5 percent. Recreational areas are severely lacking, covering only 0.2 percent of the settlement, which restricts opportunities for leisure and community interaction. Vacant land constitutes just 0.7 percent, reflecting high land utilization and minimal room for future expansion.

This land use pattern mirrors the unplanned nature of Makongeni’s growth. Residential areas have sprawled without adequate infrastructure or zoning control, leading to overcrowding and competition for space. The RCRA highlights that such unregulated expansion, coupled with inadequate drainage and encroachment on natural waterways, has worsened flooding and erosion risks across the settlement.

Overall, Makongeni’s existing land use is heavily skewed toward residential occupation, with limited allocation for social amenities, green spaces, and public utilities. Addressing this imbalance will require integrated spatial planning, land tenure regularization, and the introduction of mixed-use and nature-based planning approaches to promote a more resilient and livable urban environment.

2.4.2 Settlement Morphology and Spatial Patterns

The built environment of Makongeni is highly irregular, reflecting its evolution as an informal settlement with only limited integration into formal municipal planning. Plot sizes are generally small and irregularly shaped, especially in the central and northern sections of the settlement, where dense clusters of semi-permanent rental units dominate. These plots often lack clear demarcations, with housing structures tightly packed and separated only by narrow footpaths or shared compounds. In contrast, the southern and peripheral areas of the settlement—visible in the satellite image—show larger plot sizes, often used for a mix of housing and small-scale agriculture, reflecting more recent expansion into peri-urban land.

The road hierarchy is weak and fragmented. The main access is provided by a few arterial roads—some of which have been upgraded under KISIP—but within the interior of the settlement, circulation relies on a dense network of narrow, unpaved paths. These paths are discontinuous and meandering, with limited connectivity, and are easily blocked during rains, contributing to flooding and poor accessibility. Unlike planned neighborhoods, Makongeni lacks a clear grid or radial street pattern: instead, the street density is highest around the market and commercial zones, where spontaneous clustering of kiosks and shops generates local hubs of activity, while peripheral residential areas are served by fewer, poorly connected access lanes.

The block layout is similarly unstructured. Blocks vary widely in size and form, with no consistent alignment of buildings to roads, resulting in a patchwork morphology. In some locations, structures encroach directly onto accessways or drainage paths, a hallmark of informal growth. The northern floodplain zone near Lake Victoria is particularly illustrative: here, dense informal housing has expanded into environmentally sensitive areas,

increasing exposure to seasonal flooding. In contrast, near the southern edges, blocks are larger and more open, with visible green spaces and peri-urban agricultural plots, indicating a transitional morphology between informal housing and rural land use.

The morphology reveals the coexistence of informal growth patterns high-density, irregular plots, narrow winding paths, and unplanned block layouts with limited traces of planned development, mainly along major access roads where tarmacked surfaces and wider rights-of-way signal external interventions. This duality creates functional challenges in drainage, transport, and service delivery, while reinforcing vulnerability to climate risks concentrated in low-lying and congested sections of the settlement.

2.4.3 Land Tenure and Ownership Constraints

Land tenure in Makongeni is primarily defined by private ownership, though the majority of residents live as tenants rather than landholders. According to household survey data, 63.8 percent of residents occupy privately owned land, while 26.2 percent are unsure of the tenure status of the land they occupy. Smaller portions include ancestral land at 7.3 percent, public or government land at 1.6 percent, and community land at less than 1 percent. Only 0.3 percent of respondents did not provide an answer. This composition highlights a clear dominance of private tenure but also underscores widespread uncertainty and informal arrangements within the settlement.

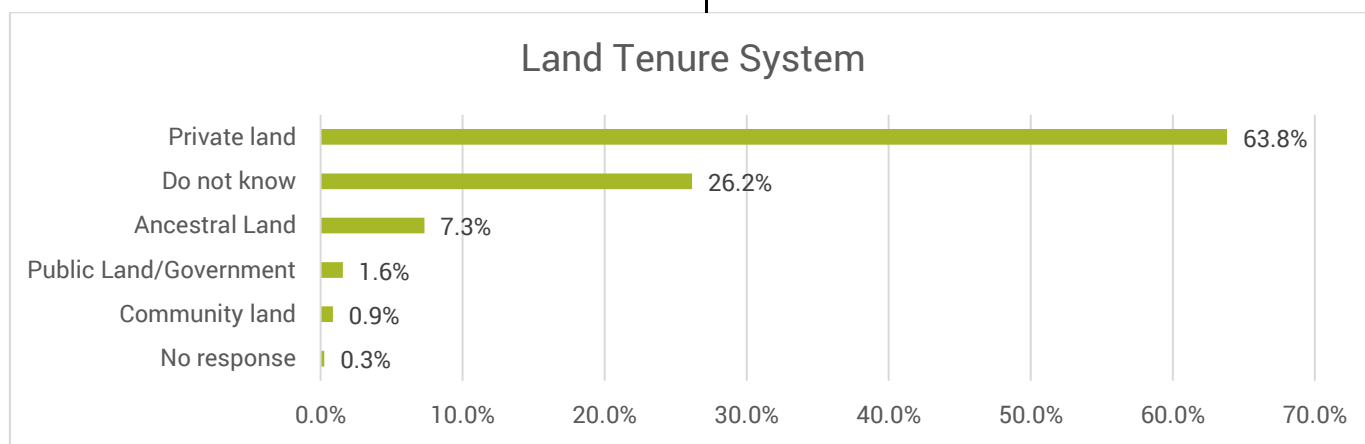


Figure 7 Land Tenure

Despite the prevalence of private ownership, tenure insecurity persists at the household level. A significant share of residents are tenants who rent from local landlords, often without written agreements or formal recognition of their occupancy rights. While some owners possess formal documentation, many operate through informal subdivision and sale, creating fragmented land holdings that complicate both ownership and planning.

Notably, eviction risks appear minimal in Makongeni, with 97.5 percent of respondents indicating they have not experienced or been threatened with eviction, and only 2 percent reporting any such threat. This apparent security, however, may conceal underlying vulnerabilities linked to unregistered tenure and informal rental agreements, which could become contentious as urban development pressures rise.

These dynamics reveal that although the settlement's land tenure system is largely private, it remains weakly regulated and unevenly documented. Tenure uncertainty limits residents' ability to invest in durable housing or access credit. Moreover, gender disparities persist, as men remain the predominant landowners while women face barriers to ownership due to cultural and financial constraints.

For effective planning, addressing these tenure challenges is essential. Systematic land registration, strengthened dispute resolution mechanisms, and inclusive tenure regularization that recognizes both tenants and informal owners will help reduce vulnerability, improve governance, and enable more equitable participation in Makongeni's future urban development.

2.4.4 Physical Planning Gaps and Challenges

Makongeni's physical planning is marked by the near-total absence of formal zoning and enforcement, which has allowed unregulated land use and settlement growth. The settlement is characterized by mixed and overlapping land uses, with residential houses tightly packed alongside kiosks, workshops, and open-air markets, often without separation or buffers. This lack of zoning has created incompatible land uses, such as schools and homes located adjacent to waste dumping areas, or residences sited along open drainage channels and flood-prone riparian corridors.

A major challenge is the absence of servitudes and wayleaves for infrastructure. Many internal access

routes are too narrow to accommodate planned services such as roads, drains, or utility lines, with community mapping exercises showing that up to 90% of houses are built within 2–3 meters of each other. This leaves little room for emergency vehicle access or drainage easements, and contributes to chronic congestion, poor ventilation, and heightened fire risk. Informal encroachment onto road reserves and riparian zones further complicates planning, as these spaces are critical for mobility and stormwater management.

Despite these challenges, some planning frameworks exist on paper. The Physical and Land Use Planning Act (2019) mandates preparation of Local Physical and Land Use Development Plans (LPLUDP), and Homa Bay Municipality is in the process of developing one. However, enforcement in Makongeni has been minimal, with weak institutional capacity and limited resources undermining the ability to implement zoning or remove incompatible land uses. As a result, the settlement remains effectively self-organized, with planning gaps manifesting in environmental degradation, inadequate infrastructure, and exposure to climate hazards.

2.4.5 Environmental Constraints and Land Suitability

Makongeni’s environmental constraints are closely tied to its topography, soils, and proximity to Lake Victoria. The settlement exhibits a north–south elevation gradient, with the lowest areas near the lakefront at about 1,135 meters above sea level and rising to 1,340 meters in the southern uplands. These northern low-lying plains are heavily settled but are highly flood-prone and prone to waterlogging, limiting their suitability for further dense development. By contrast, the southern elevated zones offer more stable terrain suitable for structured residential growth, though steeper slopes in certain patches (up to 21.5% gradient) introduce risks of erosion and slope instability if not properly managed.

Soil conditions reinforce this spatial divide. The settlement’s southern section is dominated by interstratified clayey soils, which are well-drained and moderately fertile, making them more suitable for construction and small-scale agriculture. In contrast, montmorillonitic soils in the northern and western sections have high shrink-swell capacity—expanding when wet and contracting when dry—leading to foundation instability, drainage problems, and waterlogging. This makes northern floodplain zones less appropriate for permanent structures without soil stabilization.

Environmental degradation compounds these natural constraints. Encroachment into riparian zones and wetlands has intensified flood risk, while deforestation for firewood and charcoal has reduced natural buffers

against erosion. Waste dumping in open spaces and drainage lines further undermines land suitability, creating health and ecological risks.

From a planning perspective, these conditions suggest that southern, moderately sloped areas are more suitable for formal residential and institutional land uses, provided slope-sensitive construction techniques are applied. Conversely, northern low-lying floodplains should be restricted or carefully managed due to flood vulnerability and poor soil load-bearing capacity. Makongeni’s environmental constraints flood-prone zones, unstable soils, steep slopes, and degraded ecosystems pose significant barriers to safe urban development unless explicitly integrated into land-use planning.

2.5 Local Governance and Existing Community Structures

2.5.1 Governance Framework

Local governance in Makongeni operates through a layered mix of formal and informal structures that shape how decisions are made and implemented. At the formal level, the Homa Bay County Government and Municipality hold statutory authority under the County Governments Act and the Physical and Land Use Planning Act (2019), overseeing service delivery, infrastructure planning, and land-use regulation. The National Government remains present through the Local Administration structure. Within the community, the most influential governance system is the Nyumba Kumi initiative, a neighborhood-based security and organization framework introduced nationally to strengthen grassroots participation. Under this model, clusters of approximately 10–20 households are grouped under a Nyumba Kumi elder (chairperson), who liaises directly with community members on issues of safety, conflict resolution, and welfare, while also linking to the Assistant Chief and other administrative arms of government. This structure ensures that information and decisions flow both upward (to local authorities) and downward (to households), making it a critical platform for mobilizing residents during floods, health campaigns, or settlement planning. Alongside Nyumba Kumi, self-help groups, chamas, and youth associations provide additional organization around savings, livelihoods, and advocacy. Collectively, these overlapping governance mechanisms mean that while the County Government holds formal authority, day-to-day decision-making within Makongeni is mediated through community-based structures and local leadership, with Nyumba Kumi acting as the most immediate and trusted interface between residents and the state.

2.5.2 Community Organizations and Leadership

Makongeni hosts a diverse set of community organizations that underpin daily life, social stability, and local governance. Faith-based institutions are especially influential: household survey data confirms that the vast majority of residents identify as Christian, with churches not only serving as centers of worship but also as hubs for education, childcare, and welfare support. These institutions frequently provide space for community meetings and emergency response activities, reinforcing their centrality in settlement life. Informal savings groups, or *chamas*, are another critical element of social organization. Data from the Situational Analysis shows that over 40% of households rely on *chamas* as their primary financial safety net, highlighting their importance in helping families cope with shocks such as sudden medical expenses, rent obligations, or food insecurity. Women are particularly active in these networks, using them both as economic lifelines and platforms for advocacy around household and community welfare.

Community organizations also play a major role in disaster preparedness and adaptation. Evidence from the RCRA consultations shows that CBOs and youth groups are already active in flood response and awareness campaigns, working with churches and schools to provide temporary shelters and organize clean-up activities after heavy rains. During recent flooding events, these groups mobilized quickly to disseminate information, clear blocked drains, and assist vulnerable households, demonstrating the strength of localized response. Their integration into broader governance networks—such as partnerships with settlement chiefs or the County Emergency

Operations Center—has also been recognized as a vital channel for enhancing resilience. These grassroots organizations therefore complement the Nyumba Kumi framework, ensuring that Makongeni's governance is not only security-driven but also socially responsive, adaptive, and rooted in community-led action.

2.5.3 Participation in Decision-Making

Community participation in governance and planning processes in Makongeni is active but uneven, with both strengths and persistent barriers. On one hand, the settlement has demonstrated strong involvement in consultative forums, such as the RCRA community validation workshops where over 50 residents, including women, youth, and persons with disabilities, took part in mapping flood-prone areas and prioritizing adaptation actions. Faith-based groups, *chamas*, and CBOs also provide channels for grassroots voices to reach local authorities, often linking to the Nyumba Kumi structure for upward communication. However, barriers remain significant: women, youth, and tenants are frequently underrepresented in formal decision-making, as land ownership and political patronage often determine who participates. Limited access to information further reduces participation, with many residents citing poor communication from municipal authorities about planning processes or resource allocation. Political exclusion and mistrust in local leadership also discourage engagement, particularly among marginalized groups who feel their priorities are overlooked. As a result, while Makongeni demonstrates strong social organization, its integration into formal governance remains constrained by information gaps, gender and tenure inequalities, and inconsistent recognition of community voices in planning.

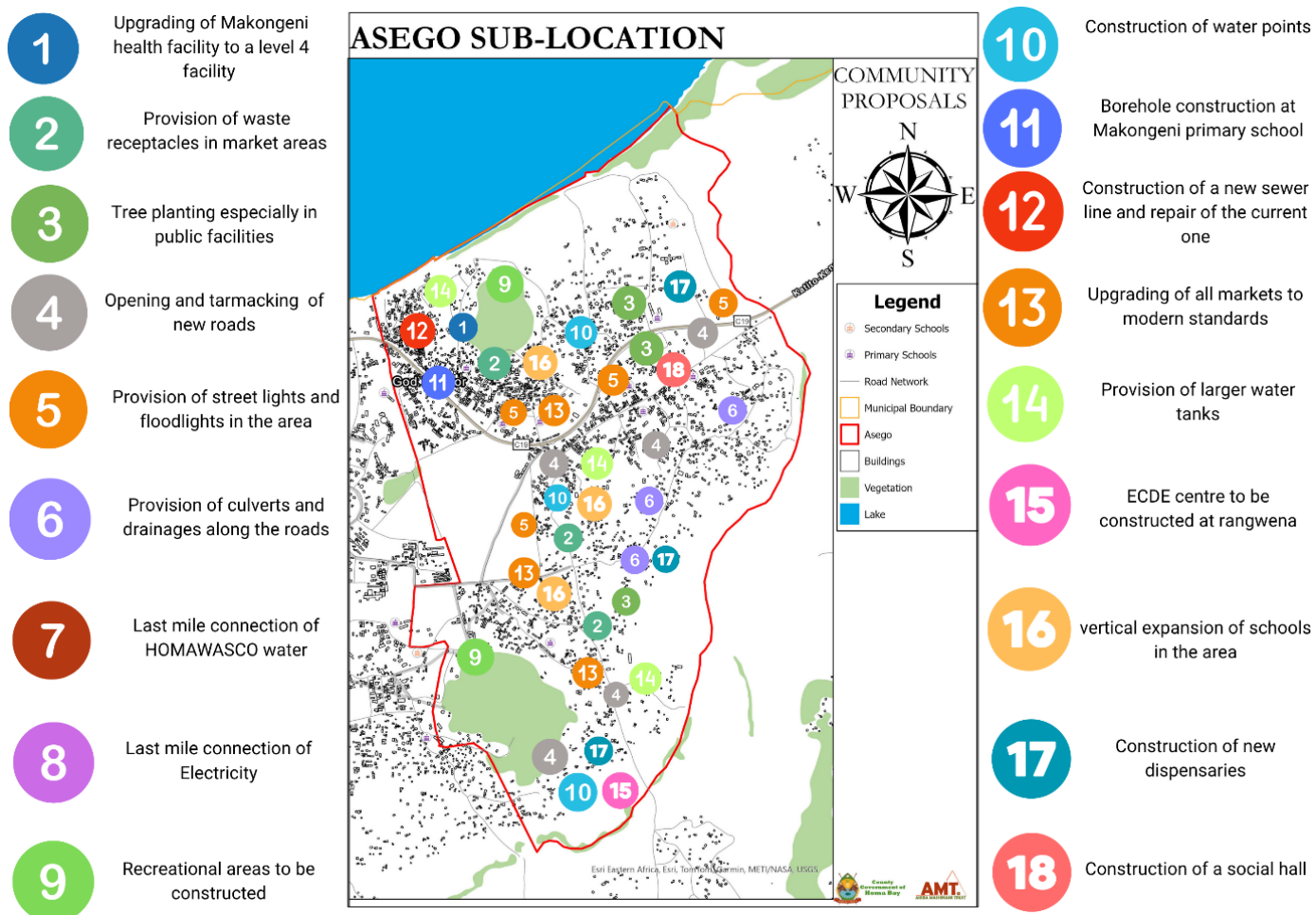


Figure 8 Community Proposals

The community proposals from Asego sub-location reflect a clear prioritization of essential services and infrastructure aimed at improving both daily living conditions and long-term resilience. Key interventions target critical gaps in basic service delivery, such as water provision through new water points, larger tanks, and boreholes (items 7, 10, 11, 14), and energy access through last-mile electricity connection and improved street lighting (items 5, 8). These measures address immediate household needs—clean water, safer streets, and reliable energy—while also enhancing social safety and productivity. Additionally, the emphasis on drainage systems, sewer line upgrades, and tarmacking of roads (items 4, 6, 12) directly responds to chronic issues of flooding, poor sanitation, and mobility barriers, which are major stressors in informal settlements like Makongeni.

Alongside basic infrastructure, the proposals highlight a strong community interest in social development and quality of life enhancements. Investments in health and education are notable, with requests for upgrading Makongeni health facility to level 4, construction of new dispensaries, expansion of schools, and establishment of an ECDE center (items 1, 15, 16, 17). Complementary initiatives such as upgrading markets, constructing recreational areas, and building a social hall (items 9, 13, 18) show recognition of the need for economic opportunities, community cohesion, and improved

public spaces. The inclusion of tree planting (item 3) further reflects environmental awareness, signaling community-driven efforts to address climate-related risks like heat stress and flooding. Collectively, these proposals outline a balanced agenda that integrates infrastructure upgrades, service delivery, social facilities, and environmental sustainability, reinforcing the community’s vision for safer, healthier, and more resilient urban living

2.5.4 Conflict Resolution Mechanisms

Conflict resolution in Makongeni is primarily handled through a blend of traditional, community-based, and administrative structures that mediate disputes at different levels. At the household and neighborhood scale, the Nyumba Kumi system serves as the first point of contact, with cluster leaders facilitating dialogue among disputing parties and escalating unresolved cases to the Assistant Chief or settlement elders. Land and tenancy-related disputes common in Makongeni given that over 72% of households are tenants are often negotiated informally between landlords, tenants, and local leaders, though unresolved cases may be referred to the Chief’s or, in more complex situations, the County Lands office or courts. Resource-use conflicts, particularly over water points, drainage paths, or waste

disposal sites, are typically managed through local leaders, which convene mediation meetings to prevent escalation. In instances where disputes involve external actors such as local government or utility providers, community representatives often through faith leaders, youth leaders, or chammas form delegations to engage with authorities. While these mechanisms have proven effective in maintaining social cohesion and avoiding violent confrontation, they are limited by power imbalances: tenants, women, and youth often have less influence in outcomes, and lack of legal tenure reduces the ability of many households to assert their rights in land conflicts. Nonetheless, these locally embedded systems remain the backbone of dispute management, ensuring that most conflicts are settled internally before reaching formal legal structures.

2.5.5 Strategic Planning Opportunities

Despite its constraints, Makongeni presents several opportunities for more structured and climate-resilient planning. The southern and south-eastern upland sections, where slopes are moderate and soils are more stable, hold potential for densification and redevelopment through incremental upgrading and improved infrastructure. These areas could accommodate higher-density housing blocks or mixed-use redevelopment without the severe flooding risks observed in the northern floodplain. In contrast, the northern low-lying flood-prone zones are less suited to further residential expansion; here, opportunities lie in open space preservation and the introduction of green infrastructure such as bioswales, retention ponds, and riparian buffers, which can reduce flood risk while providing community green spaces.

The central market area and its immediate surroundings also present opportunities for redevelopment and spatial re-organization. Currently overcrowded with informal kiosks and poorly drained swales, the area could benefit from structured layouts that integrate commercial stalls, drainage, and pedestrian circulation. Similarly, road corridors already upgraded under KISIP provide a backbone for more orderly growth, allowing adjacent informal blocks to be gradually reconfigured.

In terms of land management, Makongeni would benefit from land readjustment and regularization. This could include plot re-blocking, where extremely narrow and irregular plots are consolidated and realigned to create servitudes for roads, drainage, and utilities. Community consultations highlighted that residents recognize the need for such interventions, particularly to secure access routes for emergencies and reduce overcrowding. Regularization of tenure—through formal registration and recognition of ownership—would encourage residents and landlords to invest in more durable housing and services.

Finally, open space management offers a strategic opportunity. Vacant or degraded parcels, particularly in flood-prone northern edges and near drainage channels, could be preserved for multifunctional use: as flood buffers, public recreation grounds, or localized markets that reduce congestion in the core. Integrating these spatial adjustments with the Physical and Land Use Planning Act (2019) framework would allow Makongeni to transition from a congested informal settlement into a more resilient, mixed-use neighborhood, while safeguarding vulnerable land for ecological and community functions.

3 CLIMATE RISK ASSESSMENT & VULNERABILITY ANALYSIS

3.1 Climate Hazard Identification

3.1.1 Climate Profile Hazard Makongeni

Makongeni's climate hazard profile is defined by four interrelated threats, flooding, erosion, heat stress, and periodic droughts. These are amplified by unplanned urbanization, poor drainage infrastructure, and fragile socio-economic systems. The Rapid Climate Risk Assessment (RCRA) identifies flooding as the most recurrent and destructive hazard, affecting nearly 40% of the settlement's built-up area during major rainfall events. The settlement lies on a steep gradient draining from Got Rabuor Hill towards Lake Victoria, where surface runoff accelerates during storms, overwhelming existing drains and eroding road embankments. The RCRA confirms that drainage failures along the road to Makongeni Health Centre and at the market area are the primary points of flood accumulation, often rendering roads impassable and cutting off access to emergency and health services.

Flash floods are particularly severe during short, intense rainfall episodes. During the 2023 El Niño rains, rainfall of more than 200 mm within a 48-hour period led to widespread inundation across Makongeni, with water levels reaching up to 0.6 metres in residential compounds and overflowing into latrines and shallow wells (RCRA, 2025). Floods commonly occur between March–May and October–December, when heavy rainfall coincides with poor solid waste management and blocked culverts, causing backflow into homes and streets. Community consultations in Asego Sub-location and Makongeni reported that residents must frequently relocate belongings or evacuate children to safer areas during such floods.

In addition to floods, soil erosion and land degradation are widespread. The sloping topography of Makongeni, combined with unpaved roads and bare surfaces, promotes gully formation and undermines housing foundations. According to the RCRA's geospatial assessment, over 25% of road corridors exhibit erosion features, while runoff has carved channels along informal pathways and beneath houses.

Heat stress has emerged as an equally pressing hazard. Satellite data from the RCRA show an increase of 2.1°C in average land surface temperature between 2,000 and

2,020 across Homa Bay Municipality, with Makongeni registering some of the highest urban heat concentrations due to dense housing and low vegetation cover (RCRA, 2025). Over 70% of houses use galvanized iron sheets, which elevate indoor temperatures by 5–7°C above ambient levels during peak heat periods. This situation not only reduces liveability but also increases fire risks and household energy consumption. Limited access to shade and public green space amplifies exposure for children, street vendors, and elderly residents who spend extended hours outdoors.

Prolonged dry spells are also becoming more frequent, affecting water availability and food security. During the 2023 dry season, over 60% of households reported water shortages lasting more than a month, forcing them to rely on expensive vendors or unsafe surface water sources. Boreholes and water kiosks often run dry, particularly in upper sections of the settlement where piped supply pressure is weak. These shortages have ripple effects on sanitation and hygiene, leading to increased incidence of diarrhoeal diseases.

The combined effect of these hazards intensifies Makongeni's overall climate risk. Flooding and erosion cause immediate infrastructure damage, while heat and drought gradually erode health, income, and social wellbeing. The Homa Bay Municipality Zoning Regulations note that uncontrolled expansion of informal housing in flood-prone areas continues to increase exposure to these hazards, with high-density settlements such as Makongeni being particularly at risk.

Compounding this are secondary environmental risks, including pollution and waste accumulation. Floodwaters frequently mix with uncollected solid waste, leading to contamination of surface and groundwater sources.

The climate hazard profile of Makongeni illustrates a complex interplay between extreme rainfall, rising heat, and environmental degradation. The combination of steep slopes, poor drainage, fragile housing, and insecure land tenure magnifies the impact of these hazards, making Makongeni one of Homa Bay's most exposed and vulnerable settlements.

3.1.2 Identification of Hazards Based on Data

Historical data compiled in the RCRA highlights multiple instances where climate hazards have significantly affected Homa Bay. The 2019 floods displaced hundreds of households, destroyed sanitation facilities, and cut off access roads, with Makongeni among the worst affected. The 2020 drought left large parts of the town dependent on costly vendors, with water prices rising to KSh 30 per 20-litre jerrycan, creating a severe burden for low-income households. In 2021, heatwaves triggered widespread heat stress and dehydration, particularly in congested informal rental compounds. The CRA's projections, based on IPCC scenarios and Kenya Meteorological Department data, indicate that rainfall will become more intense, droughts will increase in frequency and severity, and temperature extremes will worsen across Homa Bay Municipality, placing Makongeni at the frontline of climate risk.

Hydrological modelling from the RCRA shows that a 10-year flood event results in flood depths between 0.5 and 0.8 metres, while a 100-year flood can exceed 1 metre, particularly around Makongeni Primary School and the access route to the health centre (RCRA, 2025). Floodwaters frequently erode unpaved roads, damage electricity poles, and trigger small slope failures near Got Rabuor Hill. In addition, 25% of surveyed road corridors show evidence of erosion and drainage blockage (RCRA, 2025). Rainfall trends from the Kenya Meteorological Department reveal shorter but more intense storms interspersed with longer dry periods, increasing both flood and drought vulnerability (KMD, 2024).

Heat stress is another rising hazard. Satellite analysis indicates that land surface heat intensity in Homa Bay has nearly doubled between 2000 and 2020. In Makongeni, over 70% of homes are roofed with iron sheets, which amplify indoor heat, leading to unlivable conditions during dry seasons.

Each hazard has direct and cascading impacts on the settlement. Flooding damages homes, displaces families, contaminates pit latrines, and spreads cholera, diarrhea, and malaria. Droughts exacerbate water scarcity, reduce agricultural productivity in peri-urban gardens, and increase food prices in local markets. Extreme heat intensifies indoor discomfort, reduces worker productivity, and increases the risk of heat stroke. Erosion destroys roads and walkways, threatens the stability of houses, and accelerates sedimentation into drainage systems. Lake-level fluctuations displace entire households, disrupt fishing activities, and erode critical infrastructure. The CRA stresses that the frequency, duration, and severity of these events are likely to intensify, making adaptation a priority for Makongeni.

3.2 Vulnerability Analysis

Vulnerability in Makongeni is multidimensional rooted in the physical fragility of its environment, the socio-economic precarity of its residents, and systemic inequalities in access to services. The Rapid Climate Risk Assessment (RCRA) identifies flooding, heat, and erosion as the key stressors that expose vulnerable groups to compounding risks such as disease, income loss, and displacement.

The settlement's socio-economic profile reveals that nearly 72.6% of residents are tenants, while only 23.4% own their homes, limiting household investment in flood-resilient housing or drainage maintenance (Makongeni Situational Analysis Report, 2025). Tenure insecurity discourages landlords from upgrading infrastructure, leaving tenants to bear the brunt of climate impacts without authority to adapt. The high population density—exceeding 3,200 persons per square kilometre—further intensifies exposure, as limited space increases the spread of contaminants when floods occur.

Women are disproportionately affected by climate risks due to their caregiving responsibilities, limited economic resources, and high dependence on informal livelihoods. The Asego Community Consultation Report notes that women spend more time fetching water, caring for sick relatives, and maintaining homes during and after flood events. When roads and markets flood, many lose income from small-scale trading and fish vending. The RCRA emphasizes that women face barriers to timely evacuation, as they often prioritize the safety of children, the elderly, and persons with disabilities before their own. Moreover, the scarcity of safe sanitation facilities during floods increases risks of gender-based violence and reproductive health complications. In Makongeni, 89% of households rely on pit latrines, most of which overflow during floods, contaminating compounds and endangering women's health.

Despite these challenges, women are central to resilience-building. The RCRA highlights women's active participation in community-led construction and micro-enterprises producing stabilized soil blocks and permeable pavements. Empowering women through training, access to credit, and representation in settlement planning committees strengthens both household and community adaptive capacity.

Youth constitute about 58% of Makongeni's population (Makongeni Situational Analysis Report, 2025) and represent both a vulnerable and an adaptive group. Many young people rely on casual labour, boda boda transport, and petty trade—livelihoods easily disrupted by floods and heatwaves. Loss of income during climate events leads to short-term coping strategies such as migration, borrowing, or reduced food intake. The RCRA

found that recurrent flood damage to informal roads particularly affects youth mobility and employment, as transport and delivery services stall during storms.

However, youth groups also show strong adaptive potential. The RCRA recommends involving youth-led community organizations in maintaining green corridors, bioswales, and drainage infrastructure. Training and employing youth in these activities not only reduces unemployment but also enhances local ownership of adaptation measures.

PWDs face heightened exposure due to physical mobility challenges and inadequate access to evacuation routes or safe shelters. The Action Sheet on Early Warning Systems specifically identifies PWDs as among those most likely to be left behind during floods or emergencies. Poorly designed footpaths and lack of ramps further restrict their access to essential services, including health facilities and public transport. The Asego Community Consultation Report highlights the absence of inclusive disaster preparedness measures, noting that most early warning communications are not accessible to visually or hearing-impaired persons. To address this, the county proposes capacity-building initiatives that train disaster management committees on inclusive risk communication and establish designated volunteers to assist PWDs during emergencies.

Elderly residents, though fewer in number, are among the most climate-sensitive groups. Many live alone or rely on family support, which becomes unreliable during crises. The RCRA observed that elderly persons struggle with evacuation during floods due to limited mobility, unsafe pathways, and lack of accessible shelters. Health challenges such as hypertension and respiratory illness are aggravated by poor air circulation in iron-roofed houses during heatwaves. Additionally, the elderly are often excluded from decision-making forums and adaptation projects that could address their needs. Engaging them through community awareness sessions and involving them in mentorship programs can ensure that their experience informs long-term resilience strategies.

Vulnerability is further deepened by intersecting factors such as poverty, insecure land tenure, and limited access to services. Households earning below KSh 6,000 per month have minimal capacity to invest in adaptation measures like raised foundations, improved drainage, or heat-mitigating roofing materials. Furthermore, the concentration of informal housing on steep slopes increases erosion risk, while inadequate solid waste management exacerbates flooding. When climate shocks occur, vulnerable groups face cumulative disadvantages—women lose income, youth face job disruption, PWDs lack mobility support, and elderly individuals experience health deterioration.

Institutionally, weak coordination among county departments has slowed implementation of resilience measures, while inadequate funding limits the reach of existing programs. The County Climate Change Act (2022) mandates inclusion of marginalized groups in adaptation planning, yet community feedback from Asego Ward indicates that representation of women, youth, and PWDs in decision-making remains low. Social cohesion, however, remains strong: community-based organizations, chamas, and youth groups often mobilize for drainage clearing, tree planting, and public clean-ups after floods—demonstrating that local networks are a foundation upon which institutional adaptation can build.

In summary, vulnerability in Makongeni is driven by a convergence of socio-economic inequality, spatial exposure, and institutional gaps. Climate hazards such as flooding and heat disproportionately impact women, youth, persons with disabilities, and the elderly, yet these same groups also represent the strongest pillars of community adaptation. Inclusive capacity-building, livelihood diversification, and gender-responsive planning are thus critical to reducing vulnerability and building sustainable resilience across the settlement.

3.3 Exposure and Sensitivity Mapping

3.3.1 Spatial Vulnerability Mapping

Spatial analysis from the Homa Bay County Rapid Climate Risk Assessment (RCRA) and the exposure map (Figure 9) reveals that Makongeni's built environment is heavily exposed to multiple overlapping hazards, including flooding, erosion, and landslides. Flood-prone zones are concentrated along the southern and western corridors of the settlement—particularly adjacent to the C19 highway, Homa Bay Sewerage Plant, and access roads leading to Makongeni Health Centre and St. Patrick's Makongeni Primary School. These areas experience recurrent inundation due to poor surface drainage and runoff from the elevated Got Rabuor hill to the east.

The exposure map identifies at least six community-reported flood hotspots, mainly located near Victoria Academy, the Makongeni market, and low-lying housing clusters near Pandou Beach and Homa Bay Sewerage Plant. Field verification confirmed that during the 2023 El Niño rains, water levels in these zones reached depths of up to 0.6–0.8 metres, cutting off access routes to the health centre and schools (RCRA, 2025). The map legend further highlights zones with a high risk of erosion along the steep northern slope of Got Rabuor, where uncontrolled stormwater channels and unpaved access roads have formed deep gullies threatening housing stability.

The KISIP road network, marked in purple on the map, offers some structural mitigation through culverts and raised footpaths, but these features are unevenly distributed and often fail under extreme rainfall. The blue-highlighted secondary drainage lines, though essential, are clogged with debris and solid waste during storms, reducing their hydraulic capacity and extending flood durations. Importantly, proximity to Homa Bay's sewer line and water pipelines increases exposure to contamination when these systems overflow.

From a spatial risk perspective, approximately 35–40% of Makongeni's land area lies within moderate to high flood-risk zones, while the remaining sections are indirectly affected through disrupted access, drainage blockage, or infrastructure damage. The concentration of residential and commercial buildings within these flood plains makes Makongeni one of the most hazard-exposed settlements in Homa Bay Municipality.

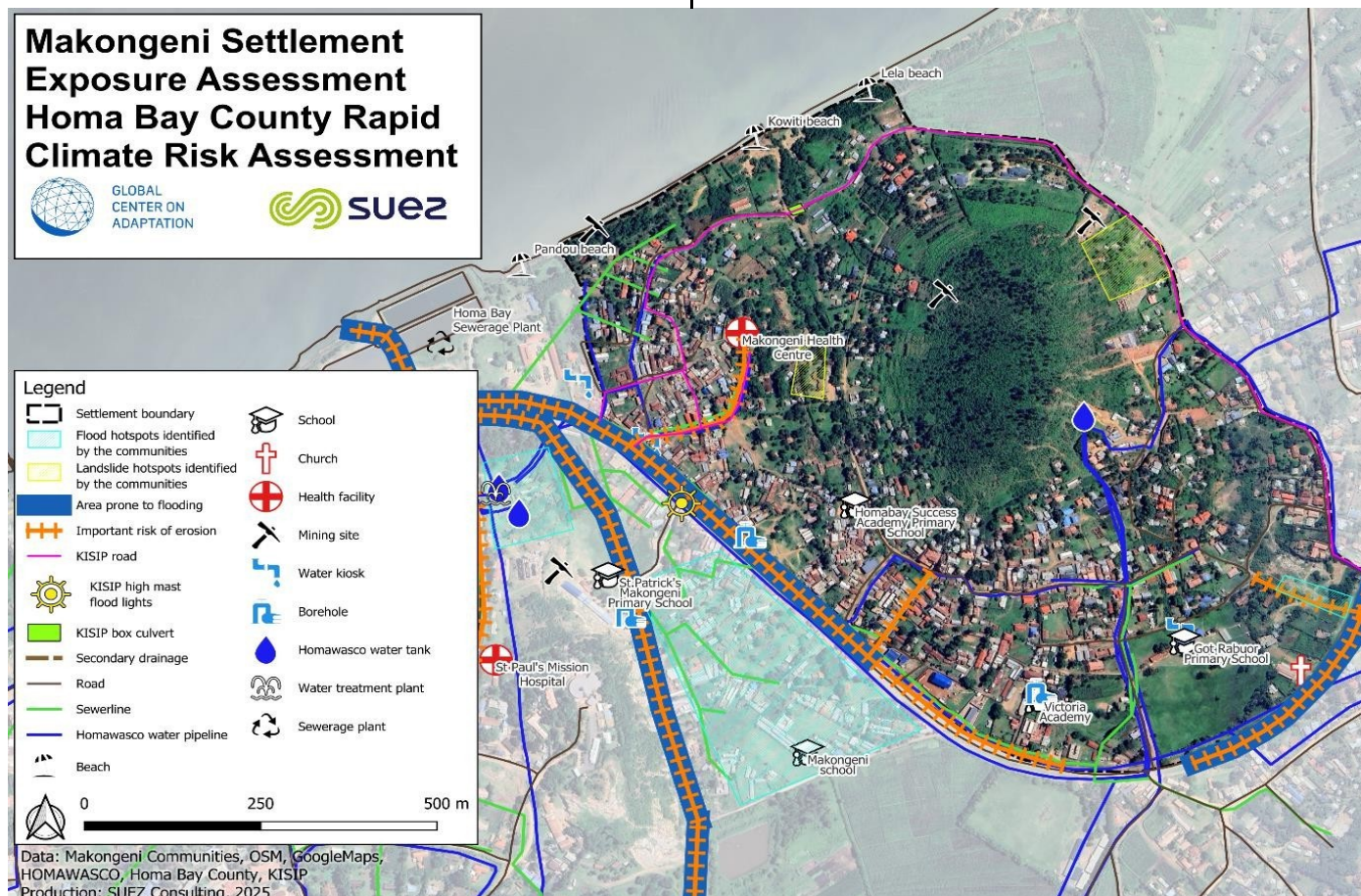


Figure 9 Makongeni Exposure Map

3.3.2 Asset Mapping

The exposure assessment map also highlights critical community assets situated within or near hazard zones, underscoring the urgency for targeted adaptation measures.

- **Health Facilities:** The Makongeni Health Centre sits at the base of Got Rabuur Hill, an area intersected by drainage lines from upper slopes. Its access road frequently floods, hampering medical service delivery. Similarly, St. Paul's Mission Hospital, located near the C19 corridor, is exposed to runoff and wastewater overflow from nearby drainage channels. The Action Sheet on Drainage (No. 3) identifies both facilities as priority intervention sites for

constructing hybrid drainage systems and retention basins.

- **Educational Institutions:** The map shows at least five schools within or adjacent to flood-prone zones—St. Patrick's Makongeni Primary, Makongeni School, Victoria Academy, Got Rabuur Primary, and Homa Bay Success Academy. Flooding around these institutions often disrupts learning and damages infrastructure. The RCRA noted that classrooms near Got Rabuur Hill face erosion at their foundations, while playgrounds double as flood retention basins during storms.
- **Water Infrastructure:** Key assets of the Homa Bay Water and Sanitation Company (HOMAWASCO)—including water kiosks, boreholes, and pipelines—traverse several flood-affected areas. Breakages in these

systems lead to contamination and irregular supply during heavy rains. The **Action Sheet on Resilient Materials (No. 5)** recommends reinforcing these facilities using flood-resistant designs and elevating water kiosks to reduce contamination risks.

- **Transportation and Public Roads:** The **C19 highway** and internal access roads (particularly those leading to Pandou and Kowiti beaches) are consistently listed by residents as impassable during floods. The **Asego Community Consultation Report** further confirms that lack of pedestrian walkways, culverts, and lighting in these areas increases safety risks, particularly for women and children.
- **Environmental and Recreational Assets:** The steep, vegetated **Got Rabuor hill**—one of Makongeni’s few remaining green zones—acts as a natural catchment and ecological buffer. However, encroachment for housing and farming has reduced its stabilizing function. The **Action Sheet on Flood Protection Measures using Nature-Based Solutions (No. 4)** proposes rehabilitating Got Rabuor through reforestation, slope stabilization, and creation of a community-managed green corridor to serve both drainage and recreational purposes.

Collectively, these assets form the social and physical backbone of Makongeni but are highly sensitive to climate shocks. The map provides crucial spatial evidence that adaptation planning must prioritize multi-functional infrastructure, combining drainage, access, and public services so as to enhance settlement-wide resilience. Integrating flood mitigation measures within existing infrastructure corridors, particularly along health and education facilities, can reduce annual flood disruptions by up to 40%, according to RCRA projections (2025).

3.4 Sensitivity to Climate Change Impacts

Sensitivity refers to the degree to which Makongeni’s systems—social, physical, and environmental—are affected by climate hazards. The Rapid Climate Risk Assessment (RCRA) identified housing, drainage, sanitation, and livelihoods as the most sensitive sectors.

Flooding directly affects households by destroying goods, collapsing poorly built houses, and inundating pit latrines. More than 89% of residents rely on pit latrines, which often overflow during flood events, contaminating compounds and water sources. The lack of formal waste management compounds this: drainage channels

become conduits for solid waste, increasing the spread of disease and impeding runoff. During the 2023 El Niño floods, community members reported severe outbreaks of waterborne illnesses, including diarrhoea and cholera (Asego Consultation Report, 2025).

Heat sensitivity is equally high. The Action Sheet on Resilient Building Materials (No. 5) observed that 70% of Makongeni homes are roofed with iron sheets, causing indoor temperatures up to 7 °C above ambient during dry seasons. This heat amplifies discomfort, especially for children and the elderly, and drives higher energy costs where fans or cooling devices are used.

Livelihood sensitivity stems from dependence on informal work. The Makongeni Situational Analysis Report (2025) shows that 64% of residents earn below KSh 6,000 per month, mainly from informal trade, casual labour, and boda boda transport. Floods halt market activity, destroy goods, and damage roads, while droughts disrupt water-dependent enterprises. Women traders lose perishable stock when markets flood, while youth lose daily wages when transport routes are blocked.

Environmental degradation increases overall sensitivity. Encroachment on the Got Rabuor slopes for housing has stripped vegetation that once stabilized soil and absorbed stormwater. The Action Sheet on Nature-Based Solutions (No. 4) stresses that reforestation and creation of green corridors could reduce runoff, soil loss, and urban heat simultaneously.

3.5 Interactions Between Hazard, Exposure, and Vulnerability (Climate Risk Framework)

Makongeni’s high climate risk results from the intersection of three reinforcing dimensions: hazard, exposure, and vulnerability.

Hazard: Increasingly intense rainfall, extreme heat, and drought episodes are driven by regional climate variability, particularly the Indian Ocean Dipole (RCRA, 2025). The area’s sloped terrain and impermeable surfaces magnify flood intensity.

Exposure: The settlement’s built-up area overlaps directly with flood plains and erosion corridors (see Section 3.3). Nearly 40% of households, schools, and key roads lie within moderate-to-high flood-risk zones. Infrastructure exposure is worsened by inadequate storm drains and by illegal construction along natural waterways.

Vulnerability: Socio-economic fragility amplifies exposure impacts. Insecure tenure, poverty, gender inequality, and limited access to credit reduce residents’ ability to prepare for or recover from disasters. The

RCRA found that repeated losses—of household goods, income, and sanitation facilities—keep families in a cycle of reconstruction and debt.

These three dimensions interact in a feedback loop. Each flood weakens physical and financial assets, which in turn heightens vulnerability to the next event. The Action Sheet on Early Warning Systems (No. 2) seeks to break this cycle by decentralizing disaster preparedness through community-led disaster management committees linked to the County Emergency Operations Centre.

By visualizing this triangular relationship, the RCRA framework demonstrates that effective adaptation must target all three sides simultaneously: reduce hazards through green infrastructure, minimize exposure through spatial planning, and lower vulnerability through socio-economic empowerment.

3.6 Capacity to Adapt

Makongeni's capacity to adapt to climate risks is gradually emerging, though constrained by financial limitations, weak institutions, and inadequate technical support. Residents have demonstrated a strong awareness of environmental challenges and have developed informal coping mechanisms such as clearing drains before rains, placing sandbags at doorsteps, and raising house floors and latrine slabs to reduce flood intrusion. During dry spells, many households practice small-scale rainwater harvesting using improvised containers, which, although insufficient, indicates adaptive awareness at the community level. The Rapid Climate Risk Assessment (RCRA) notes that these localized efforts are largely reactive and lack the technical reinforcement or financing required to make them sustainable over time.

The Asego Community Consultation Report (2025) revealed that community willingness to co-manage drainage infrastructure and engage in tree planting is high, with youth groups already participating in clean-up campaigns and environmental restoration drives. The Action Sheet on Resilient Building Materials (No. 5) builds on this strength by proposing skills training for local artisans—particularly women and youth—in the production of stabilized soil blocks, permeable pavements, and reflective roofing materials that can both withstand floods and reduce indoor heat stress. These initiatives link adaptation to job creation, demonstrating that climate resilience can also serve as a local economic driver.

Institutionally, Makongeni benefits from the framework established under the Homa Bay County Climate Change Act (2022), which mandates county departments and ward committees to mainstream climate adaptation in development planning. However,

implementation remains hindered by weak coordination between departments responsible for housing, environment, water, and infrastructure. The Homa Bay Municipality Zoning Regulations (2025) highlight that overlapping mandates, limited technical capacity, and poor budget allocation have slowed the rollout of climate-smart urban infrastructure. Community participation in governance has improved through ward climate committees, yet representation of women, youth, and persons with disabilities remains low, limiting inclusivity in decision-making.

Barriers to adaptation are deeply intertwined with poverty, tenure insecurity, and low awareness. Over 64% of Makongeni households earn below KSh 6,000 per month, making investments in resilient housing or floodproof latrines unaffordable. Tenure insecurity discourages structural upgrades, as tenants and landlords are reluctant to invest in long-term improvements. In addition, weak enforcement of building codes has allowed development in flood-prone zones and along drainage corridors. Addressing these barriers requires strengthening local governance mechanisms, improving access to microfinance, and expanding county investment in community-based adaptation programs.

Overall, Makongeni's adaptive capacity remains limited but holds significant potential. The existence of strong social networks, organized youth groups, and community self-help associations provides a foundation for locally led adaptation. Integrating these local initiatives with county-level policy support and technical assistance can transform Makongeni from a reactive settlement to a proactive model of climate resilience.

3.7 Climate Vulnerability Index (CVI) and Risk Prioritization

The RCRA developed a composite Climate Vulnerability Index (CVI) to quantify the combined effects of hazard intensity, exposure, and adaptive capacity. Makongeni recorded a CVI score of 3.9 out of 5, classifying it among the high-risk settlements within Homa Bay Municipality. The results indicate high exposure (4.3/5), significant sensitivity (4.5/5), and moderate adaptive capacity (2.8/5). This means that even relatively moderate flood events cause widespread disruption, as physical and institutional systems remain underprepared for rapid climate shocks.

The CVI findings align with community experiences from the Asego Consultation Report (2025), where residents identified flooding, blocked drainage, and poor housing conditions as the most pressing climate-related threats. Based on these findings, the Action Sheets prioritize interventions that integrate physical infrastructure upgrades with social resilience-building. The most

urgent measures include the construction of green–grey hybrid drainage systems in flood hotspots near Makongeni Health Centre, schools, and markets, which can reduce flood recurrence by improving surface runoff management. Establishing a community-based early warning and disaster management system is also essential to improve preparedness, communication, and coordinated response during extreme weather events.

Equally important is the promotion of resilient building practices and land-use regulation. The Action Sheet on Resilient Materials (No. 5) calls for the use of durable, locally produced materials such as stabilized soil blocks and permeable paving, while the Homa Bay Zoning Regulations (2025) recommend enforcing setback zones along water channels and prohibiting construction on steep slopes. The Action Sheet on Nature-Based Solutions (No. 4) further emphasizes rehabilitating Got Rabuor Hill through tree planting, terracing, and community-managed green corridors to restore soil stability and absorb runoff.

Livelihood-based adaptation also plays a key role in reducing vulnerability. The consultations identified opportunities for youth and women to engage in waste recycling, the maintenance of green infrastructure, and the production of climate-resilient building materials. Integrating these livelihood initiatives with infrastructure projects creates both economic and environmental co-benefits, ensuring that adaptation actions remain socially inclusive and self-sustaining.

Overall, the Climate Vulnerability Index underscores the urgency of integrated, community-driven adaptation. Prioritizing drainage rehabilitation, nature-based flood mitigation, resilient housing, and inclusive governance mechanisms will significantly reduce Makongeni’s vulnerability and enhance its resilience to the growing impacts of climate change.

3.8 Risk Scenarios and Projected Climate Change Impacts

3.8.1 Develop Risk Scenarios

Short-term projections (0–10 years, time horizon 2021–2040) indicate that flooding will remain Makongeni’s most persistent and damaging hazard. Hydraulic modelling from the Homa Bay County Rapid Climate Risk Assessment (RCRA) shows that a 1-in-10-year rainfall event already produces flood depths of 0.5–1.0 metres across critical areas such as the Makongeni Health Centre access road, St. Patrick’s Primary School, and the market corridor near the C19 highway. These flood depths are sufficient to inundate homes, displace households, damage road surfaces, and overflow pit latrines—posing major health risks through contamination of water sources

Table 5 Flooding Comparative Analysis

Name	Impact (Depth)	Impact (Velocity)	Impact (Depth)	Impact (Velocity)
Makongeni Settlement (RCRA Model)	Short Term vs Present (%)	Short Term vs Present (%)	Medium Term vs Present (%)	Medium Term vs Present (%)
	+2.8%	+1.9%	+5.3%	+3.6%

The RCRA’s comparative analysis projects that average flood depth in Makongeni will increase by 2.8% in the short term, while flow velocity will rise by about 1.9% compared to current levels. These increases, though seemingly modest, translate into significantly stronger runoff on steep slopes such as those around Got Rabuor Hill, where erosion and gully formation are already visible. The probability of back-to-back flood events within the same rainy season is also increasing, meaning households may face multiple damaging floods each year, reducing recovery time and worsening economic vulnerability.

Medium-term projections (time horizon 2041–2060), modelled under Representative Concentration Pathway 4.5 (RCP4.5)—a moderate global emissions scenario—show that average temperatures in Homa Bay are expected to rise by approximately +1.6°C, with up to 72 additional days annually above 35°C. Rainfall is projected to remain highly variable, but extreme downpours will intensify by 5–10%, raising peak flood depths to over 1.2 metres in low-lying parts of Makongeni, particularly around Pandou and Kowiti beaches, and Victoria Academy. Under this scenario, flood velocity is expected to increase by 3.6% relative to current conditions, further stressing drainage systems and road infrastructure.

The high-emissions scenario (RCP8.5) projects even more severe outcomes. With limited global mitigation, average temperatures in Homa Bay could rise by +2.0°C by mid-century, resulting in up to 98 additional extreme heat days per year. For Makongeni, this means nearly one-third of the year will be spent under heat stress conditions, exacerbating discomfort and health risks in the densely built iron-sheet housing typical of the settlement. In this scenario, rainfall events become more erratic but markedly more intense, triggering flash floods that exceed the drainage system’s capacity and extend flood footprints beyond current hotspots.

Drought risk is also expected to intensify under both pathways. The community already reports water prices peaking at KSh 30 per 20-litre jerrycan during dry spells; these dry periods are projected to last longer and occur

more frequently. Under RCP8.5, droughts will be followed by sudden, high-intensity rainfall events, overwhelming drainage and sanitation infrastructure and causing cascading failures such as latrine overflows, road blockages, and contamination of water points.

Taken together, the risk scenarios for Makongeni reveal a clear trajectory: without targeted adaptation, the settlement will continue to experience recurrent flooding in the short term, compounded by worsening drought and extreme heat in the medium term. Under RCP4.5, these impacts remain disruptive but manageable through effective adaptation. Under RCP8.5, however, they evolve into chronic and potentially unmanageable hazards. This progression underscores the urgency of adaptation planning that simultaneously tackles current flood vulnerability while anticipating future heat and water stress challenges.

3.8.2 Projected Climate Change Impacts

Projected climate shifts will place compounding pressure on Makongeni's infrastructure, services, and livelihoods. Under medium-term RCP4.5 conditions, even modest increases in flood depth—5 to 10% higher than present levels—will overwhelm existing drainage swales and expose critical utilities. The RCRA has already documented how pipelines crossing flood will exacerbate food insecurity as household expenditures rise, while intensified floods will extend beyond current hotspots, submerging additional residential clusters near the C19 corridor and eroding access routes. Continuous heat exposure, affecting up to one-third of the year, will deteriorate living conditions in iron-sheet housing, forcing some residents to migrate temporarily or permanently during extreme seasons.

Ultimately, the convergence of flood, drought, and heat stress will challenge both the physical and social fabric

channels and electricity poles on eroded slopes are destabilized during storms, threatening the reliability of water and power supply. Flooding of access roads leading to the Makongeni Health Centre regularly cuts off health services, while sanitation failures will likely become more frequent as over 89% of households rely on pit latrines prone to overflow contamination. The combination of standing water and higher temperatures will create breeding grounds for mosquitoes, amplifying the risk of malaria and cholera outbreaks, further burdening health systems already situated in hazard-prone zones.

Economic impacts are also projected to worsen. Rising temperatures, with 72 to 98 additional days above 35°C, will reduce productivity among outdoor workers—especially boda boda operators, street vendors, and construction labourers—who form the backbone of Makongeni's informal economy. Market areas already affected by flood depths exceeding one metre are expected to face more frequent closures, disrupting household incomes and food supply chains. In tandem, drought-driven water scarcity will keep water prices volatile and beyond the reach of low-income households, sustaining the cycle of high living costs and reduced earnings.

Under the high-emissions RCP8.5 scenario, these pressures converge into chronic and potentially irreversible socio-economic stress. Prolonged dry spells of Makongeni. Without proactive adaptation—through hybrid drainage systems, resilient housing materials, and reliable early warning networks—the community risks shifting from periodic disaster response to a state of chronic climate stress. The projections reinforce the need for integrated interventions that combine infrastructure resilience, nature-based flood management, and inclusive livelihood programs to safeguard Makongeni's long-term sustainability

4 VISIONING & COMMUNITY PRIORITIZATION

4.1 Community-Driven Visioning Workshops

4.1.1 Engagement Process

The community-driven visioning workshops in Makongeni were conducted in April 2025 as part of the participatory planning process for the People's Adaptation Plan. Guided by the Community Facilitation Guide, the workshops adopted principles of inclusivity, equity, and evidence-based planning to ensure that discussions reflected the lived realities of residents.

In preparation, a detailed household enumeration exercise had been carried out, identifying 1,147 households within Makongeni. This numbering exercise, combined with the household questionnaire survey, provided a representative socio-economic baseline that informed the workshop design and helped prioritize community concerns.

Workshops were organized to bring together a diverse cross-section of residents, including women, men, youth, elderly people, and persons with disabilities. Participants were disaggregated into focus groups to create safe and open spaces for dialogue, thereby ensuring that traditionally underrepresented voices were heard. Each group session was structured around thematic areas such as water and sanitation, housing, livelihoods, public health, energy, and environment.

Facilitators applied participatory techniques including brainstorming, storytelling, group mapping, and role-playing to encourage active engagement. Rapporteurs and group representatives were appointed to document and present findings, ensuring ownership of the process by the community. Discussions emphasized lived experiences of climate risks—such as recurrent flooding, erosion, and water scarcity—and their impacts on livelihoods, education, health, and housing.

By combining local knowledge with data from the survey and situational analysis, the workshops produced a rich set of community priorities and aspirations. These included demands for improved drainage and sanitation systems, affordable and reliable water access, resilient housing, safe roads, and expanded livelihood opportunities. The participatory process thus served as a critical bridge between technical assessments and

community visioning, ensuring that the adaptation plan was rooted in both evidence and local realities.

4.1.2 Focus Areas for Visioning

During the visioning sessions, community members articulated their aspirations for a safer, healthier, and more climate-resilient Makongeni. Drawing from household survey findings as well as priorities raised in the workshops, participants collectively identified several core areas of focus for their long-term vision.

Climate Resilience Goals featured prominently. Residents highlighted the urgent need to reduce flood risk, especially around the market and drainage swales where flooding regularly disrupted livelihoods and damaged homes. Improving access to safe and affordable water was also prioritized, with many households reporting frequent interruptions in supply and high costs of purchasing water from vendors. Women, who bore the brunt of water collection, emphasized the importance of expanding water kiosks within walking distance. The community further underscored the need to strengthen sanitation infrastructure, replacing overflowing pit latrines with more resilient facilities, and to promote housing improvements using durable, climate-resilient materials.

Long-term Sustainability was discussed in terms of social, economic, and environmental balance. Participants envisioned a future where resilient infrastructure—such as improved drains, flood-safe markets, and upgraded housing—would be maintained through collective responsibility and county support. They stressed that sustainability required livelihood strengthening, especially for informal traders and fisherfolk whose incomes were frequently disrupted by climate shocks. Residents also called for green infrastructure solutions, such as planting trees along flood paths and establishing small recreational spaces, which would serve both ecological and social needs. In doing so, the community emphasized inclusivity, ensuring that the needs of vulnerable groups—women, youth, elderly persons, and PWDs—were not sidelined but integrated into all future development planning.

4.1.3 Documentation and Reporting

The outcomes of the visioning workshops in Makongeni were carefully documented to ensure that community voices were preserved and could directly inform the adaptation planning process. Facilitators and rapporteurs, guided by the **Community Facilitation Guide**, maintained detailed written notes of plenary and breakout sessions, supported by photos and participatory maps generated by residents themselves. These records captured the diversity of perspectives across groups—women, youth and persons with disabilities, and men and elders—and provided a reliable basis for cross-checking against the household survey data.

Participatory mapping exercises produced visual evidence of flood-prone hotspots, eroded drainage swales, and locations lacking safe sanitation, alongside aspirational areas identified for new water kiosks, resilient housing, and green spaces. These maps, complemented by field observations and hydrological analysis, were compiled into workshop reports that highlighted both risks and opportunities within the settlement.

The findings from the workshops were synthesized into a clear community vision statement, reflecting the aspirations of the 1,147 households and articulating a shared pathway toward resilience. This statement emphasized equitable access to safe water and sanitation, flood protection, affordable and secure housing, strengthened health and education facilities, and expanded livelihood opportunities. The documentation not only validated the priorities already revealed in the household survey but also provided a narrative of community aspirations in their own words, ensuring legitimacy and ownership of the adaptation plan.

4.2 Participatory Mapping of Aspirations and Risks

4.2.1 Mapping Process

Participatory mapping exercises were facilitated in Makongeni to capture both the community's aspirations and their perceptions of risk. Residents used sketch maps and drawings to identify areas they wished to see developed or protected, such as potential community centers, water kiosks, drainage improvements, and green public spaces. At the same time, the exercises allowed participants to mark risk-prone locations, including flooded market zones, eroded drainage swales, waste-choked culverts, and households affected by sewer overflows. Special attention was given to areas where critical infrastructure, such as schools, health

centers, and water pipelines, intersected with hazard zones.

These maps highlighted the dual reality of Makongeni: aspirations for improved infrastructure and services on one hand, and pressing exposure to flooding, erosion, and sanitation failures on the other. The outputs complemented household survey findings, which showed that over 50% of households reported flooding impacts and that the majority relied on shared sanitation facilities that were vulnerable to overflow during heavy rains.

4.2.2 Tools and Techniques

To ensure inclusivity, the mapping used simple tools such as large printed community maps, sketch diagrams, and locally facilitated discussions, making the process accessible to women, youth, the elderly, and persons with disabilities. These community-generated maps were later validated against technical flood hazard assessments and hydrological modelling, which confirmed that hotspots identified by residents—particularly around the Makongeni market and drainage swales—were also the most exposed zones in expert analyses. The integration of local knowledge with technical evidence ensured accuracy while strengthening community ownership of the results.

4.2.3 Collaboration

The mapping process was highly collaborative. Community leaders, local government representatives, youth groups, and faith-based institutions all contributed to the discussions, ensuring that a wide spectrum of perspectives was reflected. The participatory format allowed residents to connect their daily experiences with broader resilience strategies, while county officials and technical experts provided feedback on feasibility and integration with municipal plans. This co-production approach not only generated reliable maps but also fostered trust and strengthened dialogue between the community and government stakeholders.

4.3 Criteria for Prioritizing Adaptation Options

4.3.1 Equity Check: Do Priorities Benefit the Most Vulnerable?

The prioritization of interventions in Makongeni was guided by the principle of equity, ensuring that actions addressed the needs of the most vulnerable groups—particularly female-headed households (33.4%), youth, the elderly, and persons with disabilities. Short-term proposals, such as the expansion of water kiosks in

underserved residential blocks and the construction of communal sanitation blocks in high-density clusters, were designed to provide immediate relief to those most exposed to unsafe water and flood-prone latrines. These quick-win actions were relatively low-cost and could be implemented within existing county and community resources, making them essential first steps in reducing daily burdens that disproportionately affect women and children.

Medium-term priorities, such as **drainage upgrades along the C19 road, training artisans in resilient construction, and formalizing roadside commercial strips**, were identified as crucial for sustaining equity gains over the next 3–5 years. These actions not only reduce exposure to floods and unsafe housing but also create livelihood opportunities for youth and low-income earners. In the long term, structural investments like the **settlement-wide stormwater system, progressive re-blocking and housing regularization**, and the development of a **climate-proof market hub** were proposed to break the cycle of vulnerability. While these require substantial financing and extended timelines, they are critical for securing tenure, reducing overcrowding, and ensuring that vulnerable groups are not pushed further to the margins as the settlement develops. In this way, the sequencing of short, medium, and long-term actions reflects a deliberate strategy to meet urgent needs first, while laying the groundwork for deeper, systemic equity in the future.

4.3.2 Feasibility of Implementation

The feasibility of interventions in Makongeni was assessed in terms of technical, financial, and human resource capacities. Short-term actions such as drainage clearance, water kiosk expansion, sanitation blocks, and community disaster committees were considered highly feasible because they relied on existing county budgets, local labor, and community-based organizations. These measures could be rolled out quickly with minimal technical inputs, making them effective quick wins that demonstrate immediate results while building community confidence in the adaptation process. Their implementation also leveraged local social networks, such as youth groups and chamas, which already mobilize resources and collective action during crises.

Medium- and long-term interventions were recognized as requiring more complex technical and financial arrangements. For instance, lined drainage systems, resilient housing upgrades, and rainwater harvesting installations in schools demand skilled labor and targeted financing, but remain feasible within a 3–5 year horizon if integrated into the County Integrated Development Plan (CIDP) and supported by donor or PPP funding. Larger-scale investments like the

settlement-wide stormwater system, re-blocking of residential layouts, and decentralized wastewater treatment were categorized as long-term due to their capital intensity, land requirements, and the need for cross-institutional coordination. By sequencing interventions this way, feasibility was matched to available capacities in the short term, while preparing the institutional and financial foundations necessary for more transformative actions over time.

4.3.3 Direct Link to Identified Climate Risks

The proposed interventions for Makongeni were directly anchored in the settlement's most pressing climate risks—flooding, water scarcity, and extreme heat. Short-term actions such as desilting drains, sandbag protection, and installation of water kiosks were designed to immediately reduce household exposure to recurrent floods and unsafe water, risks that were consistently identified during workshops and validated by survey data showing that over 70% of households reported flood-related impacts. Similarly, communal sanitation blocks targeted the frequent overflow of pit latrines during heavy rains, which the community highlighted as a major driver of disease outbreaks. These actions offered a direct response to urgent hazards with immediate public health benefits.

Medium- and long-term measures were also structured to address specific risks. The construction of lined drainage channels and eventual settlement-wide stormwater management systems responded directly to the chronic inundation of access roads and the market area. Housing interventions, including the promotion of cool roofs and elevated foundations, addressed dual risks of extreme heat and flooding, particularly in high-density rental compounds built with iron sheets. Rainwater harvesting systems were proposed to reduce vulnerability to water scarcity during dry periods, while green corridors and bioretention areas were identified as ecosystem-based approaches to buffer against flood risks and urban heat islands. By linking each intervention to a clearly defined hazard, the plan ensures that adaptation efforts remain locally relevant, risk-driven, and effective in reducing the community's vulnerability to climate change.

4.3.4 Co-benefits of Interventions

The interventions were designed not only to address immediate climate risks but also to deliver multiple social, economic, and environmental co-benefits. Short-term actions such as sanitation block construction and hygiene campaigns directly improved public health while also reducing the unpaid care burden on women who often manage sick children during cholera or diarrheal outbreaks. Similarly, water kiosks reduced the

time and financial cost of water access, freeing up women and youth for education and income-generating activities. Early warning committees and street lighting also contributed to stronger community cohesion and improved safety, particularly for vulnerable groups such as women, children, and the elderly.

Medium- and long-term actions offered broader co-benefits. Resilient housing upgrades and re-blocking not only reduced flood and heat risks but also created opportunities for local artisans and youth to earn livelihoods through construction work. Rainwater harvesting and stormwater management systems improved water reliability, reduced disease incidence, and lowered household expenditure on emergency water purchases. Ecosystem-based solutions such as green corridors and bioretention parks enhanced biodiversity, provided recreational spaces, and contributed to cooler microclimates within the settlement. The development of climate-proof commercial hubs and markets generated stable income streams for traders while ensuring food security through safer storage and distribution systems. Collectively, these co-benefits demonstrated that climate adaptation in Makongeni could act as a catalyst for inclusive social development, improved health outcomes, and enhanced economic resilience

4.3.5 Social and Political Acceptability

Community perceptions strongly shaped the prioritization of actions in Makongeni, with interventions gaining legitimacy when they reflected lived realities and cultural practices. During the workshops, residents consistently expressed frustration with recurring floods in the market area, the overflowing of pit latrines, and the high costs of water during dry periods. As such, interventions that directly targeted these daily challenges—such as drainage improvements, new water kiosks, and communal sanitation facilities—received the strongest support. These were perceived not only as technically appropriate but also as culturally acceptable solutions, since they responded to long-standing concerns voiced by women, youth, and elders alike. Housing upgrades were also widely endorsed, especially when framed as incremental improvements using affordable materials rather than costly relocation, which residents feared could lead to displacement.

From a political perspective, the proposed actions aligned closely with county leadership priorities under the CIDP and the emerging Local Physical and Land Use Development Plan. County officials participating in the workshops emphasized the urgency of improving drainage and WASH services, while community leaders highlighted the need to integrate livelihood protection and safety measures into adaptation efforts. Interventions such as formalizing commercial strips

along the main roads were seen as politically favorable because they combined community needs with opportunities for revenue generation and orderliness in urban space. Similarly, proposals for green corridors and bioretention areas were well-received when presented as multifunctional spaces—flood buffers, recreational zones, and safe gathering points—rather than purely technical works. This alignment between community aspirations and local government priorities increases the likelihood that the proposed actions will be implemented, supported, and maintained over time, ensuring their long-term sustainability.

4.4 Priority Areas of Intervention (Short, Medium, Long-Term)

4.4.1 Short-Term Interventions

During the community workshops and technical assessments, residents of Makongeni identified a set of urgent, short-term interventions (0-2 years) that could deliver immediate improvements to their resilience and daily living conditions. These actions were designed to respond to the most pressing vulnerabilities highlighted by both the household survey and the Rapid Climate Risk Assessment.

Flood management and drainage clearance emerged as the highest priority. Residents reported that the market area, drainage swales, and the C19 road were repeatedly inundated during heavy rainfall, disrupting livelihoods, and cutting off mobility. Community members called for the regular clearing and repair of blocked drains, desilting of channels, and temporary sandbag protections around vulnerable hotspots. These low-cost measures were viewed as essential to reduce immediate exposure to flooding while more permanent infrastructure solutions are planned.

Improved access to safe water was also prioritized. The household survey confirmed that only 22% of Makongeni households were connected to piped water, with frequent disruptions reported by over 60% of respondents. During the dry season, households were forced to rely on costly or unsafe alternatives, often collected from Lake Victoria. Residents therefore prioritized the installation of additional communal water kiosks, repairs to leaking and exposed water pipes (some located directly in flood paths), and stricter regulation of informal vendors.

Sanitation upgrades were identified as another urgent need. Over 89% of households in Makongeni relied on pit latrines, most of which overflowed during floods, contaminating compounds and water sources. Only 6.3% of residents are connected to the municipal sewer system, leaving the majority dependent on unsafe on-

site sanitation that poses serious health and environmental risks. This gap highlights the urgent need to expand and modernize the sewer network to serve more households. The community therefore requested the construction of flood-resilient communal sanitation blocks, rehabilitation of existing pit latrines, and better waste management services, including regular solid waste collection to prevent drains from clogging.

The residents highlighted community safety and public health as immediate concerns. Flooding around the Makongeni market and schools was reported to trigger outbreaks of waterborne diseases, while lack of street lighting contributed to insecurity during night hours. As part of short-term measures, the community proposed temporary public health campaigns, installation of solar-powered streetlights in flood-prone paths, and greater enforcement of waste disposal regulations.

4.4.2 Medium-Term Interventions

In the medium term (3–5 years), the community of Makongeni envisioned and validated interventions that move beyond temporary fixes to provide more durable solutions to recurrent flooding, water insecurity, poor housing quality, and fragile infrastructure. These proposals combined residents lived experiences with technical options presented by planners and engineers, ensuring feasibility and long-term functionality.

A central priority was the upgrading of drainage infrastructure. Residents repeatedly highlighted that poorly designed and blocked drains intensified flooding, particularly around the market and access roads. Technical proposals therefore focused on constructing lined, climate-resilient drainage channels, fitted with debris traps to reduce blockages and overflow. These were designed to integrate with natural water flow paths identified in hydrological studies, thus reducing erosion and property damage in lower-lying parts of the settlement.

Improving housing resilience was another priority. The household survey revealed that the majority of homes in Makongeni relied on corrugated iron sheets for roofing (72.5%) and were vulnerable to both floods and heat extremes. To address this, interventions included promotion of stronger, flood-resistant and fire-safe building materials, technical training for local artisans in resilient construction, and targeted support to landlords and tenants for affordable retrofitting. Residents, particularly women and youth, emphasized the need for financial mechanisms or subsidies that would allow low-income households to access these materials.

Water security was identified as a daily stressor, especially during dry seasons when households were forced to purchase expensive or unsafe water. Medium-term actions therefore included the installation of

additional water kiosks, the rehabilitation of existing piped systems, and the introduction of rainwater harvesting systems at both household and communal levels. Technical advice emphasized the need for durable storage facilities and filtration systems to ensure safety and sustainability.

Upgrading community infrastructure was also prioritized. Roads within Makongeni, many of which are unpaved, were frequently rendered impassable during rains, disrupting access to schools, health facilities, and markets. Residents called for the graveling and eventual paving of key access roads, coupled with proper grading and integration into the drainage system. Complementary interventions included the construction of raised market platforms to protect traders' goods from floodwaters, reflecting the community's request for safer trading spaces.

Public health and environmental management featured prominently in medium-term goals. Participants noted repeated outbreaks of cholera and diarrheal diseases linked to poor sanitation and stagnant floodwaters. To address this, residents proposed expansion of communal sanitation facilities, upgrading of existing pit latrines to more flood-resilient eco-toilets, and improved waste management systems that included designated collection points and community sensitization on safe disposal. Technical solutions added value by recommending separation of stormwater and sewage systems to minimize contamination during floods.

Medium-term interventions included capacity-building measures. Residents expressed interest in acquiring practical skills such as masonry, drainage maintenance, and urban farming that would enable them to contribute to the construction, maintenance, and long-term sustainability of new systems. Local youth groups, in particular, saw this as an opportunity for income generation while strengthening the community's adaptive capacity.

4.4.3 Long-Term Interventions

In the long term (beyond 5 years), the community and technical teams identified interventions that would transform Makongeni into a safer, healthier, and more resilient settlement. These actions were strategic in nature, requiring sustained investment, institutional partnerships, and integration into broader urban planning frameworks.

The most urgent long-term priority was the construction of comprehensive stormwater management systems. While short- and medium-term drainage interventions were intended to offer relief, residents and engineers alike recognized the need for a permanent, settlement-wide drainage network. This would include reinforced concrete drains, retention basins, and culverts, designed

to manage peak flows from increasingly intense rainfall events. Where possible, these grey systems were to be complemented with nature-based features—such as bioswales and infiltration trenches—that not only manage runoff but also improve water quality and recharge groundwater.

Linked to this was the proposal for ecosystem-based flood protection measures. The flat terrain and proximity to Lake Victoria make Makongeni particularly vulnerable to lake backflows and heavy storm surges. Technical studies identified opportunities for green corridors and bioretention areas on underutilized or degraded plots within the settlement. These vegetated buffers would serve multiple purposes: slowing runoff, reducing sediment and pollutant loads, mitigating heat, and creating safe green public spaces for the community. Residents saw these areas not only as protective infrastructure but also as opportunities for recreation, small-scale urban farming, and social interaction.

Another long-term intervention focused on upgrading housing and settlement planning. The situational analysis showed that most housing units in Makongeni were semi-permanent and highly vulnerable to flooding and extreme heat. Over time, the vision was to incrementally replace substandard housing with climate-resilient structures, designed with durable, affordable, and thermally efficient materials. This included ensuring secure tenure arrangements that would incentivize residents to invest in improvements without fear of eviction. In parallel, technical experts recommended progressive re-blocking and zoning adjustments, to create space for essential infrastructure like roads, drainage, sanitation blocks, and green corridors.

Residents also highlighted livelihood resilience and urban services as long-term goals. Beyond improved market facilities, they aspired to see the establishment of permanent, flood-proof trading hubs, vocational training centers, and expanded health and education infrastructure. Technical teams reinforced this vision by proposing the integration of energy-efficient public buildings, small-scale renewable energy systems (e.g., solar-powered water pumping), and expansion of waste-to-resource initiatives that could generate jobs while improving environmental conditions.

Long-term resilience required strong institutional integration. Community members consistently emphasized the need for sustained government presence, stronger partnerships with local organizations, and accountability mechanisms to ensure that infrastructure is maintained. The proposed interventions therefore included the strengthening of a joint community–county resilience committee and

Ward Climate Committees, tasked with overseeing implementation, mobilizing resources, and ensuring that adaptation measures remain responsive to future climate risks.

Together, these long-term interventions envisioned a transformation of Makongeni from a settlement trapped in cycles of flooding and deprivation into a resilient urban neighborhood—anchored in sustainable infrastructure, secure housing, healthy ecosystems, and inclusive governance.

4.4.4 Action Plan Development

The community workshops, household survey, and technical assessments produced a set of priority interventions for Shauri Yako. These were structured into short-, medium-, and long-term actions and aligned with the proposed land use zoning plan. The list below reflects both urgency and feasibility.

1. Drainage and Flood Management

Short-Term (0–2 years)

- Development of a climate-resilient infrastructure checklist to guide all drainage and road projects, ensuring that designs consider future rainfall intensities and runoff patterns.
- Routine desilting and clearing of blocked drains, especially along the inner market roads (Zone 544,46,48,49,50,51), and the eastern corridor leading toward the C19 road.
- Temporary flood barriers, including sandbag

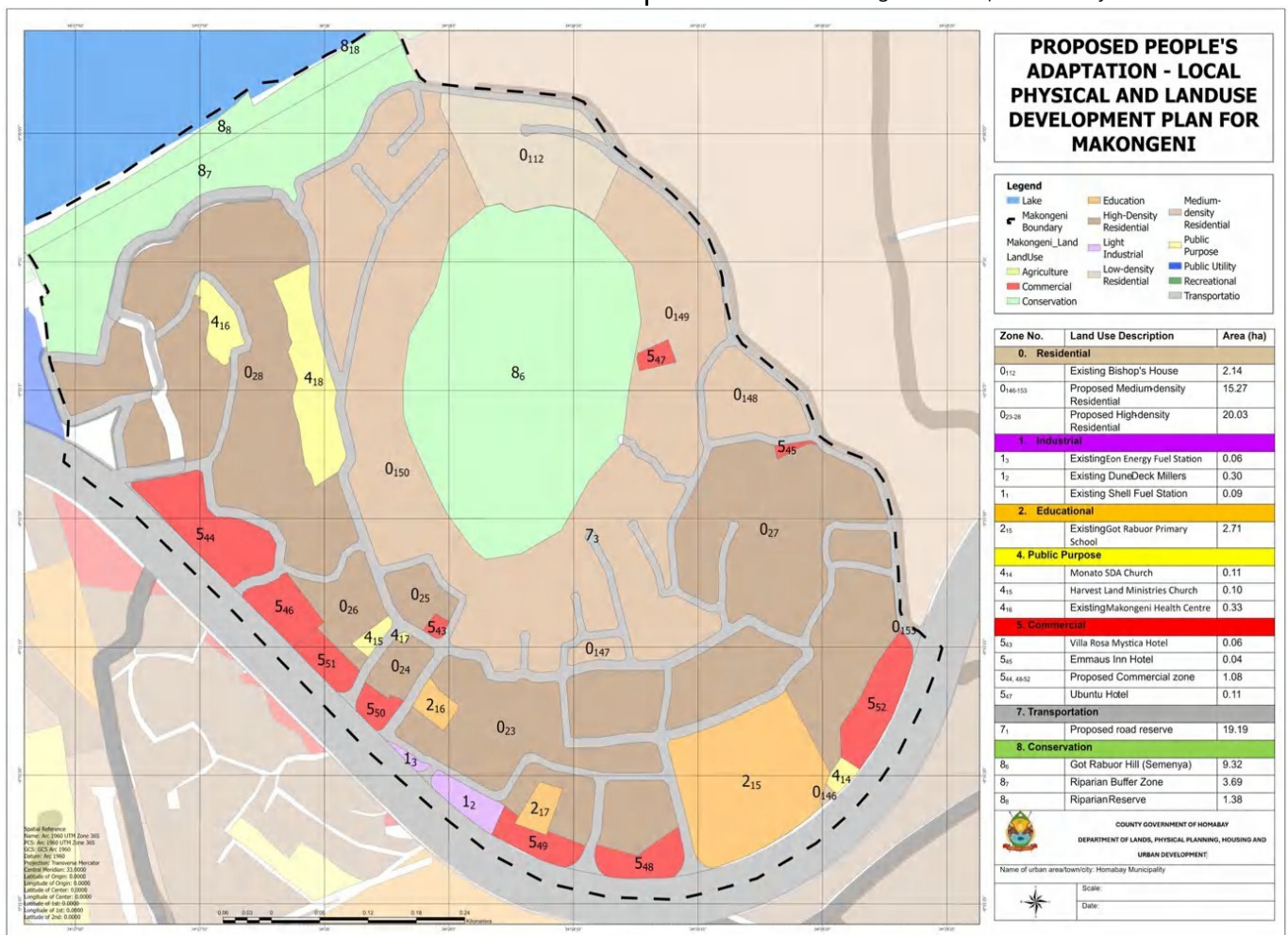
- Strengthening the waste management system by improving pre-collection and awareness programs, addressing community concerns about poor waste disposal blocking drains.

Medium-Term (3–5 years)

- Construction of lined stormwater drains with silt traps along the C19 corridor and adjoining internal roads which were identified as erosion-prone.
- Pilot retention and infiltration basins at open spaces and portions of the Zone 8 conservation belt, to regulate stormwater.
- Upgrading key access roads affected by flooding through compaction and resurfacing to ensure all-weather mobility.

Long-Term (5+ years)

- Development of a settlement-wide integrated drainage system combining reinforced concrete channels with green infrastructure—bioswales and rain gardens—particularly within the Zone 8



walls and raised walkways, in hotspots near the Health Centre and Zone 0.7 residential blocks.

- Encouraging household-level infiltration techniques, such as vegetated swales, shallow soak pits, and permeable courtyards to slow surface runoff in dense plots (Zones 0112 and 0.28).

conservation corridor to absorb and filter runoff.

- Creation of flood buffer strips and riparian green zones near Lake Victoria to reduce flood intensity and sediment discharge.

2. Water Security and Sanitation

Short-Term (0–2 years)

- Expansion of water kiosks and standpipes in underserved blocks
- Repair of damaged pipelines and reinforcement with durable materials resistant to erosion and corrosion.
- Assessment of the vendor system and water quality, ensuring regulation through HOMA WASCO.

Medium-Term

- Installation of rainwater harvesting systems in public facilities such as Zone 2.15 (Got Rabuor Primary) and Zone 2.16 (Tricent Medical School), extending benefits to nearby households.
- Construction of eco-toilets and communal sanitation blocks in dense clusters addressing the high proportion of residents relying on unsafe pit latrines.

Long-Term

- Establishment of separate sewerage and stormwater systems, with new trunk lines through public utility, reducing contamination risks.
- Scaling up decentralized wastewater treatment (DEWATS) facilities to reduce pollution into Lake Victoria.

3. Resilient Housing and Settlement Upgrading

Medium-Term

- Promotion of affordable, climate-resilient building materials such as stabilized soil blocks, raised plinths, and cool roofs, accompanied by mason training workshops.
- Incremental in-situ upgrading of high-density areas focusing on drainage, ventilation, and safe access to utilities.

Long-Term

- Re-blocking of medium-density layouts to create service lanes and stormwater channels.
- Gradual replacement of temporary units with climate-proof structures, tied to land tenure regularization and affordable housing programs.

4. Livelihoods and Commercial Infrastructure

Short-Term

- Upgrading Makongeni Market (Zone 5.44) with raised platforms and proper drainage to prevent flood-related stock loss.
- Climate-smart livelihood training, including waste recycling, small-scale irrigation, and

urban agriculture, targeting youth and women identified in the Asego meeting.

Medium-Term

- Formalization of new commercial strips (Zone 5.2) along the C19 road, incorporating flood-resilient stalls and shared waste collection points.

Long-Term

- Development of a central market hub equipped with cold storage, public sanitation, and waste sorting, integrated into Homa Bay's municipal trading system.

5. Community Health, Education, and Safety

Short-Term

- Hygiene awareness campaigns during rainy seasons to minimize outbreaks of waterborne diseases.
- Installation of solar-powered streetlights in poorly lit paths and markets to improve nighttime safety.

Medium-Term

- Expansion of sanitation facilities and waste services around key social nodes such as schools and churches.
- Expansion of Makongeni Health centre to increase facilities and capacity (Zone 4₁₆)

6. Early Warning and Community Preparedness

Short-Term

- Formation of community disaster response committees in each residential cluster, led by youth volunteers trained in rapid response and first aid.

Medium-Term

- Installation of simple flood gauge posts in hotspots like the market area and near the health centre.
- Linking Makongeni's alert system with the County Emergency Operations Center (EOC) and Kenya Meteorological Department for real-time early warning dissemination.

Table 6 Implementation Framework

Thematic Area	Intervention	Timeline	Location / Zoning Reference (Map-based)	Responsible Actors	Resources / Financing Pathways
Drainage & Flood Management	Regular clearance and desilting of drains; temporary flood barriers (sandbags, soak pits)	Short (0–2 yrs)	Market & inner access routes ((Zones 5 ^{44,46,48,49,50,51}), around Makongeni Health Centre	County Works Dept., Community Groups, CBOs, Youth brigades	County routine works budget; community labor schemes; support from CBOs & NGOs (e.g. KIWASH, FLLoCA)
	Construction of lined stormwater drains with silt traps along major corridors	Medium (3–5 yrs)	Along C19 & adjoining corridors	County Dept. of Infrastructure, NGOs, Youth Contractors	County infrastructure allocation; donor programs on urban resilience (World Bank, AfDB)
	Settlement-wide integrated drainage system (grey + green: bioswales, rain gardens, retention basins)	Long (5+ yrs)	Zone 8 Conservation corridor and open spaces	County Works, NEMA, Environmental CBOs	High-capital; Green Climate Fund; NbS grants; PPP for long-term maintenance
Water Security & Sanitation	Expansion of water kiosks , pipeline repairs, regulation of vendors	Short	Residential clusters	HOMAWASCO, County Water Dept., Community Water Committees	HOMAWASCO O&M; County water fund; community cost-sharing; FLLoCA grant
	Rainwater harvesting systems in schools & public institutions	Medium	Got Rabuor Primary, Makongeni Health Centre	School Boards, County Education, NGOs	County education budget; donor WASH programs (UNICEF, WaterAid); PTA support
	Communal sanitation blocks & eco-toilets	Medium	High-density residential zones	County Health, Faith-Based Groups, NGOs	County Health budget; WASH donor pilots; faith group contributions
	Sewer–stormwater separation and decentralized wastewater treatment	Long	Public Utility Zones	HOMAWASCO, County Water Dept., NEMA	County capital budget; Green Climate Fund; infrastructure PPPs
Resilient Housing & Settlement Upgrading	Training on resilient building materials (stabilized soil blocks, raised slabs, cool roofs)	Medium	High-density zones	County Housing Dept., AMT, Youth Groups	Climate innovation micro-grants; County Housing Fund; cooperative financing
	Re-blocking and upgrading of residential layouts; tenure regularization	Long	Medium-density	County Planning Dept., AMT, Community Committees	LPLUDP implementation fund; donor support for tenure formalization (Cities Alliance, GIZ)
Livelihoods & Commercial Infrastructure	Construction of raised trading platforms at market	Short	(Makongeni Market Zone 5 ^{44,46,48,49,50,51}),	County Trade Dept., Market	County trade budget; CDF allocations;

				Committees, Youth Masons	community savings groups
	Formalization of commercial strips with flood-resilient stalls	Medium	Along C19 corridor	County Trade & Industry Dept., Private Investors	PPPs; SACCOs; small trader cooperatives
	Climate-proof central market hub with cold storage & sanitation	Long	Expanded commercial area	County Trade & Industry, PPP Consortia	County development budget; PPP with traders; donor-supported market resilience fund
Community Health, Education & Safety	Hygiene campaigns , solar-powered streetlights for safety	Short	Settlement-wide (all residential Zones)	County Health Dept., NGOs, Youth Committees	NGO health projects; County energy & lighting programs
	Expanded sanitation & waste facilities in schools/churches	Medium	Public Purpose	County Education Dept., Faith Orgs., School Boards	Faith-based contributions; County education funding; CSR sponsorships
Early Warning & Community Preparedness	Formation of community disaster committees & youth volunteers	Short	Each residential cluster	Chiefs, County Disaster Mgmt., CBOs	Community volunteerism; NGO-led capacity building; FLLoCA grants
	Flood gauge posts and SMS alert system	Medium	Identified flood hotspots (e.g. Market Zone Health Centre access road)	County Disaster Unit, Red Cross, KMD	Red Cross grants; telecom CSR (Safaricom Foundation); County DRM budget
	Integration with County Emergency Ops Center (EOC)	Long	Settlement-wide	County Disaster Mgmt., Ward Climate Committee	County disaster allocation; donor resilience programs (UNDRR, EW4ALL)

5 INTERVENTION STRATEGIES FOR CLIMATE RESILIENCE

5.1 Water, Sanitation & Hygiene (WASH) Interventions

This section outlines the intervention strategies designed to enhance water security, improve sanitation services, and ensure equitable access to clean water in Homabay Municipality. These interventions are critical in addressing the vulnerabilities posed by climate change, particularly erratic rainfall patterns, prolonged droughts, and flooding. By focusing on resilient water and sanitation systems, the municipality can better manage its water resources, reduce the impact of climate variability, and ensure that all residents have access to safe water and sanitation facilities.

5.1.1 Climate-Proofing Water Infrastructure

Makongeni residents face persistent water insecurity, largely because existing supply systems are both unreliable and highly exposed to climate hazards. Household survey data shows that a majority of residents either rely on shallow wells, informal vendors, or directly fetch untreated water from Lake Victoria when piped supply is interrupted. This practice is not only costly but also increases vulnerability to waterborne diseases, particularly during floods when contamination is widespread. The community validation workshops further emphasized that kiosks connected to HOMAWASCO lines often become dysfunctional during heavy rains, either due to damage to supply pipes or disruption of electricity needed for pumping. To address these challenges, the People's Adaptation Plan proposes upgrading water kiosks with solar-powered pumps (for water kiosks linked to boreholes) and elevated storage tanks. This intervention ensures continuity of service during power outages, reduces reliance on costly electricity, and provides resilience against seasonal disruptions. Elevated tanks, in particular, allow for stable water pressure and gravity-fed distribution, ensuring that vulnerable households—especially women and children tasked with water collection—can access clean water even during emergencies.

In parallel, there is a need to protect water supply lines from flood erosion. The drainage swales in Makongeni

have repeatedly exposed underground and surface pipes to damage, leaving communities without water during peak flooding seasons. Residents reported broken pipes surrounded by stagnant floodwaters, which often mix with solid waste and raw sewage, worsening public health risks. To climate-proof the system, protective casing and reinforcement of critical pipelines will be undertaken, particularly in low-lying corridors near the market and along flood-prone paths. These measures will be combined with localized drainage improvements to reduce scouring around pipe installations. By strengthening water infrastructure in this way, the community will secure safer and more reliable access to water, reduce the risk of contamination, and improve adaptive capacity against recurrent flooding. This proposal is strongly aligned with community priorities, which placed improved water access and affordable supply at the top of immediate adaptation needs during the April 2025 workshops.

5.1.2 Rainwater Harvesting and Water Conservation

In Makongeni, the heavy reliance on unsafe sources such as untreated lake water or costly vendors highlights the urgent need for diversified and reliable water supply systems. Household survey data shows that residents often spend up to KSh 30 per jerrycan during dry seasons, a burden that disproportionately affects low-income families, especially female-headed households who manage daily domestic water needs. During the community validation workshops, women consistently emphasized the time lost queuing for water and the risks they face when fetching it from unsafe points. To ease this pressure, the Plan proposes scaling up household-level roof catchment systems and communal rainwater harvesting tanks. These systems would reduce dependency on unreliable piped supply, cut household expenditure, and ensure safer access to water during both dry spells and emergencies. By capturing and storing rainfall from iron-sheet rooftops, households can meet part of their daily domestic needs such as cooking, washing, and sanitation, while communal facilities like schools and health centers can serve as neighborhood water hubs during supply interruptions.

Rainwater harvesting also contributes to long-term water security by reducing pressure on HOMA WASCO systems, which are frequently disrupted by flooding and pipe damage. For Makongeni, where roofs are predominantly made of corrugated iron sheets, the infrastructure for harvesting already exists, but households lack the storage and treatment facilities to make this option viable. The Plan therefore prioritizes the installation of affordable plastic or ferro-cement tanks at both household and community levels, coupled with simple filtration or chlorination systems to ensure potability. In addition, water conservation awareness campaigns will be rolled out through community-based organizations and schools to instill practices such as reusing grey water for kitchen gardens and reducing wastage. Together, these measures will not only provide safer and cheaper water access but also strengthen community resilience against both seasonal droughts and intensifying rainfall variability.

5.1.3 Watershed Management and Tree Planting

In Makongeni, one of the most pressing challenges is the breakdown of sanitation systems during floods. The situational analysis found that more than 89% of households rely on pit latrines, most of which are in low-lying residential clusters that flood repeatedly during heavy rains. When these latrines overflow, waste mixes with stagnant runoff, contaminating compounds, footpaths, and open drains. Residents in the Asego consultation meetings described how these floods make movement dangerous—especially for women, children, and the elderly—since roads leading to schools, markets, and the health centre become impassable. The flooding problem is worsened by unplanned drainage patterns and poor waste management; existing open swales are frequently clogged with garbage and silt, turning residential lanes into stagnant pools.

To address these issues, the Plan prioritizes restoring and upgrading drainage and sanitation together, recognizing how closely they are linked in Makongeni's urban fabric. Key interventions include rehabilitating blocked swales and roadside drains, especially around Makongeni Market (Zone 5.41) and the access road to the Health Centre, using a mix of grey infrastructure (lined drains, culverts) and nature-based systems like vegetated bioswales and retention trenches along open spaces (Zone 8). These will help channel runoff safely, limit erosion, and reduce floodwater stagnation near sanitation points.

Equally critical is the flood-proofing of sanitation infrastructure. Many households currently raise toilet slabs with sandbags or dig shallow replacement pits after floods temporary fixes that increase contamination risk. The Plan therefore proposes constructing

communal flood-resilient toilets with elevated bases, sealed pits, and proper ventilation, particularly in dense, flood-prone zones. Where feasible, eco-toilets and composting systems will be piloted to reduce dependency on waterlogged pit latrines and lower groundwater pollution. These facilities will be sited close to community institutions, schools, churches, and market to ensure safety and accessibility for women, children, and persons with disabilities.

By coupling drainage rehabilitation with improved sanitation design, this integrated approach will reduce the spread of waterborne diseases like cholera and diarrhea, enhance mobility during floods, and restore dignity to affected residents. Linking construction to local artisan training and community-based maintenance groups as suggested in the Asego and Makongeni meetings. This will also create jobs and foster long-term stewardship, ensuring that Makongeni's sanitation resilience is both people-led and sustainable.

5.1.4 Climate-Resilient Wastewater Treatment Systems

In Makongeni, solid and liquid waste management has emerged as a critical sanitation and environmental concern. The situational analysis found that more than 70% of households dispose of waste through open dumping often directly into drains, vacant lots, conservation areas or flood-prone areas because of irregular collection services and lack of disposal points. During the Asego consultation, residents described how garbage piles up near Makongeni Market (Zone 5.41), around the quarry area (Zone 8.6) and along residential access roads, where it is later washed into drainage channels during rains, blocking flow and worsening floods. Without a sewer network, waste from pit latrines and greywater also mixes with surface runoff, exposing families—especially women and children—to high risks of cholera, typhoid, and other waterborne diseases.

To address this, the Plan prioritizes localized, decentralized wastewater and solid waste management systems that respond to Makongeni's dense settlement pattern and frequent flooding. For wastewater, bi-digesters and small-scale biofiltration pits will be installed alongside communal sanitation blocks in flood-prone residential zones. These systems will treat wastewater safely at the source while generating biogas for cooking or lighting, offering both environmental and economic benefits. The initiative will be implemented with support from the County Water and Sanitation Department and local artisans, ensuring adaptability and community ownership.

On solid waste, the Plan introduces a circular economy model to reduce dumping and create green jobs.

Building on the existing efforts of youth and women's groups who already collect or reuse waste informally, pilot projects will establish waste-to-value micro-enterprises:

- Plastic recycling hubs near the market (Zone 5.41)
- Composting units for organic waste from households and food vendors, to supply manure for urban gardens
- Biogas production using organic waste from market and drainage cleanup operations

These initiatives will be connected to the county's formal waste collection system, allowing for coordinated transport and disposal while maintaining community-led primary collection.

Alongside these infrastructural interventions, the Plan emphasizes community awareness and behavior change, promoting waste separation at household level, routine cleanup drives, and penalties for illegal dumping. Schools and churches will serve as demonstration sites for waste segregation and composting.

Together, these actions will transform Makongeni's waste crisis into an opportunity for climate-resilient urban management reducing flooding, improving sanitation, and creating sustainable livelihoods for residents. The integration of bio-digesters, recycling enterprises, and community education ensures that Makongeni's waste management system evolves from a reactive model to a circular, inclusive, and self-sustaining urban ecosystem.

5.2 Energy and Renewable Solutions

5.2.1 Solar Energy Applications

In Makongeni, energy access remains unreliable and unevenly distributed, posing a major challenge to water, health, and livelihood systems. The situational analysis highlighted frequent blackouts and power interruptions, especially during heavy rains, when erosion and flooding often damage electrical lines and transformers. These outages disrupt operations at communal water kiosks, health centres, and small businesses. During the Makongeni community consultation, residents reported that prolonged power cuts during floods make it impossible to pump water from HOMAWASCO lines, forcing families to rely on unsafe surface water from the lake or unprotected wells. Such conditions not only increase exposure to waterborne diseases like cholera and typhoid but also inflate household costs, as many must purchase water from private vendors at high prices.

To strengthen resilience and ensure continuous access to essential services, the Plan proposes installing solar-powered pumping systems at key water kiosks and public institutions, including Makongeni Health Centre and Got Rabuor Primary School. Solar pumps will

guarantee an uninterrupted clean water supply during power outages and climate-related disruptions, while significantly reducing dependence on grid electricity. By lowering energy costs, this intervention will help stabilize water prices, improving affordability for low-income households and particularly benefiting women traders and caregivers, who shoulder the daily responsibility for water collection and household management.

Complementing this, the Plan prioritizes solar street lighting along flood-prone access roads, public spaces, and routes connecting Makongeni Market, schools and residential areas. These areas are often unsafe at night, especially during floods, when unlit paths and standing water increase risks of accidents and insecurity. Installing reliable, solar-powered streetlights will enhance public safety, mobility, and emergency response capacity, enabling community disaster committees to coordinate evacuation or relief activities more effectively after dark.

In the longer term, the transition to renewable and decentralized solar energy systems will support Makongeni's shift toward low-carbon, climate-resilient infrastructure. It aligns with the County's clean energy and climate adaptation priorities by coupling resilience with social benefits—safer public spaces, uninterrupted water and health services, and reduced dependence on costly, unreliable grid power. Together, these interventions will strengthen both climate and energy security, ensuring that Makongeni's essential services remain operational even under extreme weather conditions.

5.2.2 Biogas and Waste-to-Energy Initiatives

In Makongeni, organic waste accumulation has become one of the settlement's most persistent sanitation and environmental challenges. The situational analysis revealed that poor waste collection systems have led to widespread dumping of garbage into open drains, road reserves, and flood paths, especially around Makongeni market and adjacent residential areas. During heavy rains, this waste is swept into drainage channels, causing severe blockages that intensify flooding and mix solid waste with sewage from overflowing pit latrines. Residents, particularly women traders operating near the market, noted that these conditions worsen during the rainy season, when stagnant, contaminated floodwaters limit access to homes, schools, and businesses.

At the same time, the majority of Makongeni households still depend on charcoal and firewood for cooking, which are both costly and harmful to health due to indoor smoke exposure. This overreliance on biomass fuels also contributes to deforestation in surrounding areas

and increases household vulnerability to rising fuel prices.

To address both the waste and energy challenges simultaneously, the Plan proposes the introduction of community-scale biogas digesters that can transform organic waste into clean, renewable cooking gas. Pilot digesters will be installed in high-waste zones such as Makongeni Market and in communal sanitation facilities in, where waste generation and flood risk are greatest. These systems will treat waste safely at the source, producing biogas for cooking and lighting while reducing methane emissions from uncontrolled decomposition. The residue – a nutrient-rich slurry – will be used as organic fertilizer for household and school kitchen gardens in nearby open spaces), promoting small-scale food production.

Beyond household energy benefits, the Plan emphasizes the development of waste-to-energy micro-enterprises managed by youth and women’s groups, who already play a major role in informal waste collection. Through technical training and micro-financing, these groups will operate the biogas units, sell surplus gas to households, and market organic slurry to local farmers and gardeners. This approach will strengthen livelihoods, encourage waste segregation at the source, and formalize community roles in maintaining sanitation and energy infrastructure.

By linking the biogas initiative with ongoing WASH improvements—such as communal sanitation blocks and decentralized wastewater systems—Makongeni will achieve multiple co-benefits: cleaner waste management, safer sanitation, affordable clean cooking energy, and reduced flood risk. Over time, expanding biogas systems will contribute to Makongeni’s broader transition toward renewable, decentralized energy, complementing the settlement’s solar initiatives and embedding climate resilience in everyday life.

5.2.3 Energy-Efficient WASH Infrastructure

In Makongeni, the water, sanitation, and hygiene (WASH) sector is one of the most energy-dependent and climate-vulnerable systems. The situational analysis highlighted frequent blackouts and erosion around electrical lines and transformers, which interrupt essential services such as water pumping, sanitation, and drainage. During the Makongeni community consultation, residents emphasized that these power failures are particularly severe during the rainy season, when flooding often damages transformers and access roads, leaving households without water for days. When pumping stations and kiosks lose power, families are forced to fetch unsafe water from Lake Victoria or shallow wells, increasing exposure to waterborne diseases such as cholera and diarrhea.

To address this, the Plan proposes upgrading communal water kiosks and sanitation facilities with energy-efficient and renewable systems. Key interventions include installing solar-powered boreholes and low-energy water treatment technologies at existing HOMAWASCO-managed sites and public facilities. These upgrades will ensure a reliable supply of safe water even during blackouts or floods, while reducing the operational costs currently incurred by water operators. By generating clean energy on-site, HOMAWASCO and community water committees can maintain service continuity without relying on costly fuel generators, making water provision more affordable and sustainable.

Complementing these power upgrades, the Plan calls for retrofitting communal sanitation blocks with low-energy lighting, natural ventilation, and water-efficient fixtures. Integrating solar lighting around toilets and bathing areas, particularly in dense residential clusters and public-purpose zones, will make these spaces safer for women and children who often face insecurity at night. The use of energy-efficient pumps, compact treatment units, and rainwater harvesting systems will also reduce both energy and water waste, improving the reliability and affordability of sanitation services.

These energy-efficiency measures are closely aligned with Makongeni’s adaptation priorities, which focus on maintaining essential services during floods, improving health and safety for vulnerable groups, and reducing dependence on grid electricity. Over time, these upgrades will drive a transition toward low-carbon, climate-smart WASH infrastructure, ensuring that clean water and sanitation remain accessible, reliable, and affordable even during extreme weather events. By combining renewable energy, efficient technologies, and community management, Makongeni can build a self-sustaining WASH system that enhances both climate resilience and long-term service quality.

5.2.4 Promotion of Clean Cooking Technologies

In Makongeni, most households still rely on charcoal and firewood for daily cooking, a practice that not only contributes to deforestation in the surrounding Homa Bay landscape but also exposes families, especially women and children, to harmful indoor air pollution. The situational analysis confirmed that traditional fuels remain dominant across the settlement due to limited access to affordable alternatives. During the Asego community consultation, residents, particularly women, reported that charcoal prices have risen sharply, consuming a significant share of household income while causing smoke-related health problems such as coughing and respiratory infections among children.

To address these challenges, the Plan prioritizes the promotion of clean and affordable cooking technologies as a key pillar of Makongeni’s energy and health resilience strategy. Pilot programs will introduce improved biomass stoves, ethanol stoves, and household-level biogas units in dense residential zones and among rental housing blocks where reliance on charcoal is highest. The initiative will focus on women’s groups and youth cooperatives, providing micro-finance schemes, subsidies, and training to make cleaner stoves and fuels more accessible. These interventions will directly reduce indoor air pollution, lower household fuel costs, and create safer and healthier living conditions, particularly for women and children who spend long hours in poorly ventilated kitchens.

Beyond immediate health and economic benefits, this transition also opens up new livelihood opportunities. The Plan supports the creation of women- and youth-led cooperatives to distribute, maintain, and even locally assemble improved cookstoves within the settlement. Training and small business grants will be provided to enable local entrepreneurs to operate as last-mile distributors, ensuring sustained adoption and maintenance.

This approach complements Makongeni’s broader waste-to-energy initiatives (see Section 5.2.2), which convert organic waste from Makongeni Market (Zone 5.41) into biogas for cooking. Together, these efforts form a circular, low-carbon energy system, turning waste into fuel and aligning Makongeni with the County’s clean energy transition agenda.

Over time, the widespread uptake of clean cooking technologies will improve public health, cut emissions, and reduce dependence on unsustainable fuels. By centering women and youth as the main drivers of this transition, Makongeni’s clean cooking program not only enhances energy security but also promotes gender equity, green employment, and long-term climate resilience within the community.

5.3 Climate-Resilient housing Interventions

5.3.1 Building Practices

In Makongeni, housing conditions remain highly vulnerable to climate shocks, with the majority of structures constructed from corrugated iron sheets (*mabati*) and mud or earthen walls that offer little protection against flooding, extreme heat, or heavy winds. The situational analysis found that most rental units are semi-permanent and overcrowded, with poor ventilation and weak foundations that deteriorate rapidly under harsh weather conditions. During the Asego community consultation, residents reported that homes

become unbearably hot during dry seasons, while floods often wash away foundations or collapse walls made from unstable materials. Many families are forced to spend nights outdoors during heatwaves, and floods regularly displace tenants living in low-lying areas.

To reduce these risks, the Plan promotes the adoption of climate-resilient and affordable building practices across Makongeni. This includes encouraging the use of stabilized soil blocks (SSBs), compressed interlocking bricks, and cool roofing materials that provide better insulation, durability, and resistance to flood damage. These materials are cost-effective and locally available, making them practical for both landlords and tenants. In the short term, demonstration housing projects will be implemented in partnership with local artisans, youth groups, and technical institutions, showcasing resilient construction methods and design options that can be scaled across the settlement.

The Plan also emphasizes incremental retrofitting of existing housing stock to improve safety and comfort for vulnerable households. Simple, affordable improvements, such as raising floor levels, reinforcing wall bases with stone, and replacing rusted *mabati* roofing with reflective or insulated sheets, can significantly reduce exposure to floods and heat stress. These upgrades will be paired with skills development programs for local masons, carpenters, and artisans, prioritizing youth and women to create employment opportunities while building technical capacity within the community.

Importantly, all housing improvements will be coordinated with drainage and land-use planning, ensuring that new or retrofitted structures do not block natural runoff or encroach on riparian areas. This integration between construction and spatial planning aligns with the Makongeni Local Physical and Land Use Development Plan (LPLUDP), which designates high-risk flood zones for infrastructure and green space rather than residential development.

By rooting resilient construction in local materials, skills, and community labor markets, Makongeni can gradually transition from fragile, temporary housing toward safe, durable, and climate-adapted homes. This shift not only strengthens household resilience to floods and heat but also promotes local livelihoods, health, and environmental sustainability.

5.3.2 Regulatory Frameworks

In Makongeni, the lack of clear and enforceable building standards has led to a persistent cycle of unsafe, substandard housing, particularly in the densely populated rental zones. The situational analysis identified widespread use of poor-quality materials—such as thin iron sheets and unreinforced mud walls—in

flood-prone areas where drainage is inadequate and land tenure remains informal. As a result, many residents live in structures that offer minimal protection from floods, wind, and heat, while landlords have little incentive to invest in durable improvements due to unclear development controls and weak enforcement mechanisms. During the Asego community consultation, participants emphasized that unregulated construction not only exposes families to danger but also worsens overcrowding and blocks natural drainage channels.

To reverse this trend, the Plan calls for the development and enforcement of climate-sensitive building regulations tailored to Makongeni's informal housing context. These regulations will set minimum standards for floor elevation, wall strength, ventilation, and material quality, while also promoting incremental retrofitting of existing homes rather than forced demolition. The goal is to create a supportive, enabling framework that guides landlords and tenants toward safer, more climate-resilient construction practices, rather than penalizing informal builders. Through technical support, training, and phased compliance, households will be encouraged to align their upgrades with safety and environmental standards.

This approach is directly reinforced by the zoning regulations proposed under the Local Physical and Land Use Development Plan (LPLUDP), which are directly linked to the broader People's Adaptation Plan which integrates climate adaptation priorities into zoning regulations. Under the plan, high-risk flood zones—currently occupied by informal housing will be earmarked for structured redevelopment into planned, multi-storey social housing blocks. The BETA policy on social and affordable housing provides an opportunity for public-private partnerships to deliver these upgraded units, combining tenure security with climate resilience.

By linking zoning reforms, building standards, and adaptation measures, Makongeni can gradually transform its most vulnerable residential areas into safe, organized, and flood-resilient neighbourhoods. This integrated strategy ensures that informal settlements are not excluded from development but are instead supported through a framework that promotes dignified living, structural safety, and environmental sustainability. In doing so, the Plan positions Makongeni as a model for climate-smart urban renewal—where secure tenure, resilient housing, and inclusive growth converge to reduce risk and enhance quality of life.

5.3.3 Access to Secure Land Tenure

In Makongeni, land tenure is relatively more secure than in many informal settlements across Kenya. The

situational analysis found that over 89% of landowners possess some form of legal or semi-formal ownership documentation, while the majority of residents are tenants renting from private landlords. This dynamic—of secure ownership but widespread tenancy—defines the settlement's housing structure. As a result, large-scale evictions or forced displacements are not a significant concern, unlike in other informal settlements where land disputes are common. However, this pattern has created a different kind of vulnerability: landlords have limited incentives to invest in durable, climate-resilient housing, often prioritizing short-term rental income over long-term improvements. Meanwhile, tenants, who make up nearly three-quarters of Makongeni's residents, lack both bargaining power and stability to influence upgrades, leaving them exposed to unsafe and deteriorating living conditions.

This situation presents an opportunity to leverage Makongeni's relative tenure security to promote investment in climate-resilient housing upgrades. The Plan therefore proposes coupling resilient building initiatives (see Section 5.3.1) with targeted incentive schemes for landlords who hold documented ownership. These incentives may include:

Subsidized access to resilient construction materials such as stabilized soil blocks, raised slab components, and cool roofing sheets.

Technical training programs for landlords and local builders on flood-resistant and energy-efficient construction techniques.

Conditional upgrading grants or low-interest credit tied to retrofitting rental units for safety, ventilation, and flood protection.

By directly linking tenure documentation with upgrade eligibility, the Plan encourages landlords to invest in permanent improvements without fear of losing their property or facing regulatory uncertainty. This approach also benefits tenants indirectly, ensuring that rental housing becomes safer, healthier, and better adapted to climate risks such as flooding and heat stress.

Over time, these measures will mobilize private capital toward public resilience goals, reducing dependence on donor or county funding. The outcome will be a gradual transformation of Makongeni's housing stock, from fragile and temporary structures into stable, climate-smart dwellings. Grounded in its comparatively strong tenure base, Makongeni has the foundation to lead a locally driven, market-supported model of urban resilience, where secure ownership becomes a driver of sustainable settlement upgrading rather than an obstacle to it.

5.4 Livelihood Diversification & Social Protection

5.4.1 Diversification of Income Sources

Makongeni's economy is heavily reliant on informal livelihoods such as petty trade, boda boda transport, fish vending, and casual labor. The situational analysis found that these activities, while vital for survival, are highly vulnerable to flooding, heat stress, and disrupted mobility during heavy rains. The Makongeni community consultation further highlighted that recurrent floods often destroy market goods, restrict transport, and cut off customers from trading areas—making diversification an urgent priority.

To build economic resilience, the Plan integrates livelihood diversification directly into Makongeni's land use and zoning framework. Flood-buffer zones and underutilized open spaces (particularly along Zone 8, the green corridor) will be repurposed for urban agriculture activities such as kitchen gardens, poultry units, and aquaponics systems. These climate-adapted enterprises will strengthen food security while creating income streams less affected by floods or market closures.

The Plan also proposes establishing micro-enterprise clusters around Makongeni Market (Zone 5. 41) and along the C19 commercial strip. These formalized spaces will accommodate small traders, artisans, recyclers, and fish processors, all operating in well-drained, serviced areas that reduce exposure to flood losses. Within these clusters, eco-enterprises—including plastic recycling, composting, and fish-smoking sheds with improved ventilation and drainage—will be supported through training and micro-financing programs.

By organizing livelihoods within designated commercial and green zones, the Plan ensures that economic activity aligns with infrastructure and environmental resilience. This structured approach reduces congestion, improves sanitation, and supports sustainable urban renewal. In doing so, Makongeni can transform its informal economy into a diverse, climate-resilient ecosystem that creates new opportunities for women and youth while strengthening household stability.

5.4.2 Strengthening Community Safety Nets

Makongeni's residents rely heavily on informal safety nets such as chamas, women's self-help groups, and youth savings associations to cope with financial and climate-related shocks. According to the situational analysis, over 40% of households depend on these

networks for emergency support and small loans. However, these systems operate without formal coordination or designated spaces, limiting their capacity to scale and respond effectively during disasters.

To strengthen these structures, the Plan embeds community safety nets within the zoning framework. Dedicated cooperative and community spaces will be allocated near Makongeni Market, the current women's centre and other key commercial hubs to serve as centres for savings groups, micro-credit schemes, and climate insurance initiatives. These hubs will provide a physical base where financial inclusion and social support systems can grow alongside livelihood activities.

Linking safety nets to climate adaptation ensures that financial resilience complements physical resilience. For example, women's chamas could co-manage savings products linked to waste-to-value enterprises or green corridor maintenance, while youth groups could operate eco-enterprises in Zone 8 and market recycling depots. This dual role—combining income generation with community stewardship—builds both economic and environmental stability.

By giving these groups structured space and formal recognition, the Plan turns Makongeni's culture of mutual aid into a core driver of resilience and inclusive growth. These community institutions will not only buffer households against shocks but also serve as co-implementers of adaptation actions, bridging social protection and sustainable development within the settlement.

5.4.3 Social Protection and Public Works

Recurrent flooding, poor drainage, and seasonal food insecurity place added pressure on Makongeni's low-income households, especially those dependent on informal work. To address these overlapping vulnerabilities, the Plan embeds social protection measures directly within the land use system through zoning-linked public works programs.

Under this framework, flood-buffer areas, green corridors (Zone 8), and drainage easements will be maintained through cash-for-work and food-for-work schemes, providing temporary income and food security during climate shocks. These programs will prioritize youth, women, and persons with disabilities, ensuring equitable participation in adaptation and settlement maintenance.

The Plan also introduces community stewardship agreements, where residents who participate in the maintenance of drains, bioswales, parks, and waste collection hubs receive county-supported stipends or

cooperative credits. This model expands on existing CBO-led clean-up activities, transforming them into a structured public works system tied to Makongeni's physical planning and resilience strategy.

By linking social protection with environmental upkeep, these programs ensure that essential adaptation measures—like drain clearance, vegetation planting, and floodplain restoration—are sustained over time while providing short-term employment. In the long run, this approach strengthens the functionality of public spaces, promotes community ownership of assets, and injects cash into the local economy.

Institutionalizing public works in the Homa Bay LPLUDP makes social protection a proactive tool for resilience, not just a safety net. It positions local labour and collective action as pillars of urban renewal, ensuring that climate adaptation directly supports livelihoods and long-term economic inclusion.

5.5 Green Infrastructure & Nature-based Solutions (NbS) Interventions – Makongeni Settlement

5.5.1 Ecosystem Services Enhancement

Makongeni's vulnerability to flooding, erosion, and rising heat stress is strongly linked to the loss of vegetation cover and encroachment of riparian zones near drainage paths and low-lying areas. The situational analysis identified degraded soils and limited tree cover as major factors amplifying flood impacts and surface heat across the settlement. During the Asego and Makongeni community consultation, residents emphasized the urgent need for tree planting and re-greening, particularly schools, and along the lake.

To address these environmental risks, the Plan introduces ecosystem-based interventions integrated into Makongeni's zoning framework. The Green Corridor (Zone 8) and Got Rabuor are designated as conservation and ecological buffer zones to reduce flood impacts and heat buildup. These areas will be rehabilitated through tree planting, grassing of drainage channels, and establishment of vegetated strips along major access routes such as the C19 road. Native species like bamboo, vetiver grass, and indigenous trees will stabilize soils, filter runoff before it reaches Lake Victoria, and provide shade and wind protection for nearby homes.

Beyond designated conservation zones, market and roadside greening will be implemented around introducing shaded pedestrian corridors and fruit trees that both cool the environment and create small income opportunities. In residential zones, multipurpose

woodlots and small community gardens will add food and energy co-benefits.

By embedding these measures in the zoning plan, the settlement transforms degraded or underutilized areas into multi-functional green assets that deliver ecological protection, public comfort, and community ownership. This approach situates environmental resilience at the heart of Makongeni's urban renewal, rather than treating it as an afterthought.

5.5.2 Nature-Based Infrastructure Development

While tree planting and soil stabilization form the ecological foundation, Makongeni also requires functional, hybrid infrastructure that combines engineered drainage with nature-based systems. The Green Corridor (Zone 8) provides an ideal site for developing bioswales, rain gardens, and infiltration trenches parallel to circulation routes. These vegetated systems will intercept stormwater directly from roads, slow runoff, and filter pollutants before discharge into Lake Victoria, reducing blockages and flood severity.

Along the C19 corridor roadside infiltration strips will manage runoff from paved surfaces, ensuring that markets remain accessible during heavy rains. This integration of green drainage within commercial and transport zones will improve both economic continuity and pedestrian safety.

These hybrid interventions will replace traditional, high-maintenance concrete channels with cost-effective, low-energy systems that are both functional and aesthetically beneficial. By embedding them in the LPLUDP, the settlement adopts a sustainable, long-term approach to flood management that strengthens climate resilience while enhancing public spaces.

5.5.3 Bioretention and Urban Cooling

Makongeni experiences combined stress from frequent floods and rising land surface temperatures, worsened by compacted soils, limited vegetation, and heat-absorbing mabati structures. To mitigate these overlapping risks, the Plan introduces a network of bioretention and cooling features across the settlement.

Beyond Green Corridor and Got Rabuor (Zone 8), vacant utility servitudes, drainage reserves, and small open pockets within residential areas will host multi-functional bioretention gardens. These shallow, planted depressions will capture runoff, allow infiltration, and cool the microclimate, while doubling as shaded community areas with benches or small kiosks.

The Plan also mandates climate-sensitive building and landscaping standards for new developments, requiring

courtyard-style housing clusters with rain gardens and permeable surfaces to absorb stormwater. Along the main routes to Makongeni Market linear bioswales and tree-lined walkways will improve drainage and provide shaded pedestrian routes for vendors and customers. Conservation edges and road reserves will be restored with tree belts and vegetated drains, creating a connected network of cooling corridors.

Collectively, these distributed green infrastructure elements will transform Makongeni's fragmented open spaces into a cohesive climate adaptation network, reducing flood peaks, moderating heat, and improving everyday comfort and liveability.

5.5.4 Community Co-Management of Green Assets

For long-term success, Makongeni's green infrastructure must be owned, maintained, and governed by the community. The zoning framework establishes public-use allocations in the Green Corridor (Zone 8), market buffer zones and along drainage easements forming the basis for community-led management structures.

The Plan proposes creating Green Asset Committees, composed of local CBOs, women's groups, and youth associations already active in waste collection and clean-up efforts. These committees will be responsible for tree planting, maintenance of bioswales and rain gardens, and routine cleaning of public green areas. Training and tools will be provided by the County Environment Department, while stipends or micro-grants will be channelled through public works and cooperative schemes (see Section 5.4.3).

This co-management model also links directly to livelihood creation. Youth groups maintaining the Green Corridor can receive small payments through county or donor-funded programs, while women's cooperatives can operate nurseries, composting initiatives, or landscaping services tied to these green spaces.

Embedding co-management within Makongeni's land use and adaptation framework ensures that public spaces remain functional, well-kept, and community-driven. It strengthens both environmental stewardship and social cohesion, making resilience not just a technical goal but a shared daily practice.

5.6 Mobility & Access Interventions

In Makongeni, movement and safety are deeply affected by poor road conditions, recurrent flooding, and lack of designated pathways, particularly around schools, markets, and health facilities. To address these

challenges, the Plan integrates mobility and access improvements directly into the zoning framework.

The Local Physical and Land Use Development Plan (LPLUDP) identifies circulation corridors, market access routes, and utility easements that will serve as structured spaces for non-motorized transport (NMT). Within these zones, the Plan proposes the construction of paved pedestrian walkways, cycle lanes, and organized boda boda stages, ensuring that residents can move safely and efficiently even during floods.

Particular attention will be given to roads linking residential areas with Makongeni Health Centre, and Market, and schools. These routes will incorporate solar street lighting, raised crossings, and shaded rest points, enhancing accessibility and security for women, children, and persons with disabilities.

The design of these corridors will follow universal access standards, integrating ramps, wide walkways, and tactile paving for inclusivity. Open spaces and utility reserves will double as emergency evacuation routes and relief staging areas during extreme weather events.

By embedding climate-resilient mobility directly into urban design, Makongeni ensures that road and transport upgrades are coordinated, inclusive, and multifunctional. This approach transforms movement networks into part of the settlement's adaptation system, improving safety, connectivity, and long-term resilience while supporting trade and everyday life.

5.7 Governance & Institutional Strengthening

In Makongeni, strengthening governance and institutional capacity is essential to ensure that the adaptation strategies identified in the Plan are effectively implemented and sustained over time. The situational analysis and Both the Makongeni and Asego community consultation both revealed that while residents possess strong traditions of collective organization through chamas, youth associations, women's groups, and community-based organizations these initiatives are often fragmented and lack formal support from county systems. Without structured coordination, promising local actions in waste management, water provision, and greening remain isolated and short-lived.

A second governance priority is the creation of clear accountability and coordination mechanisms between Makongeni's local structures and county-level frameworks, particularly the County Climate Change Action Plan (CCCAP) and the County Climate Change Fund (CCCF). These mechanisms will ensure that project planning, budgeting, and monitoring are participatory and transparent. The Plan recommends

quarterly public review meetings within Makongeni where project progress, and outcomes are shared openly, and residents provide feedback. This system of community-based monitoring and evaluation (M&E) will reduce risks of mismanagement and strengthen trust.

In addition, the Plan emphasizes the importance of aligning Makongeni's initiatives with national climate financing mechanisms, especially the Financing Locally Led Climate Action (FLLoCA) framework. Through FLLoCA, Makongeni can directly access earmarked resources for climate resilience, reducing dependence on unpredictable donor funding. Linking with this mechanism will also allow successful pilot projects—such as flood-resilient communal sanitation blocks, biogas energy systems, or green corridors—to be scaled

up across other informal settlements in Homa Bay County.

By connecting community governance, county coordination, and national financing, Makongeni can become a model for devolved climate action, demonstrating how grassroots planning can align with broader institutional systems for maximum impact. This governance structure will not only support implementation but also embed accountability, equity, and local ownership at the heart of the settlement's transformation.

6 INSTITUTIONAL FRAMEWORK & ROLES

The institutional framework for Makongeni’s People’s Adaptation Plan builds upon existing governance structures, ensuring that climate adaptation is implemented efficiently without creating new, resource-intensive institutions. As this Plan forms part of the Homa Bay Local Physical and Land Use Development Plan (LPLUDP), its implementation will rely on coordination between community groups, the Ward Climate Change Planning Committee (WCCPC), and county departments. The focus is on strengthening and linking existing mechanisms, improving accountability, and embedding climate resilience into ongoing development and service delivery processes.

6.1 Stakeholder Roles & Responsibilities

Community Groups

Makongeni’s community organizations—including chamas, CBOs, youth associations, market committees, and residents’ welfare groups—are the backbone of implementation. Their role will be to co-manage local adaptation actions, such as drainage maintenance, waste-to-value enterprises, urban greening, and early warning systems. These groups will also play a monitoring role through community scorecards and public review sessions, ensuring accountability. Capacity strengthening will be coordinated through the Ward Climate Change Planning Committee (WCCPC), allowing these grassroots structures to feed into formal county systems.

Ward Climate Change Planning Committee (WCCPC) Rather than creating a new committee, the existing WCCPC will serve as the primary coordination platform for all Makongeni climate actions. This committee already includes representatives from the county, ward administration, and community institutions. The Plan recommends strengthening it by:

Expanding representation to include Makongeni-specific actors (e.g., women’s groups, market vendors, and youth leaders).

Providing training on project management, monitoring, and reporting under the Financing Locally Led Climate Action (FLLoCA) framework.

Establishing a structured feedback system to ensure community priorities influence county-level planning and budget processes.

County Government

The Homa Bay County Government, through its departments—Water, Environment and Climate Change; Housing and Urban Development; Public Health; Roads and Transport; and Trade will lead policy guidance, technical support, and resource mobilization. The county will also integrate Makongeni’s adaptation priorities into the County Integrated Development Plan (CIDP) and the County Climate Change Action Plan (CCCAP), ensuring that local resilience investments are budgeted, regulated, and aligned with county strategies. Funding will be channelled primarily through the County Climate Change Fund (CCCF) and FLLoCA, ensuring sustainability and predictability of financing.

Non-Governmental Organizations (NGOs) & Development Partners

NGOs and development partners will complement county and community actions by providing technical assistance, innovation support, and catalytic financing. Their role will be to strengthen—not replace—local systems. This includes supporting pilot projects such as biogas waste systems, eco-toilet programs, and green corridor rehabilitation, with the WCCPC ensuring that all interventions align with community priorities.

Academia

Institutions such as Tom Mboya University and other research partners will contribute through data generation, innovation, and monitoring. They will help evaluate project outcomes, design training programs for youth and county staff, and support evidence-based decision-making on resilient building materials, NbS (Nature-based Solutions), and urban risk mapping.

Private Sector

Private sector actors—including hardware suppliers, renewable energy firms, and microfinance institutions—will be encouraged to invest in climate-resilient products and services. This includes affordable resilient building materials, clean cooking technologies, renewable energy systems, and recycling ventures. Working through public–private partnerships (PPPs), these actors will help create inclusive business models that stimulate livelihoods while embedding resilience into local markets.

6.2 Coordination Mechanisms

To promote coherence across actors, Makongeni's adaptation implementation and monitoring will be coordinated through the Ward Climate Change Planning Committee (WCCPC) thus strengthening existing platforms.

The WCCPC will facilitate:

Joint planning and coordination between community groups, county departments, NGOs, and private actors.

Quarterly review meetings within Makongeni to present progress updates, budgets, and outcomes to residents for feedback.

Reporting to the County Climate Change Directorate and the Homa Bay Municipal Planning Board, ensuring vertical accountability and policy integration.

Conflict resolution and grievance handling, to ensure inclusive and transparent participation.

This arrangement leverages existing statutory structures while embedding community participation and accountability into day-to-day coordination. The WCCPC will be the anchor for local implementation and learning, linking Makongeni directly with county and national climate action frameworks such as CCCAP, CCCF, and FLLoCA.

6.3 Integration with Development Planning & Budgeting

Adaptation in Makongeni will be fully mainstreamed into county and national planning frameworks, ensuring that

climate resilience is embedded in all future investments. This includes alignment with the LPLUDP, CIDP, and CCCAP, ensuring that local actions—such as drainage rehabilitation, resilient housing, and renewable energy—are part of the county's broader urban renewal strategy.

Budget alignment will be central to this process. Each adaptation activity identified in the Plan will be costed and reflected in the county's annual budget under relevant departments. Funding will be tracked through transparent mechanisms under the FLLoCA and CCCF, complemented by external resources from development partners and the private sector.

Monitoring and Evaluation (M&E) will be coordinated jointly by the WCCPC and County M&E units, using resilience indicators to track both physical and social outcomes. Examples include:

Number of flood-resilient sanitation blocks constructed.

Households adopting clean cooking or solar energy systems.

Reduction in waterborne disease cases during floods.

Jobs created through green infrastructure and public works programs.

By grounding monitoring and accountability in existing governance and budgeting systems, the Plan ensures that adaptation in Makongeni is institutionally owned, financially sustainable, and community-driven. Strengthening the WCCPC as the hub for coordination, oversight, and reporting ensures that implementation remains efficient, transparent, and firmly connected to both community priorities and county development goals.

7 MONITORING, EVALUATION, AND LEARNING (MEL)

The Monitoring, Evaluation, and Learning (MEL) framework for the Makongeni People’s Adaptation Plan ensures that implementation remains transparent, data-driven, and responsive to both technical outcomes and community priorities. This framework builds on the Makongeni Situational Analysis, the Resilient Community Risk Assessment (RCRA), the Asego and Makongeni community consultations, and the zoning regulations, linking adaptation progress directly to the realities on the ground. The MEL system is not only about tracking outputs but also about learning and adapting—ensuring that each phase of implementation strengthens local capacity, accountability, and climate resilience.

7.1 Community-Defined Indicators

Community engagement during the RCRA validation workshops and Asego consultations made it clear that resilience in Makongeni extends beyond physical infrastructure to include health, safety, dignity, and livelihoods. To capture these dimensions, the Plan promotes co-development of indicators between technical teams and community groups through participatory sessions facilitated by the Ward Climate Change Planning Committee (WCCPC).

Inclusive Indicators will be developed collaboratively with women’s groups, youth associations, persons with disabilities (PWDs), market vendors, and tenants’ representatives, ensuring that all voices—especially those from vulnerable groups—shape what success looks like.

Context-Specific Metrics. Examples of proposed indicators include:

- Percentage of households with access to climate-resilient water and sanitation services.
- Reduction in the number and severity of flood events disrupting access to Makongeni Market, schools, and health centres.
- Number of housing units upgraded or constructed using resilient materials such as stabilized soil blocks or raised slabs.
- Percentage increase in households adopting clean cooking or solar energy systems.

- Community perception of safety and dignity in public spaces (measured through community barazas and focus groups).
- Equity metrics tracking participation and benefit access for female-headed households, PWDs, tenants, and youth, ensuring inclusivity in project outcomes.

These indicators will be verified annually through participatory evaluation sessions and community validation meetings organized under the WCCPC.

7.2 MEL Tools & Methodologies

Monitoring in Makongeni will combine quantitative technical assessments with qualitative community-based monitoring, allowing both data and lived experience to inform decision-making.

Data Collection Tools

- Household surveys, building on the 2025 baseline data, to track access to water, housing, and waste management services.
- Participatory flood mapping, regularly updated by youth monitors and residents in hotspot areas.
- Community scorecards, developed by CBOs, to assess service quality in WASH, waste management, and drainage.
- GIS-based dashboards maintained by the County’s Climate Change Directorate to visualize progress on housing, infrastructure, and green assets.

Mixed-Method Approaches

- Quantitative surveys on access to resilient infrastructure and livelihood diversification.
- Key informant interviews with chiefs, ward officers, market leaders, and HOMAWASCO representatives.
- Community storytelling sessions to capture intangible outcomes—such as reduced stress during floods or increased trust in institutions.

Technology Integration

Simple mobile-based reporting tools will be piloted for residents to record blocked drains, flood events, or service interruptions in real time. These data points will feed directly into the Ward Climate Change Platform, improving responsiveness.

Capacity Building

Local youth and CBO members will be trained as community climate monitors, equipped with basic data collection and mapping skills. This approach ensures that monitoring remains participatory, inclusive, and community-owned.

7.3 Feedback Loops & Adaptive Management

The MEL framework prioritizes learning and adaptive management over compliance reporting. Information gathered through monitoring will guide real-time adjustments to project designs, budgets, and priorities.

Real-Time Feedback; Community monitors will report progress and challenges to the Ward Climate Change Planning Committee (WCCPC), which will convene quarterly public review meetings in Makongeni. Findings will be shared openly in community barazas and market forums to maintain transparency and trust.

Learning from Implementation; Lessons from early pilots—such as bioswales, flood-resilient sanitation [Table 7 Monitoring and Evaluation](#)

blocks, and biogas systems—will be documented by the County Climate Change Directorate and partners. These findings will shape design improvements and inform future project phases.

Adaptive Plan Revision; MEL results will be presented annually to the WCCPC and relevant county departments, where priorities can be revised, funding reallocated, and standards refined. For instance, if drainage systems underperform, materials and slope designs will be updated before scaling.

Stakeholder Collaboration; Evaluations will bring together community groups, county officials, NGOs, academia, and private sector actors, ensuring that technical expertise complements community experience. This inclusive process strengthens accountability while embedding learning into governance.

By integrating MEL within existing structures especially the Ward Climate Change Planning Committee, Makongeni ensures that monitoring is locally led, transparent, and continuous. The framework turns adaptation into an evolving process of learning and improvement, where data, dialogue, and community participation drive decision-making. In this way, the Plan becomes not just a document for action but a living tool for reflection, accountability, and adaptive resilience.

Sector / Theme	Indicator	Baseline (2025)	Target (by 2030)	Source of Verification
WASH & Drainage	% of households accessing safe, climate-resilient water sources (solar kiosks, rainwater harvesting, public standpipes).	Fewer than 40% of households rely on safe kiosks; majority depend on private vendors or shallow wells, with intermittent HOMAWASCO supply.	80% of households have reliable access to clean, affordable water via solar kiosks, standpipes, or harvested rainwater.	Household survey (2025 baseline, 2028 mid-term, 2030 endline); CBO scorecards; HOMAWASCO records.
	Number of functional, flood-resilient communal sanitation blocks serving residential clusters.	Over 89% of households use pit latrines, many flood-prone and unhygienic.	10 upgraded communal sanitation facilities constructed or rehabilitated with raised slabs, sealed pits, or eco-toilet systems in high-density zones	County Health Department reports; community mapping; WCCPC monitoring.

	Number of drainage corridors rehabilitated with grey/green hybrid systems (lined channels, bioswales, retention basins).	Only 2 functional swales, frequently blocked by waste.	5 key corridors rehabilitated, including those near the market and health centre, using green-grey NbS designs.	GIS mapping; field verification; Municipal Engineering Department reports.
Housing	% of new or retrofitted housing using resilient materials (stabilized soil blocks, raised slabs, cool roofs).	Less than 10% of housing incorporates resilient materials; most structures are iron-sheet units prone to heat and erosion.	40% of new or upgraded rental units adopt climate-resilient materials and design by 2030.	Building approval data; landlord surveys; participatory MEL sessions.
	Community perception of safety and comfort in housing (resistance to heat, floods, and erosion).	Recurrent complaints of overheating and structural damage in flood-prone areas.	≥70% of residents report improved comfort, ventilation, and safety through surveys and community dialogues.	Household focus groups; CBO survey reports; MEL validation meetings.
Livelihoods & Markets	Number of active micro-enterprise clusters formalized at or Makongeni Market.	Informal market structure, poor drainage, frequent stock losses during floods.	Three organized clusters operating in waste-to-value recycling, fish processing, and poultry/agriculture value addition.	Market association records; County Trade Department reports; CBO monitoring.
	% of households with diversified income sources (≥2 livelihoods).	Majority depend on a single income source—petty trade or casual labor—highly vulnerable to climate shocks.	60% of households engaged in at least two income-generating activities (e.g., trade + urban agriculture or eco-enterprise).	Household surveys; chama savings records; livelihood tracking through WCCPC reports.
Green Infrastructure (NbS)	Total area of green buffers restored (tree belts, bioswales, riparian vegetation, bioretention systems).	Tree cover below 15%; riparian edges degraded due to waste dumping and erosion.	≥5 hectares restored under the Green Corridor (Zone 8) and community park (Zone 3.1).	GIS mapping; drone photo evidence; County Environment Dept. reports.
	Number of functional multi-use green	None functional; park space underutilized.	Three functional spaces established—Children’s	Site inspections; Municipal Parks

	spaces (parks, corridors, retention zones).		Park (3.1), Green Corridor (8), and market buffer zone (5.1).	Department reports; community MEL meetings.
Governance & Participation	Frequency and functionality of Ward Climate Change Planning Committee (WCCPC) meetings focused on Makongeni.	Ward-level coordination exists but meetings irregular; limited documentation.	≥4 documented meetings annually, linked to county reporting and FLLoCA updates.	WCCPC minutes; community baraza records; County Climate Change Directorate reports.
	% of women, youth, and PWDs participating in adaptation planning, monitoring, and review.	Participation limited and fragmented across projects.	At least 50% representation in all MEL and planning activities, including quarterly review forums.	Attendance lists; gender and inclusion audits; NGO partner reports.
	Number of adaptation projects accessing devolved climate finance (CCCF/FLLoCA).	0 projects funded specifically through devolved climate mechanisms.	At least 5 Makongeni initiatives financed under CCCF or FLLoCA (e.g., drainage, WASH, housing, green infrastructure).	County Treasury records; project audit reports; FLLoCA tracking dashboard.

8 FINANCING THE ADAPTATION PLAN

This section lays out the principles and strategies for financing the adaptation plan, ensuring that the necessary resources are mobilized, allocated, and managed in a transparent and equitable manner. The financing strategy should be structured to address

immediate, short-term needs as well as long-term resilience goals. In developing this section, it is crucial to emphasize sustainable, inclusive financing practices while aligning local, county, and external resources with the overall climate adaptation objectives.

Table 8 Financial Adaptation Plan

Section	Focus Area	Proposals for Makongeni
8.1 Community Contributions	8.1.1 Identification of Local Contributions	<ul style="list-style-type: none"> • Strengthen existing chamas, youth savings groups, and women’s CBOs (relied on by over 40% of households) to mobilize pooled funds for small-scale adaptation such as sanitation and waste management. • Encourage in-kind contributions – labour, sand, ballast, and voluntary clean-up or drain desilting drives. • Engage market vendors, boda boda operators, and recyclers through small, voluntary levies earmarked for resilience initiatives (e.g., drain clearing, market drainage upgrades). • Mobilize landlords to reinvest part of rental income into flood-proofing, communal toilets, and drainage improvements.
	8.1.2 Mechanisms for Contribution	<ul style="list-style-type: none"> • Coordinate all local contributions under the Ward Climate Change Planning Committee (WCCPC) to avoid duplicating institutions. • Establish a Makongeni Community Climate Resilience Fund under the WCCPC, pooling community, county, and donor contributions. • Utilize mobile money and digital payment systems to ensure transparency and traceability. • Link community contributions to county matching grants through CCCF and FLLoCA.
	8.1.3 Equity & Inclusivity Considerations	<ul style="list-style-type: none"> • Safeguard low-income households, women, PWDs, and the elderly from financial overburden. • Promote labour-for-contribution schemes allowing those unable to pay cash to participate through voluntary work. • Ensure equitable distribution of benefits across all Makongeni zones to avoid concentration of investments near commercial areas only.

8.2 County Budget Alignment	8.2.1 Linking to County Development Plans	<ul style="list-style-type: none"> Align financing with Homa Bay CIDP III (2023–2027), County Climate Change Action Plan (2023–2027), and Climate Change Act (2022). Integrate the Makongeni People’s Adaptation Plan (PAP) within the Local Physical and Land Use Development Plan (LPLUDP) for resource targeting and planning continuity.
	8.2.2 Budgeting for Adaptation	<ul style="list-style-type: none"> Mainstream Makongeni PAP priorities – WASH, drainage, housing, waste management, and green infrastructure – into departmental budgets (Water, Health, Urban Development). Introduce recurrent budget lines for maintaining adaptation assets such as drains, sanitation blocks, and solar pumps. Include performance-based indicators in county budgets to measure progress in local adaptation outcomes.
	8.2.3 Advocacy for Climate Budgeting	<ul style="list-style-type: none"> Strengthen WCCPC’s capacity to advocate for climate budget tagging within Homa Bay’s financial framework. Prioritize Makongeni projects under the County Climate Change Fund (CCCF) by demonstrating effective community co-financing.
8.3 External Funding	8.3.1 Diversification of Funding Sources	<ul style="list-style-type: none"> Access devolved climate finance through FLLoCA and CCCF, while exploring grants from donor programs and climate adaptation funds. Partner with private sector actors (e.g., green construction firms, renewable energy suppliers, WASH enterprises) for co-financing of adaptation projects.
	8.3.2 Strategic Alignment with Donors	<ul style="list-style-type: none"> Align the Plan’s interventions with SDGs, Kenya’s NDCs, and the Sendai Framework, enhancing eligibility for global and national climate funds. Position Makongeni as a pilot settlement for community-led adaptation within Homa Bay Municipality.
	8.3.3 Co-Financing & Partnerships	<ul style="list-style-type: none"> Build partnerships with Tom Mboya University, local NGOs, and international adaptation initiatives for research, technical support, and scaling of proven solutions. Develop public–private partnerships (PPPs) for resilient housing, drainage, solar-powered water systems, and waste recycling enterprises. Encourage co-financing between county departments, HOMAWASCO, and CBOs for sustainability.
8.4 Tracking & Transparency Mechanisms	8.4.1 Clear Financial Reporting	<ul style="list-style-type: none"> The WCCPC, supported by county officers, will prepare annual public financial reports summarizing community contributions, grants, and expenditures. Reports will be displayed during community barazas, market meetings, and noticeboards.
	8.4.2 Use of Digital Tools for Monitoring	<ul style="list-style-type: none"> Create community dashboards (linked to the County Climate Directorate) to track project milestones and fund utilization.

		<ul style="list-style-type: none"> • Use WhatsApp/SMS alerts to share real-time updates on project progress, fund receipts, and outcomes.
	8.4.3 Independent Oversight Mechanisms	<ul style="list-style-type: none"> • Form a local audit subcommittee within the WCCPC composed of faith leaders, CBO representatives, and youth monitors to verify expenditures. • Conduct annual independent audits with participation from the County Internal Audit Office.
	8.4.4 Stakeholder Engagement in Monitoring	<ul style="list-style-type: none"> • Hold quarterly participatory review meetings bringing together community members, county officers, NGOs, and private sector partners. • Conduct participatory budgeting forums where residents help prioritize spending and track implementation. • Maintain transparent documentation (minutes, budget summaries, project maps) accessible to all stakeholders.

8.5 Coordination with Ongoing Programs and Projects

The implementation of the Makongeni People’s Adaptation Plan (PAP) will build on and coordinate with ongoing development programs and projects already addressing urban resilience, infrastructure upgrading, and community livelihoods in Homa Bay County. Aligning the Plan’s interventions with these initiatives ensures that resources are used efficiently, overlaps are avoided, and climate adaptation is fully integrated into existing institutional frameworks. Coordination will be led through the Ward Climate Change Planning Committee (WCCPC)—the statutory mechanism for planning and implementation of climate actions at the ward level—ensuring that Makongeni’s adaptation priorities are synchronized with county and national programs.

8.5.1 Kenya Informal Settlements Improvement Project (KISIP II)

The Kenya Informal Settlements Improvement Project Phase II (KISIP II)—implemented by the State Department for Housing and Urban Development in partnership with county governments—continues to be a major vehicle for upgrading informal settlements across Kenya. In Homa Bay County, KISIP II has supported activities such as settlement mapping, tenure regularization, and provision of basic infrastructure in select urban areas.

The Makongeni People’s Adaptation Plan complements KISIP II by incorporating climate resilience and adaptation elements into the upgrading process. Planned interventions such as drainage rehabilitation,

flood mitigation through green infrastructure, and the promotion of resilient and affordable building materials align directly with KISIP’s objectives of improving settlement conditions. Collaboration with KISIP II will help ensure that new or upgraded infrastructure in Makongeni is climate-proofed and that community structures previously established under KISIP continue to guide and benefit from ongoing investments.

8.5.2 Financing Locally Led Climate Action (FLLoCA)

The Financing Locally Led Climate Action (FLLoCA) program provides a national mechanism for devolving climate finance to the county and community levels. The Makongeni Plan is directly aligned with FLLoCA’s framework, which emphasizes the identification and financing of community-driven climate adaptation priorities through the County Climate Change Fund (CCCF).

By linking Makongeni’s locally identified needs—such as drainage rehabilitation, water kiosks, flood-resilient sanitation blocks, and tree planting—to FLLoCA’s funding structure, the settlement will be able to access predictable, performance-based grants for small- and medium-scale resilience projects. Through the leadership of the WCCPC, Makongeni will demonstrate how settlement-level adaptation planning can operationalize devolved climate finance, serving as a model for other informal settlements across Homa Bay Municipality and County.

8.5.3 County-Level and Partner Initiatives

The success of the Makongeni Plan also depends on coordination with existing county sectoral programs

that already contribute to climate adaptation and service delivery. The Department of Water, Sanitation, Environment, Energy, and Climate Change is currently implementing the Homa Bay County Climate Change Action Plan (2023–2027), which includes initiatives on water access improvement, environmental restoration, and renewable energy. Similarly, the Department of Lands, Physical Planning, Housing, and Urban Development oversees housing and infrastructure programs under the Local Physical and Land Use Development Plan (LPLUDP), offering entry points for sectoral development agenda, embedded within county investment plans and annual budgets.

8.5.4 Community-Led and Civil Society Initiatives

Makongeni benefits from a vibrant network of community organizations, women’s groups, youth associations, and savings cooperatives that are already engaged in environmental and social initiatives such as solid waste management, sanitation improvement, and urban greening. These groups represent an essential social infrastructure for adaptation implementation.

The Plan will strengthen and collaborate with these existing structures—many of which participated in the Asego community consultation and the Resilient Community Risk Assessment (RCRA)—to deliver localized actions such as bioswale maintenance, neighbourhood clean-ups, tree planting, and waste-to-energy pilots. By channelling resources and technical support through these groups, the Plan ensures that adaptation actions remain locally owned, context-specific, and socially inclusive, while also creating employment opportunities for youth and women.

8.5.5 Coordination Mechanism

To harmonize the various programs and projects operating within Makongeni, the Plan will strengthen the coordination role of the Ward Climate Change Planning

incorporating flood-resilient design standards, raised foundations, and stabilized soil block construction.

In addition, the Department of Trade and Industrialization continues to support market improvement and small business formalization around Makongeni Market providing an opportunity to integrate flood-proofed market stalls, waste-to-value enterprises, and drainage upgrades. By aligning the PAP’s priorities with these ongoing departmental initiatives, the Plan ensures that climate adaptation becomes a cross-

Committee (WCCPC) rather than creating new bodies. The WCCPC will serve as the central platform for linking community-level actions with county and national adaptation frameworks.

Specifically, the WCCPC will:

- Coordinate ongoing and new projects related to Makongeni’s adaptation priorities to ensure complementarity and avoid duplication.
- Facilitate data sharing, reporting, and joint monitoring among county departments, development partners, and research institutions such as Tom Mboya University.
- Ensure that all investments adhere to the Homa Bay County Climate Change Act (2022), the County Climate Change Action Plan (2023–2027), and the LPLUDP.
- Convene quarterly coordination and review meetings to assess progress, share lessons, and align future budgets and activities.

This integrated coordination mechanism positions the Makongeni People’s Adaptation Plan as a practical, collaborative framework that unites community-led resilience actions with county and national programs. By building on existing partnerships and governance structures, the Plan ensures that climate adaptation in Makongeni is coherent, sustainable, and institutionally embedded within the broader development agenda of Homa Bay Municipality.

9 CONCLUSION

The Makongeni People’s Adaptation Plan represents a major step toward inclusive, climate-responsive, and sustainable urban transformation in Homa Bay Municipality. Grounded in detailed evidence from the Makongeni Situational Analysis and the Homa Bay Rapid Climate Risk Assessment (RCRA) conducted by SUEZ Consulting, this Plan bridges scientific assessment with community-led planning to deliver practical, context-specific solutions.

It recognizes that building resilience in Makongeni is not only about addressing climate risks such as flooding, erosion, and heat stress, but also about reimagining the broader urban system—its infrastructure, housing, economy, and governance. By embedding adaptation measures within land use planning and service delivery, the PAP establishes a pathway toward improved living conditions, enhanced public health, and secure livelihoods for residents.

The Plan’s participatory approach, led by Akiba Mashinani Trust (AMT) in partnership with the Global Centre on Adaptation (GCA) and the County Government

of Homa Bay, ensures that community voices remain central throughout implementation. Through active involvement of local residents, county departments, and institutional partners, Makongeni’s transition to a more resilient and well-planned settlement will reflect both local priorities and policy commitments under the Homa Bay County Climate Change Act (2022) and Financing Locally Led Climate Action (FLLoCA) framework.

In the long term, this People’s Adaptation Plan serves as more than a response to climate threats—it is a living framework for equitable urban renewal. It demonstrates how informal settlements can evolve into inclusive, environmentally sustainable, and economically vibrant communities when planning is rooted in local knowledge, scientific evidence, and shared responsibility. The lessons and strategies developed in Makongeni will provide a replicable model for other urban settlements across Homa Bay County and Kenya, advancing the national agenda for resilient and people-centred urban development.

REFERENCES

County-Level Laws, Plans, and Policies

1. County Government of Homa Bay. (2021). Homa Bay County Climate Change Policy. Department of Environment.
2. County Government of Homa Bay. (2022). Homa Bay County Climate Change Act, No. 5 of 2022. County Assembly of Homa Bay.
3. County Government of Homa Bay. (2023). Homa Bay County Climate Change Action Plan (2023–2027). Department of Environment and Climate Change.
4. County Government of Homa Bay. (2023). Homa Bay County Integrated Development Plan (2023–2027). Department of Finance and Economic Planning.

National Laws and Policies

5. Government of Kenya. (2010). Constitution of Kenya, 2010. Nairobi: National Council for Law Reporting.
6. Government of Kenya. (2012). County Governments Act, No. 17 of 2012. Nairobi: National Council for Law Reporting.
7. Government of Kenya. (2011/2019). Urban Areas and Cities Act, No. 13 of 2011 (Amended 2019). Nairobi: National Council for Law Reporting.
8. Government of Kenya. (2019). Physical and Land Use Planning Act, No. 13 of 2019. Nairobi: National Council for Law Reporting.
9. Government of Kenya. (2016/2023). Climate Change Act, No. 11 of 2016 (Amended 2023). Nairobi: National Council for Law Reporting.
10. Government of Kenya. (1999/2015). Environmental Management and Coordination Act, No. 8 of 1999 (Amended 2015). Nairobi: National Environment Management Authority (NEMA).
11. Government of Kenya. (2009). National Land Policy (Sessional Paper No. 3 of 2009). Nairobi: Ministry of Lands.
12. Government of Kenya. (2016). National Urban Development Policy. Nairobi: Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works.
13. Government of Kenya. (2017). National Land Use Policy (Sessional Paper No. 1 of 2017). Nairobi: Ministry of Lands and Physical Planning.
14. Government of Kenya. (2015). National Spatial Plan 2015–2045. Nairobi: Ministry of Lands and Physical Planning.
15. Government of Kenya. (2021). National Water Policy. Nairobi: Ministry of Water, Sanitation and Irrigation.
16. Government of Kenya. (2023). National Climate Change Action Plan (2023–2027). Nairobi: Ministry of Environment, Climate Change and Forestry.
17. Government of Kenya. (2022). Bottom-Up Economic Transformation Agenda (BETA). Nairobi: Government Press.

Institutional Reports, Technical Contributions, and Development Partners

18. County Government of Homa Bay and Akiba Mashinani Trust. (2025). Community Enumeration and Informal Settlement Situational Analysis Report: Homa Bay Municipality. Nairobi: AMT.
19. Global Center on Adaptation. (2022). The Role of Participatory Mapping in Informal Settlement Resilience. Rotterdam: GCA Publications
20. Global Center on Adaptation. (2023). Building Climate Resilience in Urban Informal Settlements: A Guide for Locally Led Adaptation. Rotterdam: GCA.
21. Kenya National Bureau of Statistics. (2020). 2019 Kenya Population and Housing Census Volume I: Population by County and Sub-County. Nairobi: KNBS.
22. Kenya Institute for Public Policy Research and Analysis. (2018). Kenya Economic Report: Boosting Inclusive Growth for Sustainable Development. Nairobi: KIPPRA.
23. Kenya Meteorological Department. (2022). Historical Climate Data for Homa Bay Region. Nairobi: KMD.
24. National Drought Management Authority. (2023). Drought Early Warning Bulletins – Lake Region Counties. Nairobi: NDMA.
25. National Environment Management Authority. (2020). State of the Environment Report – Homa Bay County. Nairobi: NEMA.
26. Suez Consulting. (2025). Rapid Climate Risk Assessment (RCRA) for Informal Settlements in Homa Bay Municipality. Paris/Nairobi: Suez for GCA.

27. UN-Habitat. (2019). Planning for Climate Change: A Strategic, Values-Based Approach for Urban Planners. Nairobi: UN-Habitat.
28. UN-Habitat. (2021). Kenya Climate Resilient Urban Development Framework. Nairobi: UN- Habitat.
29. World Bank. (2016). Kenya Urbanization Review: Managing Urban Growth for Inclusive Development. Washington, D.C.: World Bank.
30. World Bank. (2019). Kenya Climate Risk Profile: Homa Bay County. Washington, D.C.: World Bank.

