REPUBLIC OF KENYA

COUNTY GOVERNMENT OF HOMA BAY

URBAN CLIMATE RISK PROFILE FOR HOMA BAY MUNICIPALITY 2025

MUNICIPALITY MANAGER CEO-HOMA BAY COUNTY
18 FEB 2026
HOMA-BAY MUNICIPALITY
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Foreword

Homa bay municipality sits in the basin of Lake Victoria basin which is highly populated zone with immense natural resources for sustaining livelihoods and supporting economic development .studies have shown that lake Victoria is highly vulnerable to the impacts of climate hazards and risks .A combination of demographic ,economic and social factors contribute to the vulnerability of the municipality to the impacts of climate hazards .The situation is further aggravated by its location right on the shores of the lake which bears the brunt of unsustainable environmentally harmful practices such as unsustainable harvesting of forest resources in areas near and away from the lake.

This participatory climate risk profile report is a manifestation of our commitment to full implementation of the climate change policies and legal framework.We recognize the crucial role of the climate risk profile in identifying climate hazards and risks ,mapping livelihood resources ,identifying existing community adaptation strategies ,documenting the community proposed climate adaptation investments options, future urban planning and setting priorities options for the municipality.

With the projected occurrence of the climate hazards and the associated demand for ore resources to cope with the impacts, we are committed to bridging the gap for financing the climate led actions.

Antipas Nyambok,

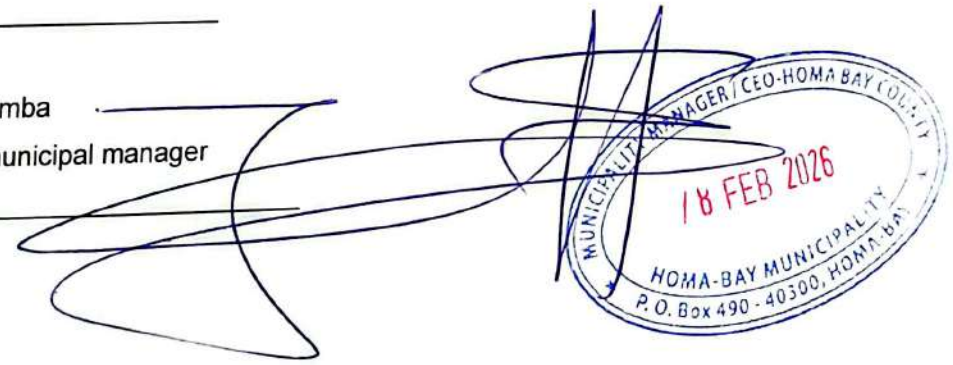
Homa Bay Municipal board, board chair.

Signature _____

Sigar.J. Agumba

Homa bay municipal manager

Signature _____



Executive Summary

Homa Bay Municipality Climate Risk Profile presents a high-level assessment of physical climate risks for the municipality, providing insight for decision -makers into the potential for increasing, expanding and emerging risks across space and time, and for different climate futures. The Rapid Climate Risk Assessment for Homa bay Municipality employed an interdisciplinary and participatory methodology combining spatial analysis, climate modelling and community engagement. The objective of the RCRA is to identify, evaluate, and prioritize the key climate -related hazards affecting Homa Bay Municipality, determine the urban elements and populations most at risk, and provide guidance for resilient urban planning and climate adaptation measures The assessment focuses on three climate hazards; pluvial flooding, drought and extreme heat.

Exposure, sensitivity, and adaptive capacity indicators is used to score vulnerability across the municipality. This approach reveals that while all settlements face climate risks ,their vulnerabilities differ based on topography ,infrastructure quality ,and social dynamics .The impacts of climate hazards and risks affects key productive sectors of Homa Bay Municipality including agriculture ,livestock productions,fisheries,trade and enterprise activities ,forestry ,water ,infrastructure and health systems.

The impacts of climate hazards and risks disproportionately affect the vulnerable and marginalized groups of people in the homa bay municipality such as; women, children ,the elderly .people living with disabilities .the youth and minority community. Communities have been implementing adaptation to the impacts of climate hazards and risks however they are still vulnerable to increased frequency and magnitude of climate hazards.

The future climate projections for the municipality presents a picture of increase intensity and frequency of climate hazards which calls for forward planning and mobilization of financial resources to increase the resilience of the people and communities to the anticipated future impacts. The communities identified adaptations that will build the resilience of key productive sectors.

Promotion of early warning systems, capacity building, expansion of existing water production capacity, increased investments in health sector, investment in sustainable waste management systems, investment in disaster risk management systems, investment in disaster risk management services and capacity building on smart agricultural practices.

Table 17. Summary risks for drought risk for Homa Bay Municipality

Category	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services					
Stormwater Drainage	Medium	Medium	High	High	High
Water & Wastewater Management	Medium	Medium	Medium	Medium	Medium
Solid Waste Management	Medium	High	High	High	High
Transport and Mobility	Medium	High	High	High	High
Energy	Medium	Medium	Medium	Medium	Medium
Economic Infrastructure	Medium	High	High	High	High
Social Infrastructure	High	High	High	High	High
Emergency Services	Medium	Medium	Medium	Medium	Medium
Populations					
Urban Residents	Medium	High	High	High	High
Informal Settlement Residents	High	High	High	High	High
Vulnerable and Marginalized Groups	High	High	High	High	High
Natural Assets					
Urban Green Infrastructure	Medium	Medium	Medium	Medium	Medium
Urban Blue Infrastructure	Medium	Medium	Medium	Medium	Medium
Peri-urban and Agricultural Systems	High	High	High	High	High

Table 18: Summary of pluvial flooding risks for Homa Bay Municipality.

Category	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services					
Stormwater Drainage	High	High	High	High	High
Water & Wastewater Management	High	High	High	High	High
Solid Waste Management	High	High	High	High	High
Transport and Mobility	High	High	High	High	High
Energy	Medium	Medium	Medium	Medium	Medium
Economic Infrastructure	High	High	High	High	High
Social Infrastructure	High	High	High	High	High
Emergency Services	High	High	High	High	High
Populations					
Urban Residents	High	High	High	High	High
Informal Settlement Residents	High	High	High	High	High
Vulnerable and Marginalized Groups	High	High	High	high	High
Natural Assets					
Urban Green Infrastructure	Medium	Low	Low	Low	Low
Urban Blue Infrastructure	High	High	High	High	High

Category	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Peri-urban and Agricultural Systems	High	High	High	High	High

Table 19: Summary of extreme heat risks for Homa Bay Municipality

Category	Risk Level				
	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services					
Stormwater Drainage	High	Medium	Medium	Medium	High
Solid Waste Management	Medium	Medium	Medium	Medium	High
Transport and Mobility	Medium	Medium	Medium	Medium	High
Energy	High	High	High	High	High
Economic Infrastructure	Medium	Medium	Medium	Medium	High
Social Infrastructure	High	High	High	High	High
Emergency Services	Medium	Medium	Medium	Medium	High
Populations					
Urban Residents	High	High	High	High	High
Informal Settlement Residents	High	High	High	High	High
Vulnerable and Marginalized Groups	High	High	High	High	High
Natural Assets					
Urban Green Infrastructure	Medium	Medium	Medium	Medium	Medium
Urban Blue Infrastructure	Medium	Medium	Medium	Medium	High
Peri-urban and Agricultural Systems	Medium	Medium	Medium	Medium	Medium

Table of Contents

List of Acronyms

AMT	Akiba Mashinani Trust
CBD	Central Business District
CBOs	Community Based Organizations.
CGHB	County Government of Homa Bay
CRA	Climate Risk Assessment.
FBOs	Food Business Operators.
GCA	Global Centre on Adaptation
GCA	Global Center on Adaptation.
HOMAWASCO	Homa Bay Water and Sewerage Company
KISIP	Kenya Informal Settlement Improvement Projects.
KMTC	Kenya Medical Training Center
NGOs	Non-Governmental Organizations
PPP	Public Private Partnership.
PALPLUP	People's Adaptation Local Physical and Land Use Development Plan
RCRA	Rapid climate risk assessment
REREC	Rural Electrification and Renewable Energy
SPEI	Standardized Precipitation Evo transpiration Index
SSP	Shared Socioeconomic Pathways
TVET	Technical and Vocational Education Training

List of Figures

List of Tables

1. Context

This section provide an overview of the background and context of Homa Bay Municipality, highlighting the objectives, the geographic information, governance structure, economic, social, land use and key stakeholders inclusiveness .Key challenges faced by the municipality and measures to address the challenges and leverage opportunities are outlined.

1.1. Objective

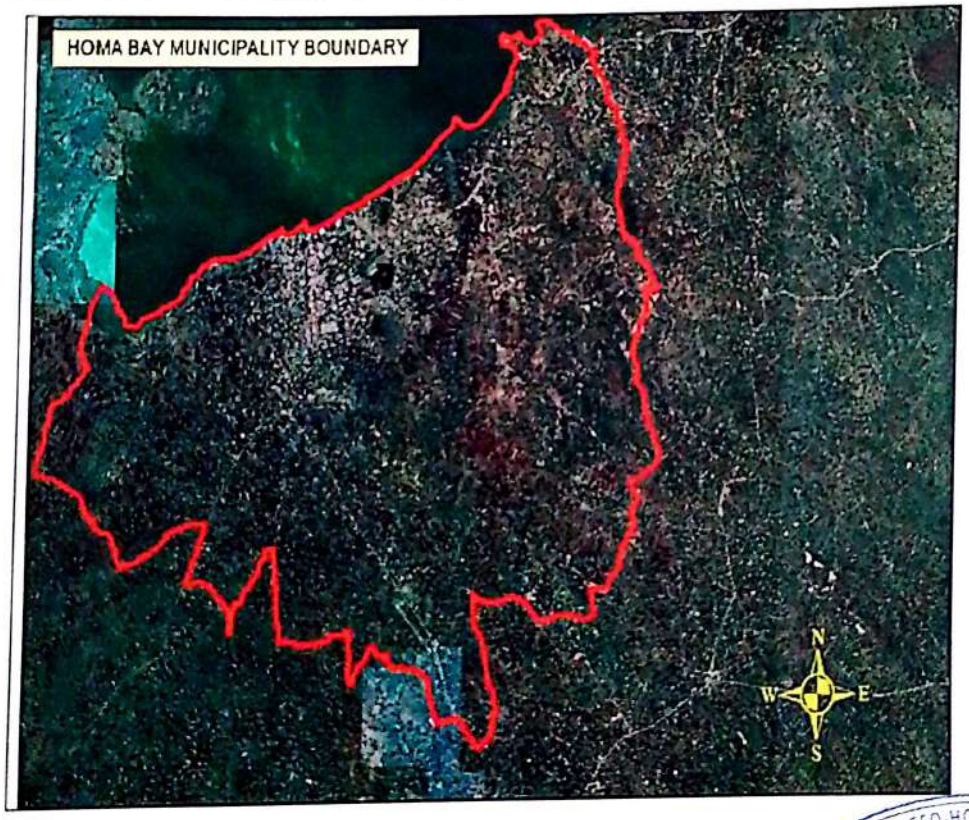
This Urban Climate Risk Profile aims to identify key climate hazards of Homa bay to inform urban planning, build resilience and guide targeted investments in adaptation.it enables the integration of climate risk data into development plans, prioritizing actions for vulnerable sectors like agriculture, water and infrastructure.

1.2.Urban Context

1.2.1. Geographic area.

Homa Bay municipality is situated on 0 29 20.08" S 34 24'16.22"E and 0 36'24.36"S 34 31'25.60"E within the South Western region of Kenya, where it boarders Republic of Uganda and Tanzania. It serves as the headquarters of Homa Bay County, and it is strategically located on the shores of Lake Victoria, the largest freshwater Lake in Victoria. The municipality covers an area of approximately 103.1 square kilometers and is known for its scenic beauty, cultural heritage, and strategic position for regional trade and connectivity.

Figure 1:Homa municipality boundary



SOURCE: Department of Lands, CGHB

1.2.2. Governance Structure.

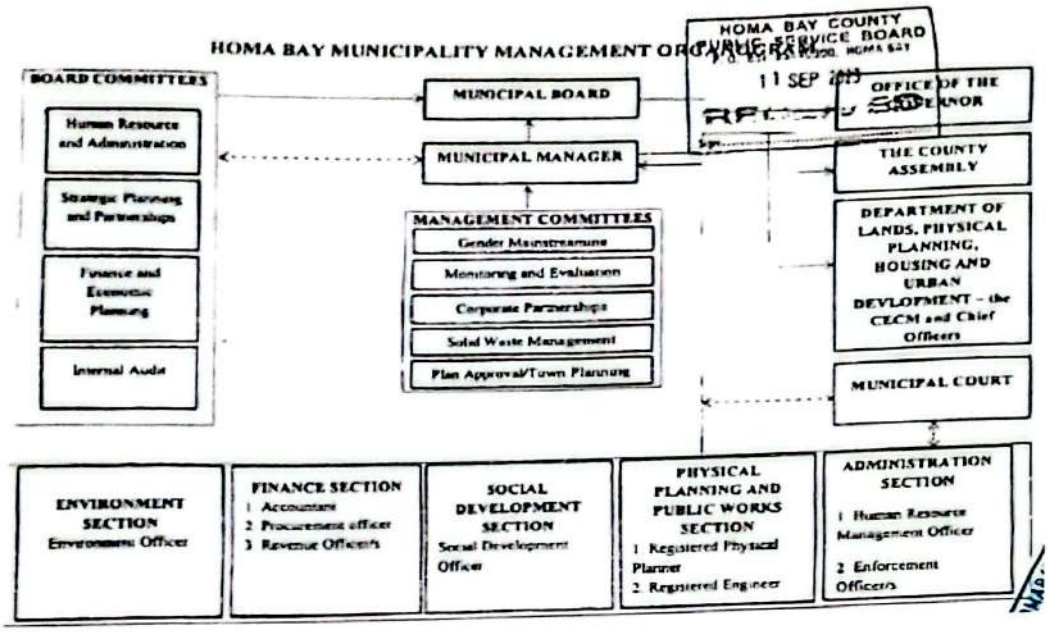
The institutional framework for implementation of Homa Bay Municipality functions is anchored in the Urban Areas and Cities Act No 13 of 2011 and the Homa Bay Municipality charter gazette on 27th March 2019.The Urban Areas and Cities Act 13 of 2011 stipulates the management of a city and a municipality shall be vested in the county government and administered on its behalf by. At the municipal level, strategic oversight is provided by the homa bay municipality board ,which is responsible for policy guidance ,approval of municipal plans and policies ,and oversight of service delivery in line with Urban Areas and Cities Act .The day to day administration and management of the municipality is undertaken by the municipal manager ,who serves as the accounting officer and coordinating officer and ensures implementation of approved plans and programmes.

The development of the Urban Climate Risk Profile and subsequently is a coordinated, multisectoral process involving both municipal and county -level technical departments .Key responsible units included the Environment ,Planning ,Public works ,Department of lands ,Housing ,Physical planning ,Housing and Urban Development ,Department of Water,Sanitation,Environment,Forestry and Climate Change .

1.2.2.1 Homa Bay Municipal Organogram.

The organizational structure below illustrates the institutional framework for the Homa Bay Municipality.

Fig 2: Organogram of the Municipality.



1.2.3. Socio-economic Context.

Socio economic activities within Homa Bay municipality are primarily driven by its location on Lake Victoria and its role as the administrative capital of Homa Bay County. The economy is heavily centered on fishing, agriculture, trade and emerging small-scale industrial processing.

Employment dynamics: The economy of Homa bay municipality is heavily reliant on informal and small-scale income generating activities.

According to 2025 enumeration,28.2% of the working population is self-employed mostly in small businesses on freelance services while another 11.0 % Engage in casual labour .Formal wage employment accounts just for 12.0% reflecting the municipality's limited capacity to absorb labor into structured section such as education ,health and administration.

Population Size, Distribution & Density Homa Bay Municipality's population is reflected through two key data sources: the Kenya National Bureau of Statistics (KNBS) 2019 census, which estimates a population of 82,414 within the municipal boundary, and the enumeration carried out as part of this planning process, by the County Government of Homa bay and AMT, in 2025. The latter provides a more granular and community level population estimate of 56,505 residents (adjusted from a 50,297 baseline with 89% household coverage). While the KNBS data offers official national comparability, the enumeration is more locally specific. The divergence in figures stems from methodological differences KNBS applied broad census sampling, while the enumeration data was gathered via direct household-level mapping and interviews across all sub locations. 41 Population distribution is uneven across the Municipality, reflecting the mixed urban, peri urban settlement structure.

Based on the study, Arujo emerges as the most populous sub location with 13,708 residents accounting for over 31% of the total surveyed population. Asego (8,738 residents) and Homa Bay Town (5,886 residents) follow as key urban centers. These areas, characterized by dense residential developments and active commercial zones, are also home to the largest informal settlements, such as Shaun Yako and Sofia. On the other hand, sub locations like Kalanya Kanyango, Kotieno, and Kothidha have significantly lower populations, ranging between 3,000–4,000 residents each, indicating more peri-urban or low-intensity land use patterns. The 2019 KNBS census data aligns with this pattern of spatial variation. It shows that sublocations such as Asego, Kobwola- Kogwang, Arujo, and Township-Homa Bay each cover more than 98% of their areas within the municipal boundary and collectively accommodate a significant share of the Municipality's 82,414 population. Homa Bay Town stands out with the highest population density at 2,263 persons/ km²—a clear indicator of its central role as the Municipality's administrative and economic hub. In contrast, low-density sublocations like Kanam, Kotieno, and Kowili (each with fewer than 2,000 people) highlight the rural–urban transition zones, which offer future opportunities for planned growth and urban expansion. Together, the data supports a nuanced understanding of population concentration and provides a strong basis for service delivery, infrastructure planning. Growth Trends Homa Bay Municipality continues to experience steady population growth, consistent with national and county-level demographic trends. As noted earlier, the 2019 KNBS census recorded a total of 82,414 residents within the current municipal boundary, while the current enumeration provides a population estimate of 56,505 residents. These two population baselines—though different in scope and methodology—offer a realistic range for understanding the Municipality's demographic trajectory. Using the estimate of 56,505 as a 2025 baseline, and applying an average annual growth rate of 2.2%, Homa Bay Municipality is projected to grow by approximately 24% over the next ten years, reaching around 70,032 residents by 2035. This projection reflects the steady momentum driven by urban migration, early-age fertility, and internal mobility within Homa Bay County. The same 45 growth rate applied to the 2019 KNBS figure of 82,414 yields a projection of approximately 102,008 residents by 2035. This represents a potential increase of nearly 20,000 people over the coming decade, reinforcing Homa Bay's position as one of the fastest-growing secondary towns in the region. These population dynamics are further influenced by the Municipality's youthful age structure and its role as a migration destination. The inflow of youth and working-age individuals from rural parts of the county and neighboring counties contributes to increased settlement density, particularly in sublocations like Arujo, Asego, and Homa Bay Town. These areas already report high concentrations of households and buildings, according to the AMT survey, and are likely to absorb the largest share of future growth. As such, population expansion will not only be numerical but spatial—manifesting in the densification of existing settlements and outward expansion into peri-urban zones. Despite having a fixed land area of 90.2 km², the Municipality's population-to-land ratio is set to increase significantly. High-density areas such as Homa Bay Town already exceed 2,200 persons/ km², while several others are approaching or surpassing the 1,000 persons/km² mark. These trends point to increasing demographic pressure on housing, land, and social infrastructure. If current growth rates continue, the projections based on both the current enumeration and by KNBS confirm that Homa Bay Municipality is on a clear upward population trajectory, with the total number of residents likely to fall between 70,000 and 102,000 by 2035.

Table 1: Population projections for Homa Bay Municipality

Year	2025Enumeration	KNBS 2019 Baseline 82,414
2025	56,505	82,414
2027	58,995	85,991
2029	61,586	89,732
2031	64,284	93,643
2033	67,097	97,732
2035	70,032	102,009

Table 2: Population projections for Homa Bay Municipality segregated by age groups.

Age groups	Male (2025)	Female (2025)	Male (2027)	Female (2027)	Male (2029)	Female (2029)	Male (2031)	Female (2031)	Male (2033)	Female (2033)	Male (2035)	Female (2035)
0-4	4,944	4,862	5,164	5,078	5,394	5,034	5,634	5,540	5,885	5,787	6,146	6,044
5-9	4,944	4,862	5,164	5,078	5,394	5,034	5,634	5,540	5,885	5,787	6,146	6,044
10-14	4,697	4,615	4,006	4,820	5,124	5,034	5,352	5,258	5,590	5,492	5,839	5,737
15-19	4,450	4,367	4,648	4,562	4,855	4,765	5,071	4,977	5,296	5,198	5,532	5429
20-24	4,120	4,038	4,304	4,217	4,495	4,405	4,695	4,601	4,904	4,806	5,122	5,029
25-29	3,708	3,626	3,873	3,787	4,045	3,955	4,225	4,131	4,413	4,315	4,610	4,507
30-34	3,296	3,214	3,443	3,357	3,596	3,506	3,756	3,662	3,923	3,825	4,097	3,995
35-39	2,637	2,554	2,754	2,668	2,877	2,787	3,005	2,911	3,138	3,040	3,278	3,175
40-44	1,977	1,895	2,065	1,979	2,157	2,067	2,253	2,159	2,354	2,255	2,458	2,356
45-49	1,483	1,401	1,549	1,463	1,618	1,528	1,690	1,596	1,765	1,667	1,844	1,741
50-54	988	906	1,032	946	1,078	988	1,126	1,032	1,177	1,078	1,229	1,126
55-59	659	576	688	602	719	629	751	657	784	686	819	717
60-64	412	412	430	430	449	449	469	469	490	490	512	512
65-69	247	247	258	258	269	269	281	281	294	294	307	307
70-74	164	164	172	172	179	179	187	187	196	196	204	204
75-79	82	82	86	86	89	89	93	93	98	98	102	102
80+	41	41	43	43	44	44	46	46	49	49	51	51

House income levels: Household incomes in the municipality reflect wide disparities and frequent precarity. More than four households (26.1%) have no regular income while another 12.9% survives on under Ksh 2000 per month. These income levels leaves families highly vulnerable to shocks from illnesses to food price fluctuations from seasonal jobs. Only about 14% of households report monthly incomes above Ksh 10000, limiting the capacity to invest in better housing, schooling or livelihoods.

Education and Employment Link: The data reveals a strong and consistent link between education levels and employment outcomes, Individuals without formal schooling experience the highest unemployment rate at 42%.

Interestingly TVET as emerged as a highly effective pathway among the residents.

Food Access and vulnerability: Food security across Homa bay municipality is deeply intertwined with income instability and limited agricultural engagement, With 26.1% of

households reporting no income and another 12.9% earning below ksh 2000 monthly or significant portion of the population struggles to meet daily food needs.

The socio-economic data does not directly capture household food acquisition methods, however insights drawn from employment trends indicate that most households depend on market purchases rather than home grown foods.

Agriculture and livelihoods: Despite its largely urban setting, Homa bay municipality still retains pockets of agricultural activity that are vital both food access and household income. According to the study 207,685 hectares in the county are under food crops, with just 21,211 hectares under cash crops and 7872 hectares in horticulture, staple foods include maize, beans, cassava, sweet potatoes, and cowpeas.

Agricultural activities remain affected by climate unpredicabilty. Furthermore, irrigation infrastructure is poorly developed, leaving farmers at the mercy of erratic rains.

Blue economy and irrigation: As a Municipality located along Lake Victoria, Homa Bay 's food security landscape is shaped by fisheries, water access and lake based farming .There are seven fish landing sites ; Ngegu ,Lela, Achich, Kananga,Angalo ,Konginga and Ombogo serving as food hubs.

The absence of a formal spatial marine plan has led to disorganized development pollution and encroachment on fishing breeding areas, especially around Samunyi and Rangwena estuaries.

Informal trade and dynamics: Trade and microenterprise are the economic heartbeat of Homa Bay municipality The study reveals 30.4 % of the working population is self-employed, a significant majority of whom operates kiosks, market stalls or offering services such as tailoring, boda boda services and food vending.

Financial Access and savings. Despite vibrant microenterprise activity financial inclusion in homa bay remains low. Over 40% of residents depend on informal settlement often without pay slips, assets records or collateral requirements traditionally demanded by banks and formal lenders. This structural exclusion prevents many from accessing credit saving securely or building long term financial resilience

1.2.4. Economic Context.

Economic activities within the municipality are divided between the formal and informal sectors, both of which operate in symbiosis, collectively sustaining the livelihoods of the population and providing essential goods and services. First, the municipality is based on a fairly significant industrial sector. On one hand, the formal sector is anchored by the fishing industry, which stands as the municipality's primary economic activity (Homa Bay Municipality, 2023).

Lake Victoria serves as a major source of economic opportunity, not only through direct fishing but also by supporting a broader industrial ecosystem that includes fish processing and export, boat and equipment building and repair, as well as agro-industrial operations such as animal feed manufacturing. On the other, the informal sector, commonly referred to as "Jua Kali", plays an equally critical role (Ibid). It encompasses a range of small scale, skill-based activities such as carpentry, motor vehicle mechanics, tailoring, and dressmaking. The Jua Kali sector is essential for poverty reduction and for absorbing a significant portion of the unemployed population, making it a vital pillar of the local economy. In addition, commercial activities are also at the heart of Homa Bay's economy, once again divided between the formal and informal sectors (Ibid). The formal sector remains largely driven by fishing and trade-related activities but also includes commercial banks and a more structured retail trade system.

The informal sector, on the other hand, comprises a range of activities such as small-scale agriculture, open-air markets, and street vending. This informal economy plays a vital role in supporting local resilience, especially for vulnerable groups who depend on it as a primary source of income and access to everyday goods.

1.2.5. Land-use Context.

The developed areas of Homa Bay Municipality are predominantly residential. Of all the developed plots recorded, 82.6% are used for housing. This shows that most of the land is taken up by homes, especially low-density units like bungalows and cottages. While this meets shelter needs, it also limits space for other important public and economic uses. Commercial land, including shops, kiosks, and hospitality businesses, accounts for just 5.3%. These businesses are mostly informal kiosks and roadside vendors, with very few planned commercial centers or office buildings. Public buildings such as churches, health facilities, and Table 5 Summary of Land Use Categories Land Use Category Share of Developed Parcels (%) Residential Commercial Public Purpose Mixed Use Educational Industrial Agricultural Recreational Public Utility 82.6 5.3 3.4 4.7 1.4 0.8 government offices cover 3.4% of the land, with churches alone making up nearly two-thirds of this category. Educational facilities occupy 1.4% of developed land, mostly early childhood and primary schools, with limited provision for secondary or tertiary institutions. Recreational areas, at only 0.3%, are scarce and industrial zones are even lower at 0.8%. This indicates limited space for youth activities, sports, green spaces, and job-creating industries. Public utilities like water, power, and waste facilities occupy just 0.3%, which is inadequate for a growing urban population. These gaps in non-residential land use suggest that, while housing demand is being met, the town's land allocation is unbalanced. Essential infrastructure and services are squeezed into limited space, which may lead to overcrowding, traffic congestion, poor service delivery, and increased land use conflict.

Table 3: Summary of land use categories.

Land use Category	Share of Developed Parcels (%)
Residential	82.6
Commercial	5.3
Mixed use	4.7
Public Purpose	3.4
Educational	1.4
Industrial	0.8
Agricultural	0.7
Recreational	0.3
Public Utility	0.3
Vacant	0.3

Figure 3: Current land use map for Homa bay municipality.

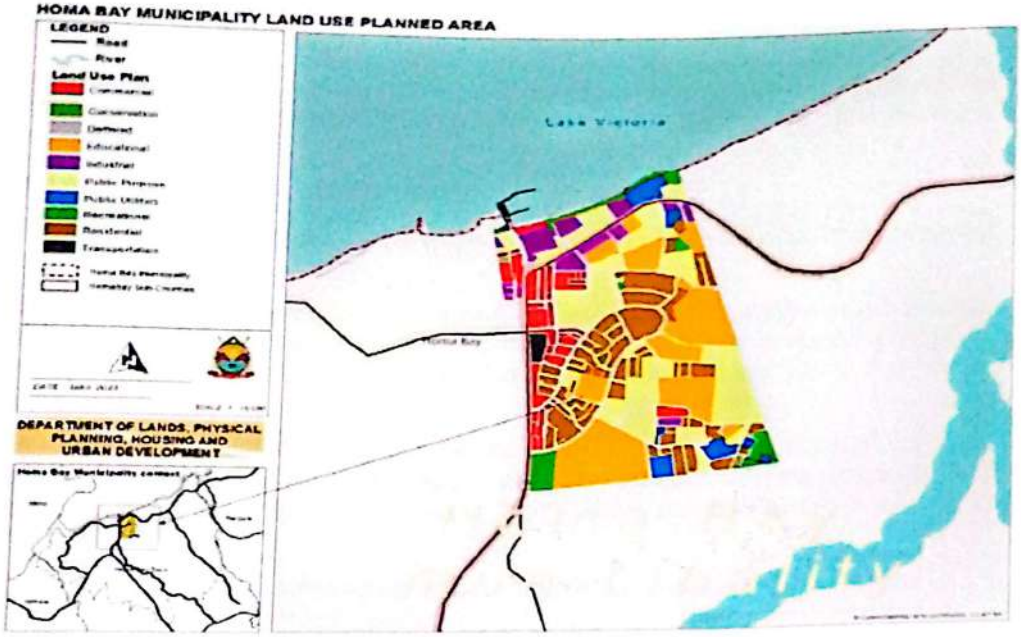
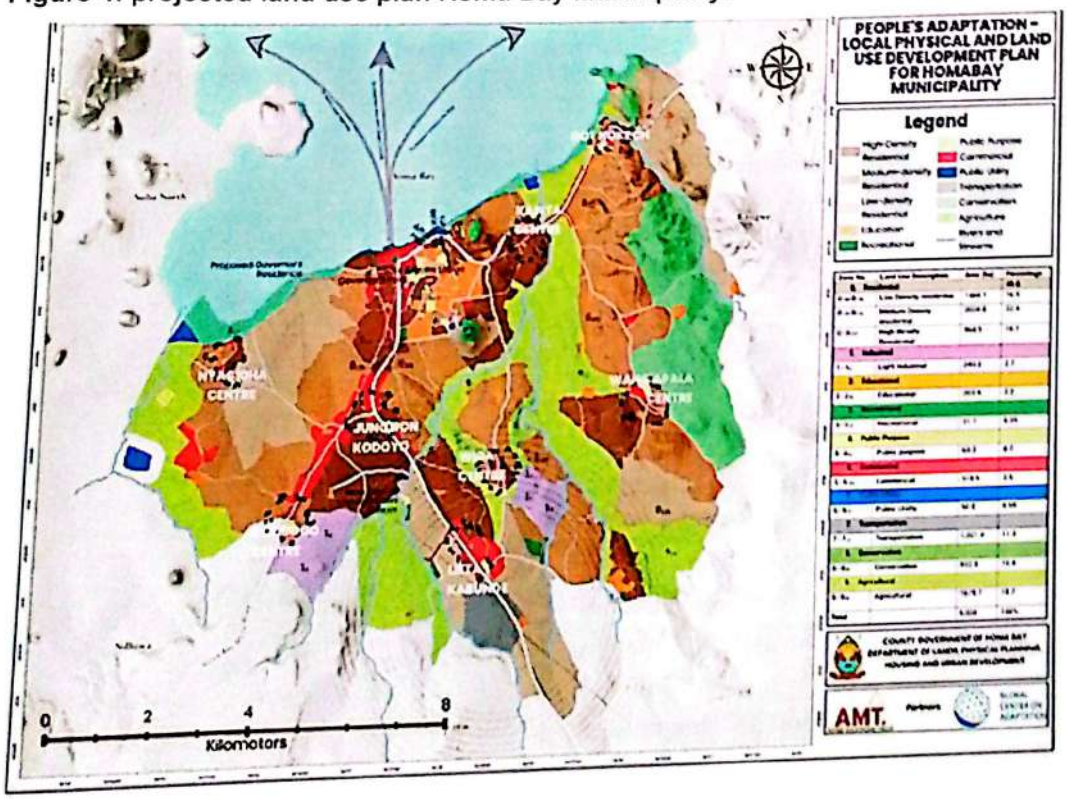


Figure 4: projected land use plan Homa Bay Municipality.



Homa Bay Municipality

SOURCE (PALPLUP)

1.3. Key Stakeholders & Inclusiveness.

Homa Bay Municipality will adopt a participatory approach to governance and management of the Municipality as spelt out in the Urban Areas and Cities Act No 13 of 2011. As stipulated in the Act, the residents of Homa Bay Municipality have the right to:

a) Contribute to the decision-making processes of the city or urban area by submitting written or oral presentations or complaints to a board or town committee through the city or municipal manager or town administrator;

b) Prompt responses to their written or oral communications;

c) Be informed of decisions of a board or town committee, affecting their rights, property and reasonable expectations.

key stakeholders were identified through a structured stakeholder mapping analysis process conducted at the onset of climate risk profile preparation. This process combined a review of existing institutional frameworks, municipal and county development plans and sector mandates.

The Municipality stakeholders are responsible for prioritizing county programs and projects while ensuring sustainability and ownership. They also provide finances, materials and services for programs and projects. The various stakeholders and their roles are outlined in table below.

Table 4: Homa bay stakeholders and their roles in climate risk profile.

Stakeholder groups	Major roles
Local community members	Engaging the various levels and units of government on natures of concern e.g. effects of floods, droughts. Help in hazard identification Mapping of hazard prone areas Come with interventions that need to be addressed to curb the effects of climate hazards identified.
County Government Entities.	Provision of funds and technical assistance in climate risk profile development. Provision of links to other development partners. Provision of civic education during the climate Risk profile development process.
National Government Ministries Departments and Agencies	Provision of funds and technical assistance. Establishment of legal,regulatory and policy regimes Provision of civic education and trainings.
Global Donor Organizations include the world bank, GCA and UN system	Provision of funds and technical assistance.

	Championing good governance and public sector reforms.
Public Benefit Organizations (NGOs, CBOs and FBOs)	Provision of funds and technical assistance Hazard identification and mitigation measures. Ensuring the public views are put into consideration.
Private Sector Organization.	Provision of funds and technical assistance. Generation of new ideas, technologies and innovations. Provision of contracted services. Provision of funds and technical assistance under PPP framework.
The Media	Dissemination of information. Civic Education.
Tom Mboya University	Conducting research Assistance in data collection.
Private utility service providers	Data Providers.
The clergy	Championing for best practices.

High	**High Influence – Low Interest** • National Government Ministries • Media… • Privae utility service providers	**High Influence – High Interest** • County Government Entities • Local Community members. • Public Benefit Organization. • National government agencies
	Low Influence – Low Interest • Public Private Partnership	**Low Influence – High Interest** Global Donor Organizations. Clergy. Private benefit organizations Vulnerable and marginalized groups Tom mboya university college.
Low		High

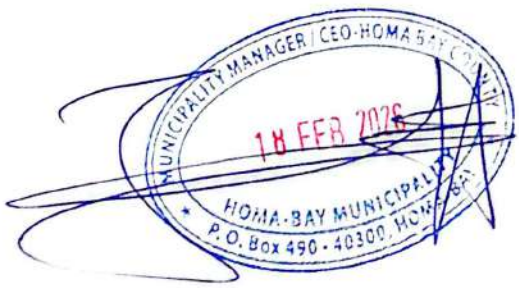
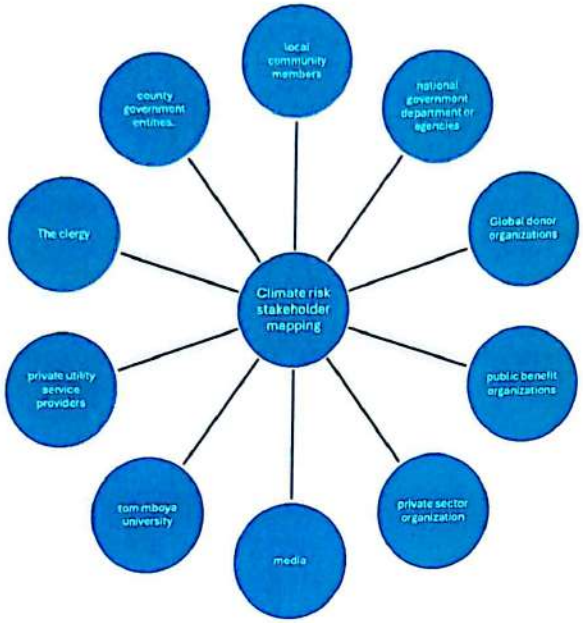


Figure 5: Stakeholder mapping for Homa bay Municipality



2. Hazard Assessment.

A Hazard assessment is a systematic process of identifying potential sources of harm (climate hazards), evaluating the risks associated with them, and implementing control measures to eliminate or mitigate those risks .it is a proactive safety tool used to protect citizens and properties by analyzing potential dangers before they cause injuries

This section presents the hazard assessment for Homa bay Municipality as part of the urban climate risk profile.it identifies and screens key climate hazards review historical climate trends and future projections.

For a climate hazard to be considered key it must be likely to occur, have significant impact and be a high priority.

2.1. Key Climate Hazards

Table 5: Hazard screening for Homa Bay Municipality.

Hazard	Hazard Likely (Y/N)	Significant Impact (Y/N)	High Priority (Y/N)	Key Hazard (Y/N)
Heat Stress				
Average surface temperature increase	Y	Y	Y	Y
Average ocean temperature increase	N	N	N	N
Extreme heat	Y	Y	Y	Y
Marine heatwaves	N	N	N	N
Cold Stress				
Average surface temperature during winter	N	N	N	N
Extreme cold (e.g., cold spells, frost)	N	N	N	N
Snowfall and ice storms	N	N	N	N
Flooding				
Changes in precipitation patterns	Y	Y	N	N
Pluvial (surface level) flooding, including flash flooding and urban flooding	Y	Y	Y	Y
Fluvial (river) flooding	N	N	N	N
Sea level rise	N	N	N	N
Coastal flooding, including storm surges	N	N	N	N
Waterlogging	Y	Y	N	Y
Water Stress				
Drought (meteorological, hydrological)	Y	Y	Y	Y
Groundwater salinization	N	N	N	N
Saline intrusion	N	N	N	N
Wildfire				
Wildfires & bushfires	N	N	N	N
Storms				
Extreme wind	N	N	N	N
Tropical cyclones	N	N	N	N
Sand and dust storms	Y	N	N	N
Hailstorms	N	N	N	N
Mass Movement				
Landslides	Y	Y	N	N
Coastal erosion	N	N	N	N
Gully erosion	Y	Y	N	N
Marine Conditions				

Hazard	Hazard Likely (Y/N)	Significant Impact (Y/N)	High Priority (Y/N)	Key Hazard (Y/N)
Ocean acidification	N	N	N	N
Geophysical*				
Subsidence	N	N	N	N
Earthquakes	N	N	N	N
Volcanos	N	N	N	N

** These hazards, if present, can be highly impactful and are therefore included in the screening step, as they may significantly influence the urban planning informed by this urban climate risk profile*

2.2. Climate Indicators and Hazard Thresholds.

Climate indicators are measurable variables that represent a hazard They are used to track long term trends in climate change and help define the intensity and likelihood of climate hazard events.

Climate indicators allow hazards to be transferred into consistent, comparable categories that can guide rapid risk assessments and communication with decision markers.

Hazard thresholds define how we interpret hazard indicators including the intensity at which hazards pose danger to infrastructure people or ecosystems.

Table 6: Climate indicators and hazard thresholds selected for the assessment.

Key Hazard	Climate indicator	Data source	Threshold		
			Low	Medium	High
Drought	SPEI drought index	SPEI database	>-1.0	-1.0 to -1.5	-1.5
Extreme heat	# days with heat index > 35(MEAN)	World Bank Climate Change Knowledge Portal	< 5 days /season	5-15 days /season	>15 days /season
Surface Flooding	# of days of precipitation >50mm	World Climate Change Knowledge Portal	< 3 days/year	3-6 days /year	>6 days/year

2.3. Current Hazard Levels and Climate Projections.

climate hazard levels are increasing globally with projections indicating more frequent heatwaves droughts and extreme precipitation especially under higher SSP warming scenarios. Risk assessments combine climate models with vulnerability data to identify threats to infrastructure and populations. Key hazards include rising temperature, change in rainfall patterns and rise in water levels

Climate projection is the stimulated response of climate system to a scenario of future emissions or concentration of greenhouse gases (GHGs), aerosols and change in land use generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emissions/concentration/radiative forcing scenario used, which is in turn based on assumptions.

Table 7: Current and future hazards levels for Homa Bay Municipality.

	Hazard Level				
Hazard	**Current (Baseline)**	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
drought	Medium	High	High	High	High
Extreme heat	High	High	High	High	High
Surface flooding	High	Medium	High	Medium	High

For this Urban Climate Risk Profile, hazard levels should be interpreted in accordance with the table below.

Table 8. Interpretation of hazard levels

Level	Interpretation
High	Hazard events that are likely to occur with high frequency and/or intensity
Medium	Hazard events that are likely to occur with moderate frequency and/or intensity
Low	Hazard events that are likely to occur with low frequency and/or intensity

2.4. Current and Future Hazard Impact Areas.

Homa bay municipality faces the significant and increasing environmental of hazards, primarily driven by its location on Lake Victoria and changing climate patterns .The impacts are disproportionately felt in informal settlements ,markets and low lying residential areas .

Figure 3: Makongeni informal settlement ,flood affected area.

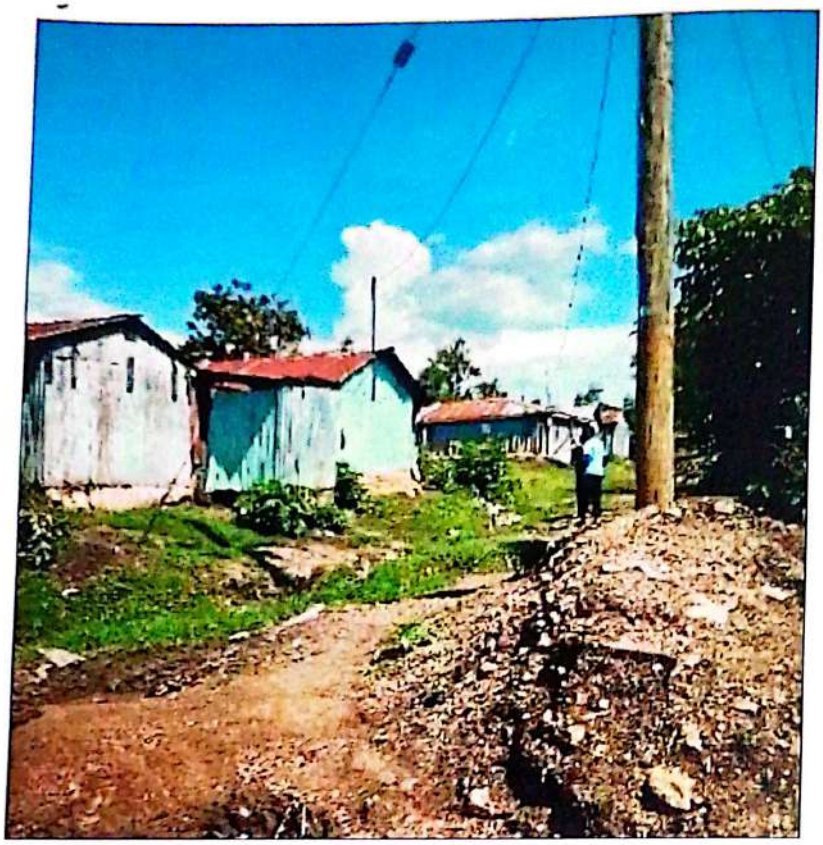


Figure 3(b):Angalo area flood affected zone.

Figure 3(c): Flooded affected area in homa bay town

3. Exposure & Vulnerability Assessment.

Vulnerability assessment identifies internal weaknesses that can be exploited, while exposure assessment quantifies the extent to which assets are reachable or exposed to threats. they prioritize fixing the most significant risks.

In this study, the exposure assessment confirmed that critical public services and economic assets are situated in high -risk zones. Schools, health, centers, roads and markets across the municipality are frequently impacted by floods, yet few of these infrastructure, are built to withstand such events.

The vulnerability assessment, supported as well by the participatory process, revealed a complex layering of interlinked vulnerabilities, both environmental and socio-economic in nature. Environmental factors such unstable soils, inadequate drainage systems, and deteriorated water infrastructure, interact with social drivers like poverty, insecure land tenure, limited access to services and gender- based inequalities. In particular, limited land tenure security reduces residents' incentives and capacity to invest in resilient infrastructure.

In fact ,women face heightened vulnerability due to unequal land ownership ,restricted decision making power ,and their central role in managing household chores and caregiving roles that become even more difficult under conditions of water scarcity or flooding .Indeed ,one of the strongest insights that come out during the communities engagement was that access to water emerged not only as a key risk affected by climate hazards (floods and drought) but also a daily vulnerability due to infrastructure gaps, service interruptions and management issues .

These overlapping vulnerabilities reinforce one another reducing the ability of households and communities to recover from climate shocks. Importantly the assessment identified impact chains linking climate hazards to cascading effects across social, economic and physical

systems. For instance, a single flood event may result not only in damage of homes ,but also in closure of access roads ,disruption of school attendance, overflow of sanitation systems ,increased incidence of waterborne diseases , and loss of income for informal traders .These interconnected impacts reveal the systematic nature of climate vulnerability in informal urban settings and reinforce the need for cross sectoral and integrated adaptation strategies.

3.1. Urban Elements

Urban elements are the physical, functional and sensory components that shape the form character and experience of a city, the elements ,including buildings ,streets ,public spaces ,and landscape ,determine a city's legibility ,mobility and livability

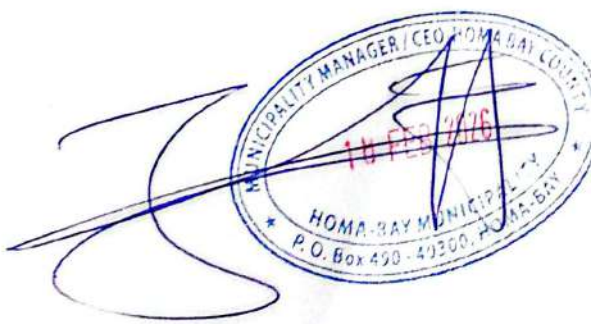
Table 9: Urban elements inventory

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
Infrastructure & Services				
Stormwater Drainage	Stormwater drainage conveyance network	Y	N	Largely limited to the CBD and government quarters Most residential estates lack functional drainage
	Stormwater storage	Y	N	Natural depressions and low-lying areas of shauri yako informal settlement. A stream within shauri yako settlement that acts as water storage within the municipality. Flood plains along river Rangwena. Lake Victoria which acts as the water catchment area within the municipality.
Water & Wastewater Management	Pumping stations	Y	N	Main treatment plant on the Lake Victoria ,the Got Asego treatment plant ,Kasarani booster station located east of Homa bay high school.
	Groundwater abstraction	Y	N	Primarily driven by community-based boreholes with key sites including the Makongeni-Kapita water projects and Maguje water project located in Homa Bay East Sub location.

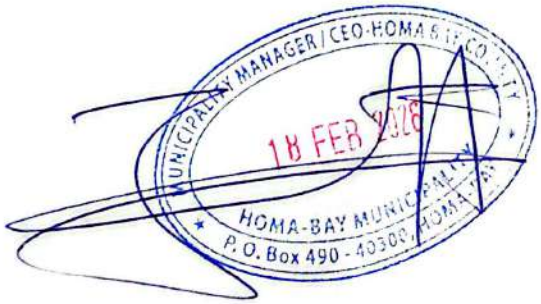
Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Water treatment facilities	Y	Y	Water treatment in homa bay municipality is primarily managed by HOMAWASCO ,featuring a key treatment plant at Got Asego and a new facility in shaurin yako HOMAWASCO utilizes GIS to map ,analyze and manage its water distribution.
	Water supply networks	Y	Y	Water supply within the municipality is managed by HOMAWASCO.The network heavily supported by the Lake Victoria South Water Works Development Agency project, serves key areas like Homa Bay town ,Makongeni,Got Rabuor ,Kapita and Rangwena.
	Sewer networks	Y	Y	Primarily managed by HOMAWASCO with its current coverage standing at approximately 14% to 30%. The existing system which requires rehabilitation ,consists of trunk, main and outfall sewer lines, often functioning below optimal capacity.
	Wastewater treatment facilities	Y	Y	Waste water is primarily managed through stabilization ponds with plans for relocation and upgrading to improve efficiency.
Solid Waste Management	Transfer facilities	Y	N	Homa bay municipality has functional two lagoons and eight functional skips that are strategically distributed within Homa bay municipality.
	Landfills and dump sites	Y	N	Homa bay lack adequate facility and a suitable site for the safe handling and disposal of solid waste ,with the current disposal site located at the foot of Asego Hill.
	Recycling centers	N	N	N/A

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Collection fleet	Y	N	Municipal and private waste collector vehicles serving the residential and commercial areas
Transport and Mobility	Road networks	Y	Y	Primary and secondary roads connecting commercial and residential areas. The road network within Homa Bay Municipality is currently undergoing significant upgrading, focusing on improving connectivity, widening key routes to dual carriageways and paving urban roads to bitumen standards to enhance economic growth.
	Bridges	Y	Y	Key bridges within Homa Bay municipality are the Arujo bridge and the Rangwena Bridge.
	Public transport networks (rail, bus, mini-bus, etc.)	Y	N	Commonly used modes are motorcycles, public minibuses (matatus) and private vehicles.
	Transportation terminals	Y	N	The main Homa Bay town bus and the water transport terminal used by the water bus.
	Vehicle depots	Y	N	The cotton Aggregation Center and Tractor Transport system in Magare (Homa West ward) which supports agricultural logistics.
	Non-motorized transport networks	N	N	Residents of the municipality largely depend on walking and cycling but the infrastructure to support non -motorized transportation is severely lacking. Existinng pedestrian walkways are narrow ,poorly maintained and obstructed by poor drains and open manholes.

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Freight and logistics hubs	Y	N	Key logistical transport and freight hubs in Homa Bay Municipality include; Homa Bay pier (under construction),Koginga beach fish market ,Kabunde airstrip ,Cotton Aggregation Centre and logistic and courier services.
Energy	Energy power plants	N	N	N/A
	Poles and power lines	Y	N	Available across the municipality and there is increase in number due to the last mile by the REREC.
	Transformers and substations	Y	N	Transmission line is the primary high voltage infrastructure within Homa Bay Municipality by connecting it to the national grid through the newly energized Ndhiwa substation.
	Streetlighting	Y	Y	Homa Bay Municipality is undergoing significant street lighting upgrades,heavily investing in solar powered lights and high masts to enhance urban infrastructure under the KISIP projects.
Economic Infrastructure	Markets	Y	Y	Major markets within Homa Bay Municipality are, the modern fish market ,the municipal market opposite shivling supermarket The minor markets include Makongeni, Soko Mijinga, Sofia ,Kapita e.t.c
	Businesses and commercial hubs	Y	Y	Concentrated commercial areas within CBD and along the Homa bay -Kisumu highway.
	Industrial zones/parks and logistics parks	Y	N	The t Industrial area opposite the water bus terminal

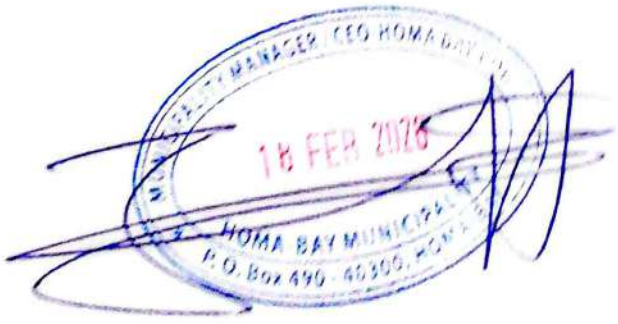


Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
Social Infrastructure	Government buildings and service centers	Y	Y	Municipal offices Some of the county government offices The county assembly of Homa Bay offices. The Huduma Centre . The National Government Offices . The law court.
	Education facilities	Y	Y	The spatial distribution of education institutions in Homa Bay Municipality reveals concentration of primary schools around the urban core, with fewer secondary schools and only one university near the central area. There are 36 primary schools ,12 secondary schools ,two technical and vocational training institutions ,three colleges and one university.
	Healthcare facilities	Y	Y	The distribution of health facilities vary from one sub location to the other. There are five public health institutions within the municipality i.e Homa Bay Teaching and Referral Hospital, Makongeni level 4 hospital ,Nyalkinyi level 3 ,pedo level 3 and Wiga level 2 hospital.
	Public spaces	Y	N	The governor's park
	Faith-based buildings	Y	N	Churches and other worship facilities are found in all wards within the Homa Bay Municipality
	Cultural and heritage assets	N	N	N/A
Emergency Services	Fire stations	N	N	N/A
	Police stations	Y	N	The primary police facilty serving Homa Bay Municipality is the Homa Bay Police Divisional Headquarters.



Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Telecommunications networks	Y	Y	The municipality is centered on robust mobile network coverage coverage provided by major Kenyan telcos with digital infrastructure for governance and business
	Early warning systems	Y	Y	The climate information center that provides agro advisories and early warning information to the farmers focusing on adapting to floods and droughts
	Disaster management centers and shelters	Y	Y	The municipality is strengthening its disaster management infrastructure ,particularly in response to flooding ,with key centers and partnerships focused on rapid response .Kenya Red Cross Society located within the HOMAWASCO compound Emergency Operations Centre situated within the municipality.
	Evacuation routes	Y	Y	The evacuation routes and centers are primarily designated based on flood risk. The municipality uses government schools as evacuation centers and key routes in and out of the municipality, including the C19 road that passes through the town ,serve as main corridors foe emergency services .
Populations				
Urban Residents	Population	Y	Y	Homa Bay municipality population is approximated to be 82,414 as per the Kenya National Bureau of Statistics .

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Households	Y	Y	The enumeration conducted in 2025 by the Akiba Mashinani for Homa Bay municipality people led adaptation plan,shows that the municipality has a total of 21,317.
Informal Settlement Residents	Population living in informal settlements	Y	Y	The 2025 enumeration shows that the informal settlements represents a significant portion of the municipality's housing ecosystem accounting for over 27% of all households
	Households lacking land tenure	Y	Y	According to the data captured in the 2025 enumeration by the Akiba Mashinani Team ,6.9 % of the residents are unaware of their legal status or documentation of their land.
	Households / residents lacking access to basic services	Y	Y	Over 10000 residents in high densely populated informal settlement areas ,hence lack basic services.
Ver	Low-income households	Y	Y	Data from 2025 enumeration by the AMT shows that12.9% households survive on under Ksh 2000 per month. These income levels leaves families highly vulnerable to shocks from illness to food price fluctuations due to climate change.
	Women-headed households	Y	N	The 30% of households are headed by women within Homa Bay Municipality 40.36% of women within the municipality own land compared to 48.63% of men limiting women's ability to access credit ,secure housing or invest in agricultural livelihoods.



Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Children and youth	Y	Y	The youth face significant vulnerabilities due to limited economic opportunities ,unstable livelihoods and poor living conditions, all of which reduce their ability to anticipate, cope with and recover from climate related events .
	Elderly persons	Y	Y	Nevertheless, although elderly make a small portion of the population, they remain a significant concern due to their heightened vulnerability to climate change which is often compounded by other social and economic factors .Many older residents lack financial security.
	People with disabilities (PWD)	Y	N	PWDs are disproportionately vulnerable to climate change ,facing up to four times higher risks of death or injury during disasters due to inaccessible evacuation, emergency information , and infrastructure.
	Homeless populations	Y	N	Though Homa Bay Municipality did not register a good number of homeless population, homeless population face extreme, disproportionate vulnerability to climate change,with unhoused individuals being up to 100 times more likely to die from heat related illnesses than the general population.
	Unemployed or precariously employed workers	Y	N	According to the data collected by the Akiba Mashinani ,28.2% of the municipal residents are unemployed.

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
	Seasonal workers / migrant laborers	Y	N	Seasonal workers especially in agriculture and construction ,are among the most vulnerable population to climate change ,with their risk often directly proportional to rising temperatures ,leading to increased rates of heat-related illness.
	Nomadic groups in peri-urban areas	N	N	N/A
	Urban refugees and migrants	N	N	N/A
	Minority ethnic groups in urban areas	Y	N	Homa Bay Municipality hosts diverse ,albeit small, population of other groups e.g the Somalis ,the kisiis who are engaging in trade and other commercial activities . Minority ethnic groups are disproportionately vulnerable to climate change due to the intersection of social, economic and geographic marginalization.
Natural Assets				
Urban Green Infrastructure	Urban parks and gardens	Y	Y	Governor's park and Homa Bay Arboretum.
	Green corridors	N	N	The town is integrating climate resilient urban planning, including the "People 's Adaptation Plan " to manage rapid urbanization ,alongside urban beautification and green building standards.
	Street landscaping	N	N	N/A
	Urban forests and forest reserves	Y	Y	Homa Bay Arboretum a dedicated sanctuary within the municipality for tree conservation and recreation.

Category	Subcategory	Included in the RCRA (Y/N)	Available in GIS format (Y/N)	Description
Urban Blue Infrastructure	Natural wetlands	Y	Y	Natural wetland within Homa Bay Municipality is primarily dominated by the Lake Victoria shoreline ecosystem, which are experiencing significant degradation from pollution and encroachment
	Rivers	Y	Y	Major rivers such as River Rangwena and Arujo act as carbon sinks, natural buffers against flooding and key component in regulating the global carbon cycle.
	Riparian zones	Y	Y	Riparian zones along Lake Victoria shoreline and major rivers such as Rangwena and Arujo .Riparian zones serve as wildlife corridors and carbon sinks while providing recreational green spaces.
	Lakes, ponds and reservoirs	Y	Y	Lake Victoria ,the primary water body ,providing the main source of water for the municipality.
	Coastal ecosystems	N	N	N/A
	Urban agriculture	Y	N	Kitchen gardens are mostly common in the informal settlements of the municipality.
Peri-urban and Agricultural Systems	Peri-urban agriculture	Y	N	Although not the dominant economic activity in Homa Bay Municipality, mainly horticulture is still present , primarily through small scale farming and livestock rearing .
	Agroforestry systems	Y	N/A	A few residents practice agroforestry within the municipality.
	Forests and forest reserves	Y	Y	The Homa Bay Arboretum.
	Protected areas and national parks	N	N	N/A
	Savannahs and rangelands	N	N	N/A

3.2. Exposure, Vulnerability, and Impacts of Climate Hazards on Urban Elements.

For this Urban Climate Risk Profile, exposure and vulnerability levels should be interpreted in accordance with the table below.

Table 10: Interpretation of exposure and vulnerability levels

Level	Exposure Level Interpretation	Vulnerability Level Interpretation
High	A large number and high-value urban elements (e.g., critical infrastructure, dense neighborhoods, major economic assets) are located within the hazard footprint.	The urban element is vulnerable to the climate hazard due to high natural sensitivity – considering physical and non-physical characteristics – and limited adaptive capacity.
Medium	A moderate number or a mix of low- and medium-value urban elements are located within the hazard footprint.	The urban element is somewhat vulnerable to the climate hazard due to moderate sensitivity and adaptive capacity.
Low	Few or no critical urban elements lie within the hazard footprint or area of impact.	The urban element is minimally vulnerable to the climate hazard due to limited sensitivity and/or a high degree of adaptive capacity.

For this Urban Climate Risk Profile, the following matrix summarizes likely impacts on each urban element by combining the assigned exposure and vulnerability levels.

Table 11: Impact Matrix

		Vulnerability Level		
		Low	Medium	High
Exposure Level	High	Moderate	Major	Catastrophic
	Medium	Minor	Moderate	Major
	Low	Insignificant	Minor	Moderate

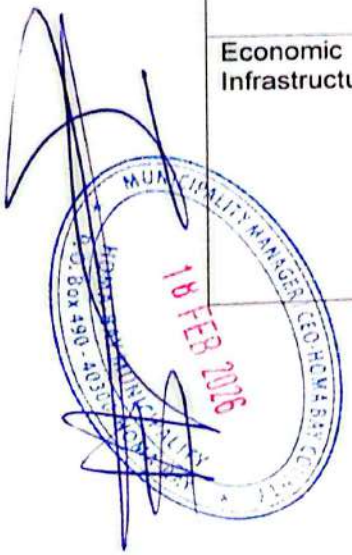

MUNICIPALITY MANAGER/CEO-HOMA BAY COUNTY
15 FEB 2026
HOMA BAY MUNICIPALITY
P.O. Box 490

Table 12: Exposure, Vulnerability, and Impacts of drought on Urban Elements

Hazard: DROUGHT

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• The upper part of shauri yako which is always hit by drought has an artificial stream that drains storm water and serves a bigger population. The stream dries up during the dry seasons. • Most of the storm water drainage systems are constructed in areas that are prone to drought.	high	**Sensitivity:** • Poorly constructed drainage system • Population sensitivity • Topographic sensitivity **Adaptive Capacity:** • Limited system upgrading and poor system maintenance	Medium	Major
Water & Wastewater Management	• Most boreholes are dug in areas with high population, with one borehole serving a large number of individuals. • The distance from the lake makes around arujo, Nduta, Ohongo ,upper Nyalkinyi to be more prone to the effects of drought .	Medium	**Sensitivity:** • The distance away from the lake. • Population sensitivity. **Adaptive Capacity:** • The closeness to the lake to the lake makes the settlements around the lake basin more resilient to the risk of climate change.	Medium	Moderate
Solid Waste Management	• The municipal Makaburini dumpsite is located at the foot of Asego hill Homa Bay east ward, a region that is prone to drought • The dumpsite serves the whole of Homa Bay County.	High	**Sensitivity:** • The nearness to drought prone area. • The large number of individuals served by the dumpsite. **Adaptive Capacity:** • Monthly clean up exercise. • The strategic distribution of waste receptacles within the municipality.	medium	Major

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Transport and Mobility	• Most of the municipality feeder roads are situated in areas that are prone to drought, the upper part of Shauri Yako ,Arujo areas and the Nduta area. • The roads become dusty and inaccessible during the dry seasons increasing the cost of transport of people and goods. •	high	**Sensitivity:** • The location of the feeder roads in areas that are drought prone. • The substandard nature of the feeder roads. **Adaptive Capacity:** • Upgrading the standards of the roads.	Medium	Major
Energy	• Most of the power lines and transformers are erected in drought prone areas prolonged drought heighten energy power for cooling while reducing hydropower generation efficiency. • Also to mention that most drought prone uses solar as source of energy. Too much exposure to solar heat reduces the efficiency of the solar lights to produce energy.	High	**Sensitivity:** • Topographic sensitivity. • Economic sensitivity. • … **Adaptive Capacity:** • Alternative sources of energy • Areas affected mostly depend on solar energy.	Low	Moderate
Economic Infrastructure	• Most roads-network connection, energy and buildings, the waste management facilities are located in drought prone zones increasing their exposure to the effects of the drought. • Most population that drives the economy of the municipality are located in these areas.	high	**Sensitivity:** • Topographic sensitivity • Population density. • … **Adaptive Capacity:** • Public awareness and creation • Greening awareness. • …	medium	Major



Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Social Infrastructure	• Most secondary schools, churches and heal centers are located in areas that are hit by drought exposing them to the impacts of drought, wiga health center,nyalkinyi school, wiga schools. • The schools in these areas are densely populated.	high	**Sensitivity:** • Topographic sensitivity • Population demographics • ... **Adaptive Capacity:** • Planting of trees in schools churches and health facilities • Limited technical capacity to implement sustainable structural adaptations • Limited financial resources • The Homa Bay County Climate Change Act (2022) and the People's Adaptation Plan are actively engaging stakeholders to integrate climate resilience into institutional planning	high	catastrophic
Emergency Services	• Most emergency service are not situated in drought prone areas. • The population living within the drought prone areas are not able to access the emergency services	low	**Sensitivity:** • Topographic sensitivity • Social gap **Adaptive Capacity:** • Proper co-ordination between the municipality and partners society	high	Moderate
Populations					
Urban Residents	• Urban residents are not within the drought risk areas • The urban area of the municipality is located along the shoreline of the Lake Victoria.	Low	**Sensitivity:** • Population increases due to the per-urban-urban migration • Fluctuation in food production due to drought in the per urban areas	High	Major

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
			Adaptive Capacity: • Promotion of climate smart urban agriculture such as kitchen gardens. • Small scale irrigation. • Alternative source of income fishing and trading.		
Informal Settlement Residents	• Most informal settlements, areas are within the, drought prone zones. • Most buildings within the informal settlements are made of iron sheet increasing their exposure to effects of drought. • Most population within the informal settlements live in poverty and cannot access essential services	High	**Sensitivity:** • Geographical sensitivity. • Structural sensitivity • Economic sensitivity • Demographic sensitivity • ...	High	Catastrophic
			Adaptive Capacity: • Limited financial resources and coping mechanism • ...		
Vulnerable and Marginalized Groups	• Most vulnerable and marginalized groups live in drought prone areas due to their inability to move to safer areas, low income and social injustices within the community. • Most live in crowded settlements with poorly built houses and infrastructures exposing them to the impacts of drought	High	**Sensitivity:** • Geographic sensitivity. • Economic sensitivity. • Social sensitivity.	High	Catastrophic
			Adaptive Capacity: • Weak social protection. • Weak policy implementation on gender.		
Natural Assets					
Urban Green Infrastructure	• Drought is extreme in the peri urban areas of the municipality with the urban green infrastructure having minimal exposure to the hazard, but experience	Low	**Sensitivity:** • Social sensitivity • Population increase	High	Moderate

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	indirect impact of the migration of people from the peri urban areas.		**Adaptive Capacity:** • Lack of strategic planning. • Implementation of the people's led plan to the later.		
Urban Blue Infrastructure	• Most of the urban blue infrastructure are not located within the drought areas but are affected by drying of rivers. g river rangwena that drains into the Lake. • Population increases of municipal residents from affected areas out pressure on the water sources reducing their volume, impaired water quality.	Low	**Sensitivity:** • High population density. **Adaptive Capacity:** • Limited policies on blue infrastructure conservation.	High	Moderate
Peri-urban and Agricultural Systems	• Most of the peri urban areas are located in drought prone arounds. • The peri-urban areas have limited water sources to carry out irrigation and other domestic chores.	High	**Sensitivity:** • Demographic sensitivity. • ...infrastructural sensitivity. **Adaptive Capacity:** • Limited climate resilient smart practces.	High	Catastrophic

Table 13: Exposure, Vulnerability, and Impacts of pluvial flooding on Urban Elements

Hazard: PLUVIAL FLOODING

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Frequent flooding persists in the low - lying areas of the informal settlements with poor drainage • The storm water drainage system in shauri yako is shallowly dug and cannot	High	**Sensitivity:** • Poor soil permeability • Blocked drainage channels. • Encroachment into riparian areas. • Unplanned development	high	Catastrophic

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	withstand surface run off during rainy season.		**Adaptive Capacity:** • Few drainage infrastructures are built to withstand flooding • The existing drainage are overwhelmed		
Water & Wastewater Management	• The lake Victoria which serves as the main source of water is located at the lower lying area of the municipality making it to be the last aquifer for downstream storm waters. • The wastewater stabilization pond is built on the Lake Victoria shoreline, flood prone zone.	High	**Sensitivity:** • Topographic sensitivity • Lack of proper of proper infrastructure e.g. the buffer zone • Critical exposure of essential infrastructure like the water pipes **Adaptive Capacity:** • The existing sewer lines are overwhelmed during rainy season leading to the overflow. • Lack of coordination in the maintenance, protection and redesign of Key systems to withstand future climate shocks	High	Catastrophic
Solid Waste Management	• The municipal dumpsite is located at the foot of Asego hill making it to be the receiving end of water moving downstream, flooding the whole facility • The lagoons are constructed along the drainages making them to be prone to flooding.	High	**Sensitivity:** • Location sensitivity • Topographic sensitivity. • Institutional gaps. **Adaptive Capacity:** • Inadequate waste receptacles i • Lack of a designated dumpsite or material recovery facility.	High	Catastrophic
Transport and Mobility	• The municipal bridges i.e Arujo and Rangwena are within the flood impact area.	High	**Sensitivity:** • Poor and inadequate drainage systems. • Improper disposal of wastes that clog the drainage systems.	High	Catastrophic

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	• Approximately 50 of the municipal roads are constructed within low lying areas with poorly done or no drainage systems		**Adaptive Capacity:** • Limited budgetary allocations for infrastructure. • Inadequate technical planning. • The adaptive capacity for Homa Bay municipality is currently low .		
Energy	• Flooding in the lower lying areas of the municipality e.g Makongeni, Lower shauri yako,the shoreline of Lake Victoria causes falling of electric poles and powers causing power outrage .	Low	**Sensitivity:** • Exposed ground installation. • Illegal erection of power lines in flood prone areas. **Adaptive Capacity:** • The municipality is enhancing its adaptive capacity through the People 's Adaptation Plan (2025-2035) and Climate Resilient City Plan ,which prioritize resilient ,community led infrastructure and renewable energy adoption.	High	Moderate
Economic Infrastructure	• Flooding in the shoreline of Lake Victoria ,the lower part of shower ,Nyalkinyi , the major highways, the beaches that are located on flood prone areas the affects the normal economic activities of the people within these areas and beyond.	High	**Sensitivity:** • The location of the economic hubs • ... **Adaptive Capacity:** • Enhancing its adaptive capacity through community-based initiatives, the People's Adaptation Plan and Climate Change Acts.	High	Catastrophic

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Social Infrastructure	• Most schools, hospitals, health facilities are mainly found within the flood prone areas and often rely on dry weather roads to access institutional institutes. • The schools contain overwhelming number of learners. • Most school buildings are done using iron sheet materials and mud thatched houses increasing their exposure.	High	**Sensitivity:** • The geographic location. • Population density. • Low quality building materials. **Adaptive Capacity:** • The county government is carrying out an initiative "ondoa Kaunda" • People 's Adaptation Plan focuses on upgrading social infrastructure in informal settlements, improving flood prone.	High	Catastrophic
Populations					
Urban Residents	• Urban residents, particularly in informal settlements like sofia, shauri yako and makongeni face chronic exposure to surface flooding during heavy rains due to flat topography, backflow from lake ,inadequate drainage systems and clogged waste channels.	High	**Sensitivity:** • Flat topography • Clogged drainage systems • Inadequate drainage systems • ... **Adaptive Capacity:** • A community led approach. supported by Akiba Mashinani Trust and Global Center on Adaptation is focusing on mapping flood zones and implementing Nature-Based Solutions. • The municipality is working with international agencies to train on "Disaster Resilient Score Card '.	High	Catastrophic
Informal Settlement Residents	• The three informal settlements within Homa Bay Municipality are located in flat topography that are prone to flooding	High	**Sensitivity:** • Topography • Structural intergrity	High	Catastrophic

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	• Flat terrain has increased unregulated and concentrated development which in turn increases their exposure to flooding. • Most buildings in the informal settlements are built using iron sheets and mud		**Adaptive Capacity:** • Weak enforcement of legal urban planning frameworks • Limited resources and high poverty levels		
Vulnerable and Marginalized Groups	• Vulnerable groups in Homa Bay Municipality particularly in informal settlements like Sofia, Makongeni and Shauri -Yako face high to critical exposure.	High	**Sensitivity:** • Settlements patterns (informality) • ...Low lying areas **Adaptive Capacity:** • Limited resources • Limited accessible infrastructure. •	High	Catastrophic .
Natural Assets					
Urban Green Infrastructure	• Urban green infrastructure within the municipality faces moderate exposure to flooding especially in low lying lakeshore areas like Shauri Yako . • While green areas generally serve as buffer zones ,intense ,short-interval rainfall limits their absorption capacity ,exacerbating flood risks	Medium	**Sensitivity:** • Low lying area. • Proximity to Lake Victoria. • High intensity rainfall. **Adaptive Capacity:** • Due to limited formal infrastructure, residents in areas like Makongeni use local materials and knowledge to create makeshift drainage, reducing immediate flood risks. • Residents have organized manual clean-ups to clear blocked drains, and established early warning systems to manage.	Medium	Moderate
Urban Blue Infrastructure	• Urban blue infrastructure, including drainages and lake front areas faces	High	**Sensitivity:** • Proximity to the lake • Low -lying area.	High	Catastrophic

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	high risk flood exposure particularly in informal settlements. • Intensive rainfall causes severe overflow, disrupting local markets and causing significant erosion due to the city's low-lying lakeshore. • Flooding affects pockets near tourist hotel and the main market leading to high impact disruption. • ...		**Adaptive Capacity:** • Community -Driven Adaptation. • Informal interventions. • Formal planning integration.		
Peri-urban and Agricultural Systems	• Peri -urban and agricultural systems face high exposure to flooding particularly in low -lying areas lakeside areas like shauri, fish landing beaches, the Nyalkinyi area.	High	**Sensitivity:** • Low -lying areas and lake zone areas (littoral zones) high risk zone for flooding. • Increasing urban growth into hazard prone areas. **Adaptive Capacity:** • Low adaptive capacity but being actively enhanced through community -led action plans and county climate strategies.	High	Catastrophic.

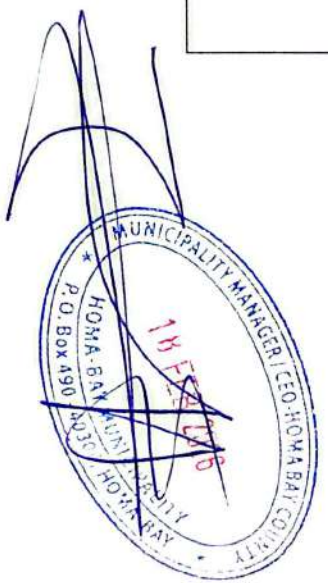


Table 14: Exposure, Vulnerability, and Impacts of Extreme heat on Urban Elements.

Hazard: EXTREME HEAT.

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Infrastructure & Services					
Stormwater Drainage	• Storm water drainage systems are highly exposed to extreme heat waves • The storm water drainage systems are constructed in low-lying areas that are high risk zones.	High	**Sensitivity:** • Low lying areas. • Structural composition. **Adaptive Capacity:** • Upgrading infrastructure. • Leveraging community-led efforts. **Adaptive Capacity:** • Adaptive capacity of water and waste water is currently undergoing a major transformation, moving from a highly vulnerable system to a more resilient one by. 2035.	High	Catastrophic
Solid Waste Management	• The solid waste management waste receptacles and lagoons are located in urban areas, areas with gray infrastructure and are prone to urban heat effect. • Solid waste management face severe elevated risks of heat related illnesses. • Disposal is done in landfills; extreme heat accelerates waste decomposition causing increased odors.	Medium	**Sensitivity:** • Location. • Institutional gaps. • Methods of waste disposal. **Adaptive Capacity:** • Homa Bay Municipality is enhancing the adaptive capacity of its solid waste management to extreme heat by integrating climate resilience into solid waste management policy and solid waste management plan. • Community -	High	Major

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
Transport and Mobility	• Transport and mobility in Homa Bay Municipality face high exposure to extreme heat, driven by intense sunshine in the Lake Victoria Basin, which disrupts pedestrian and informal transit, increasing health risks and reducing mobility.	High	**Sensitivity:** • Limited unshaded infrastructure. • High reliance on open air transport. • Rising urban temperatures • Proximity to the lake. **Adaptive Capacity:** • Homa Bay Municipality is enhancing adaptive capacity of its transport sector in extreme heat through the "People Led Adaptation Plan "and improved infrastructure, aiming to mitigate risks, like surface temperatures.	Medium	Major
Energy	• Most settlements within the municipality are located within the urban core an area that is mainly affected by extreme heat. • Most settlements are boardering lake region exposing the residents and existing infrastructure to extreme heat. • The prevalence of heat absorbing building materials and strain on electrical systems during peak demand. • Extreme heat waves impact the functionality of power distribution networks.	High	**Sensitivity:** • Proximity to the lake • Location within the urban core. **Adaptive Capacity:** • Locally led adaptations • Capacity building . • Over 300 local youth were involved in household mapping and enumeration, boosting local capacity and ownership of resilience strategies.	High	Catastrophic
Economic Infrastructure	• Major markets and trading centers are located on the hazard prone areas. • Are near to the Lake Basin area affected by extreme heat.	High	**Sensitivity:** • Proximity to the risk zone • Nature of building materials.	Medium	Major

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
			Adaptive Capacity: • Limited resources • Increase in illegal stalls to replace the open air selling which is the most used method.		
Social Infrastructure	• Most schools and health facilities are within the hazard prone areas, with poorly constructed iron sheets materials increasing the exposure to effects of extreme heat changes	High	**Sensitivity:** • Location within hazard prone areas • Proximity to the Lake Basin. **Adaptive Capacity:** • County Government led initiative ,"Ondoa Kaunda" that is doing away with the mabati structures in schools and replacing them with permanent structure . • Limited resources	High	Catastrophic
Emergency Services	• Emergency services in Homa Bay municipality, including firefighters and health workers, face significant exposure ,including high temperatures and heatwaves. • Most emergency facilities are located within the urban core, an area that is prone to extreme heat.	High	**Sensitivity:** • Proximity to lake basin • Urban Heat. Island effect • Location in low lying areas. **Adaptive Capacity:** • Actively building adaptive capacity of its emergency services to manage extreme heat by strengthening policy frameworks and improving response coordination. • ...	Medium	Major
Populations					
Urban Residents	• Urban residents within the municipality face high exposure to extreme heat driven by its location in the climate - sensitive Lake Victoria Basin.	High	**Sensitivity:** • Location • Rapid urban growth • High population density.	High	Catastrophic

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	• The combination of rapid urban growth and high population density significantly increases the risk.		**Adaptive Capacity:** • High poverty levels reduces the capacity to adapt. • …		
Informal Settlement Residents	• Informal settlements such as shauri yako,makongeni and sofia face high exposure to extreme heat ,driven by 80% of dwelling being constructed from corrugated iron sheets ,high density ,unplanned development ,inadequate ventilation and green spaces.	High	**Sensitivity:** • Construction materials • Population density • Location of the settlements. • Inadequate ventilation **Adaptive Capacity:** • Strengthening their adaptive capacity through a Global Center on Adaptation People's Adaptation Plan. • …	High	Catastrophic
Vulnerable and Marginalized Groups	• Most vulnerable and marginalized live in informal settlements with poorly built houses that increases their exposure to impacts of extreme heat. • …	High	**Sensitivity:** • Locality • Structural integrity. **Adaptive Capacity:** • Limited adaptive capacity, due to limited resources and high poverty level. • Social exclusion land and property ownership reduces their ability to cope up with the challenges.	High	Catastrophic
Natural Assets					
Urban Green Infrastructure	• The urban green infrastructure is mainly located within the urban core ,an area that is close to the shoreline of Lake	High	**Sensitivity:** • Location • Proximity to the lake	Low	Moderate

Category	Exposure (Description)	Exposure Level	Vulnerability (Description)	Vulnerability Level	Impact Level
	Victoria ,an area that is highly exposed to extreme heat .		**Adaptive Capacity:** • Community -led initiatives -95% of local residents rely on tree planting and 70% on planting vegetation. • Informal settlements are prioritizing greening to mitigate extreme heat. • Strategic planning. The Akiba Mashinani Trust and Global Center on Adaptation are helping to formalize this by integrating green space development into municipality's official land -use plans.		
Urban Blue Infrastructure	• Most blue infrastructure are located within the low -lying areas of the municipality, areas that are prone to extreme heat • The lake is fed by rivers, e.g. rangwena that reduces in volume due to rise in temperatures • A greater population around relies on the blue infrastructure for domestic and commercial purpose hence increased pressure on the water resources during extreme heat.	High	**Sensitivity:** • Location • Population density **Adaptive Capacity:** • Nature based solutions • Climate resilient urban planning • Most residents have opted to rain water harvesting.	Medium	Major
Peri-urban and Agricultural Systems	• Most agricultural systems are located within low lying areas of the municipality, around the shoreline which majorly depend on irrigation.	Medium	**Sensitivity:** • Location • ... **Adaptive Capacity:** • Diversifying irrigation methods. • Chicken rearing.	Medium	Moderate

4. Climate Risk Assessment

Homa Bay Municipality faces critical climate risks, primarily driven by severe flooding, droughts and temperatures extremes ,heavily affecting infrastructure ,water and sanitation .Key risks include Lake Victoria water level fluctuations ,destruction of drainage systems ,and waterborne diseases exacerbated by rapid ,unplanned urban growth .Vulnerable areas like Makongeni ,Shauri Yako and Sofia facing the highest risks

For this Urban Climate Risk Profile, the following matrix summarizes overall risk for each urban element by combining the assessed hazard level and the estimated impact level

Table 15: Risk matrix

		Hazard Level		
		Low	Medium	High
Impact Level	Catastrophic	High	Very High	Very High
	Major	Medium	High	Very High
	Moderate	Low	Medium	High
	Minor	Low	Low	Medium
	Insignificant	Very Low	Low	Low

For this Urban Climate Risk Profile, risk levels should be interpreted based on the table below

Table 16: Interpretation of risk levels

Level	Interpretation
Very High	Very high risks are unacceptable. Risk should be avoided, reduced or transferred. Immediate planning and implementation of risk reduction measures is required. Allocate resources and coordinate interventions to prevent or minimize impact.
High	High risks should be actively addressed. Develop and implement mitigation actions promptly. Monitor environmental indicators and ensure readiness of emergency or adaptation measures.
Medium	Medium risks should be managed. Plan and implement mitigation activities to reduce them to acceptable levels. Regularly review climate data and risk levels.
Low	Low risks are acceptable under current conditions. Minimal control or monitoring is needed, provided they remain stable and do not escalate.
Very Low	Very low risks are negligible in terms of likelihood and consequences. No immediate action is required beyond routine monitoring and periodic review.

4.1. Current and Future Climate Risks on Urban Elements.

Table 17: Summary of drought risks for Homa Bay Municipality.

	Time Horizon & Climate Scenario	Current	2050 SSP2 4.5	2050 SSP5 8.5	2100 SSP2-4.5	2100 SSP5 8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services						
Stormwater Drainage	Major	Medium	Medium	High	High	High
Water & Wastewater Management	Moderate	Medium	Medium	Medium	Medium	Medium
Solid Waste Management	Major	Medium	Medium	High	High	High
Transport and Mobility	Major	Medium	Medium	High	High	High
Energy	Moderate	Medium	Medium	Medium	Medium	Medium
Economic Infrastructure	Major	Medium	Medium	High	High	High
Social Infrastructure	Catastrophic	High	High	High	High	High
Emergency Services	Moderate	Medium	Medium	Medium	Medium	Medium
Populations						
Urban Residents	Major	Medium	Medium	High	High	High
Informal Settlement Residents	Catastrophic	High	High	High	High	High
Vulnerable and Marginalized Groups	Catastrophic	High	High	High	High	High
Natural Assets						
Urban Green Infrastructure	Moderate	Medium	Medium	Medium	Medium	Medium
Urban Blue Infrastructure	Moderate	Medium	Medium	Medium	Medium	Medium
Peri-urban and Agricultural Systems	Catastrophic	High	High	High	High	High

Table 16: Summary of pluvial flooding risks for Homa Bay Municipality

Categories	Time Horizon & Climate Scenario Hazard Level / Impact	Current	2050 SSP2 4.5	2050 SSP5 8.5	2100 SSP2 4.5	2100 SSP5 8.5
		Risk Levels				
		Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
Infrastructure & Services						
Stormwater Drainage	Catastrophic	High	High	High	High	High
Water & Wastewater Management	Catastrophic	High	High	High	High	High
Solid Waste Management	Catastrophic	High	High	High	High	High
Transport and Mobility	Catastrophic	High	High	High	High	High
Energy	Moderate	Medium	Medium	Medium	Medium	Medium
Economic Infrastructure	Catastrophic	High	High	High	High	High
Social Infrastructure	Catastrophic	High	High	High	High	High
Populations						
Urban Residents	Catastrophic	High	High	High	High	High
Informal Settlement Residents	Catastrophic	High	High	High	High	High
Vulnerable and Marginalized Groups	Catastrophic	High	High	High	High	High
Natural Assets						
Urban Green Infrastructure	Moderate	Medium	Low	Low	Low	Low
Urban Blue Infrastructure	Catastrophic	High	High	High	High	High
Peri-urban and Agricultural Systems	Catastrophic	High	High	High	High	High

Table 19: Summary of extreme heat risks for Homa Bay Municipality.

	Time Horizon & Climate Scenario	Current	2050 SSP2-4.5	2050 SSP5-8.5	2100 SSP2-4.5	2100 SSP5-8.5
	Hazard Level					
Categories	**Impact**	**Risk Levels**				
		Current	**2050 SSP2-4.5**	**2050 SSP5-8.5**	**2100 SSP2-4.5**	**2100 SSP5-8.5**
Infrastructure & Services						
Stormwater Drainage	Catastrophic	High	Medium	Medium	Medium	High
Solid Waste Management	Major	Medium	Medium	Medium	Medium	High
Transport and Mobility	Major	Medium	Medium	Medium	Medium	High
Energy	Catastrophic	High	High	High	High	High
Economic Infrastructure	Major	Medium	Medium	Medium	Medium	High
Social Infrastructure	Catastrophic	High	High	High	High	High
Emergency Services	Major	Medium	Medium	Medium	Medium	High
Populations						
Urban Residents	Catastrophic	High	High	High	High	High
Informal Settlement Residents	Catastrophic	High	High	High	High	High
Vulnerable and Marginalized Groups	Catastrophic	High	High	High	High	High
Natural Assets						
Urban Green Infrastructure	Moderate	Medium	Medium	Medium	Medium	Medium
Urban Blue Infrastructure	Major	Medium	Medium	Medium	Medium	High
Peri-urban and Agricultural Systems	Moderate	Medium	Medium	Medium	Medium	Medium

4.2 Climate Risk Hotspots

Climate risk hotspots in Homa Bay Municipality are primarily concentrated in areas where urban development, socio-economic vulnerability, and natural hazard intersect. These hotspots are primarily located along the Lake Victoria shoreline and within densely populated informal settlements, and in peri-urban agricultural zones. The main drivers include , rapid urbanization, poor waste management, encroachment on floodplains, limited stormwater infrastructure ,raising lake water levels ,and the impacts of climate change ,such as higher temperatures ,prolonged droughts ,and intense rainfall events .

Flood prone areas include Homa bay town, the three informal settlements that is Shauri Yako, Makongeni and Sofia, Arujo, parts of Asego, Nyalkinyi ,Angalo

Drought prone areas include the peri-urban and agricultural lands on the outskirts of Homa Bay town are highly sensitive to droughts, which affect small -scale farming, livestock and water availability of households.

Extreme heat hotspots are prone in densely urban areas with limited tree cover, impervious surfaces, and minimal green infrastructure experience urban heat islands, informal settlements disproportionately affected due to inadequate housing materials and lacking cooling materials. The informal areas include shauri yako, Makongeni and Sofia.

Figure 6: Surface Temperature prone areas.

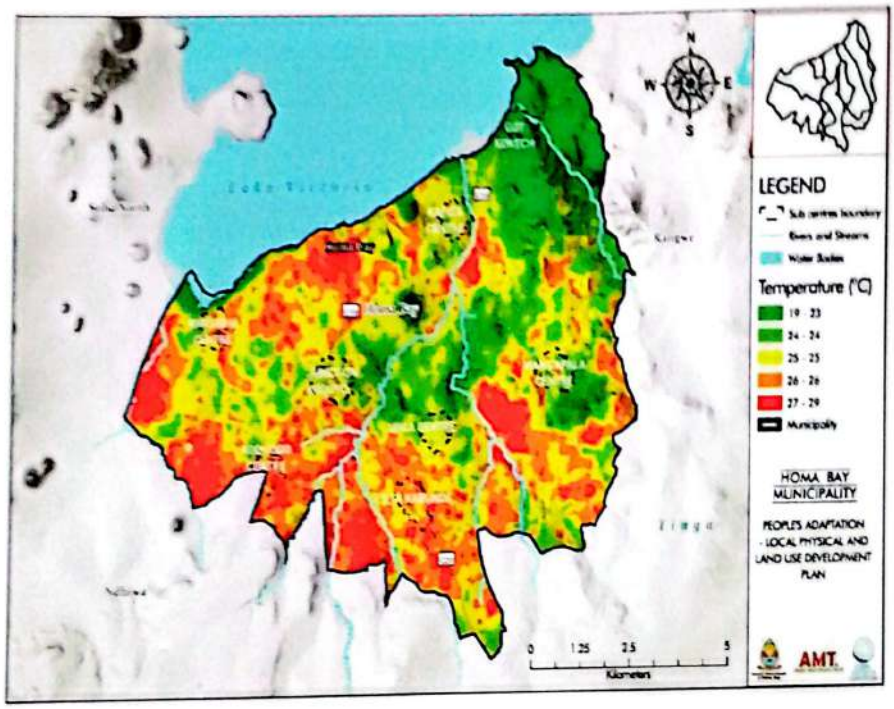
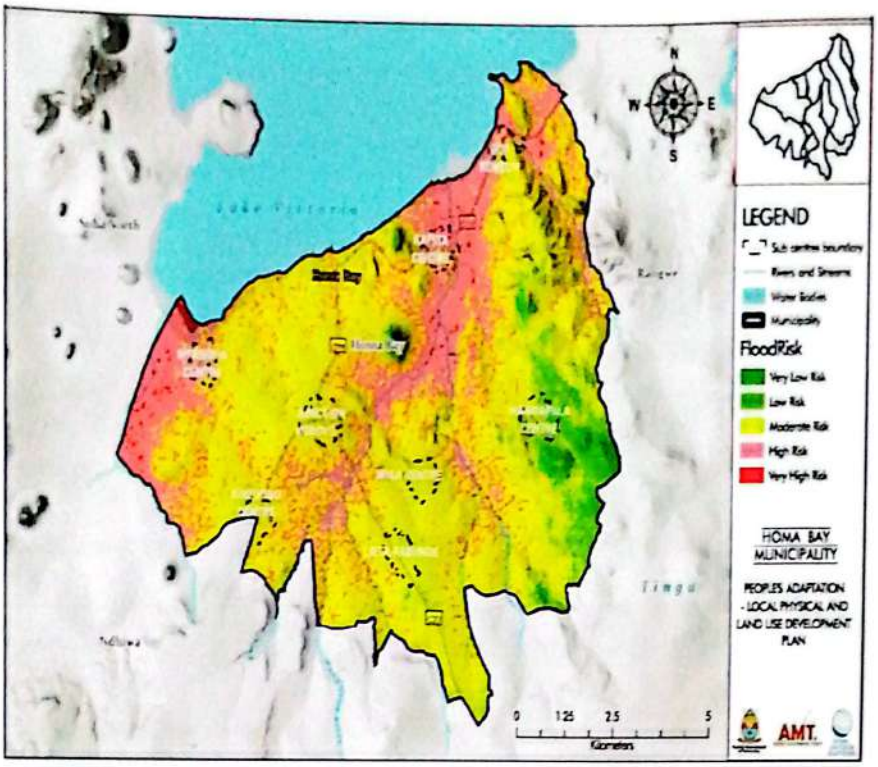


Figure 7: Flood Risk zones.



SOURCE: (PALPLUP).

5. What's Next?

5.1. Key Findings.

The main climate hazards for Homa bay municipality are pluvial flooding, drought and extreme heat. pluvial flooding and extreme heat consistently affect infrastructure, populations and natural assets. Drought mainly affects peri-urban agriculture, solid waste management, energy and informal settlements.

Informal settlements residents, and vulnerable/marginalized groups face highest combined risk across all hazards. Critical infrastructure (stormwater drainage, transport, and social infrastructure, and energy systems is highly exposed to both floods and heat.

Flooding risks will remain high to catastrophic under both SSP2-4.5 and SSP 5-8.5 scenarios through 2100 due to urbanization, shrinking permeable surfaces and lake level rise.

Extreme heat is projected to intensify particularly in urban centers and informal settlements, aggravating population and vulnerability.

Drought risks are projected to increase for agricultural systems and water dependent infrastructure.

Table 20: a Summary of climate risks affecting urban elements for Homa Bay Municipality.

Category	List of Key Hazards		
	Current	Mid-term (2050)	Long-term (2100)
Infrastructure & Services			
Stormwater Drainage	Pluvial flooding-high Extreme heat-high	Pluvial flooding-high	Pluvial flooding -high
Water & Wastewater Management	Pluvial flooding -high	Pluvial flooding -high	Pluvial flooding-high
Solid Waste Management	Drought - major Pluvial flooding-High	Pluvial flooding-high	Pluvial flooding-high
Transport and Mobility	Drought - major Pluvial flooding -high	Pluvial flooding-high	Pluvial flooding -high
Energy	Extreme heat-high	Drought - moderate	Extreme heat-high
Economic Infrastructure	Drought - major Pluvial flooding -high	Pluvial flooding-high	Pluvial flooding -high
Social Infrastructure	Drought – catastrophic	Extreme heat -catastrophic	Extreme heat-catastrophic
Emergency Services	Drought - moderate	Extreme heat-high	Extreme heat-high
Populations			

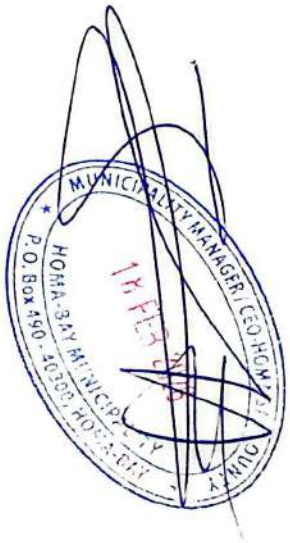
Category	List of Key Hazards		
	Current	Mid-term (2050)	Long-term (2100)
Urban Residents	Drought - major Pluvial flooding-high	Pluvial flooding-high	Pluvial flooding -high
Informal Settlement Residents	Drought - catastrophic Pluvial flooding-high	Pluvial flooding-high	Pluvial flooding -high
Vulnerable and Marginalized Groups	Drought - catastrophic Pluvial flooding -high	Pluvial flooding-high	Pluvial flooding -high
Natural Assets			
Urban Green Infrastructure	Drought - moderate	Extreme heat-moderate	Extreme heat-moderate
Urban Blue Infrastructure	Pluvial flooding -high	Pluvial flooding -high	Pluvial flooding-high
Peri-urban and Agricultural Systems	Drought - catastrophic	Pluvial flooding-high	Pluvial flooding-high

5.2. Climate Adaptation and Resilience Solutions

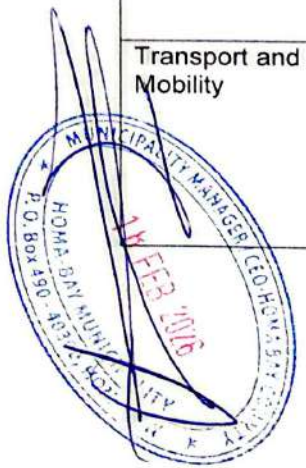
Climate adaptations and resilience solutions involved, proactive ,multisectoral strategies to manage risks from climate change ,ranging from infrastructure strengthening to ecosystem based approaches.

Table 21: Climate adaptation and resilience solutions recommended for Homa Bay Municipality.

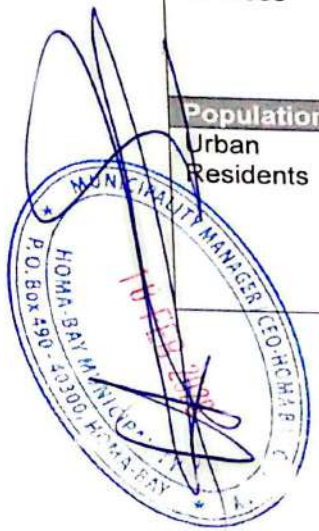
Category	Recommended Solutions		
	Immediate	**Mid-term**	**Long-term**
Infrastructure & Services			
Stormwater Drainage	• Rainwater harvesting to reduce surface runoff. • Regular removal of debris and sediments. • Early warning systems and participatory.	• Nature -based solutions, using green buffers and native vegetation to improve micro climate. • Construction of water pans ,infiltration trenches and basins in low-lying areas of Shauri ysko ,Sofia and Wiga.to regulate run -off and support urban water harvesting .	• Construction of primary drainage systems along arterial and sub arterial roads to be designed for rapid yet regulated conveyance of storm water incorporating sediments traps, check dams and flood detention features to prevent erosion and downstream flooding. • Semi -permeable pavements on sidewalks and parking areas will enhance infiltration.



Category	Recommended Solutions		
	Immediate	**Mid-term**	**Long-term**
Water & Wastewater Management	• Regreening of the shoreline by planting more trees. • Planting of bamboo trees for water purification. • Repair of waster pipes and upgrading the water management sytems.	• Installation of sewer mains along major roads to enhance wastewater conveyance from residential ,institutional and commercial premises . • …	• Upgrading the Ngegu Water treatment plant into a Central Flocculation Unit .this upgrade will integrate energy efficient pump,solar power systems and automated flow control to reduce carbon intensity. • Expansion of the Lakefront Water treatment plant from 8,800m3 to 11,800m3 to meet growing demand. • Construction of two new boreholes in Olodo and Wangapala, each with 80m3 elevated tanks powered by renewable energy. • Construction of modern sewer treatment plant at Rangwena ,incorporating biodigesters for biogas recovery and ,constructed wetlands for tertiary treatment.
Solid Waste Management	• Civic education program to promote waste segregation at source. • Public -private partnership. • Regular clean -ups.	• Full implementation of the solid waste management policy • Constant Monitoring and implementation of the municipal solid waste management plan.	• Construction of a material recovery facility. • …
Transport and Mobility	• Use of early warning signs. • Using digital platforms to alert commuters on hazards. • Clearing and expanding drainage systems in flood prone areas. • Capacity building	• Implementing. Climate proof repairs . • Raising road levels. • Greening of roads.	• Integrating universal design standards into transport infrastructure to ensure accessibility to all residents. •



Category	Recommended Solutions		
	Immediate	Mid-term	Long-term
Energy	• Complimentary civic education and awareness programs to promote clean energy adoption, energy efficiency and conservation. • These campaigns will empower residents to participate in Kenya's green transition.	• Modernization of existing power station to incorporate smart grid technique and energy efficient systems to enhance capacity and climate resilience, ensuring a stable power even during high temperatures. • To expand access and equity in distribution of solar mini gids to off grid areas. • …	• Development of a county energy policy and plan that incorporates climate resiience. • …
Economic Infrastructure	• Early warning systems • Unclogging of drainage systems	• Green corridors • Decongestion of market centers.	• Implementation of the Locally Led People's Adaptation plan • Integrating climate smart practices in trading and busines areas
Social Infrastructure	• Early warning systems • Civic education and awareness on climate related issues.	• Planting of trees in schools. • Building of more schools to accommodate the growing population.	• Building of climate smart buildings within the schools, health facilities and entertainment points. • …
Emergency Services	• Early warning systems. • Training of the emergency service providers and. • Creation of awareness on emergency evacuation and drills.	• Improve rapid response capabilities. • Improved communication channels. • Temporary flood barriers. •	• Emergency and first Aid Response posts in Arujo, Got Kokech and Rangwena bridge as part of the wider municipal emergency network • Spatially -based intelligence systems.
Populations			
Urban Residents	• Construction and clearing of drainage ditches to alleviate waterlogging • Organizing clean-ups and utilizing local knowledge to identify and mitigate hazards. • Early warning systems.	• Enforcing land -use planning to avoid flood prone areas. • Adapting resilient building materials.	• Integrating the People's Adaptation Plan into municipality's initiatives. •



Category	Recommended Solutions		
	Immediate	**Mid-term**	**Long-term**
Informal Settlement Residents	• Construction and clearing of drainage to alleviate waterlogging. • Early warning systems. • Construction of green corridors. • Tree planting.	• Promoting the use of resilient building materials • Economic empowerment of the informal residents to increase their adaptive capacity. • Disaster risk tracking. • Implementation of drainage measures at critical corridors.	• Formalizing informal settlements into county planning frameworks • Integrating the People's Adaptation Plan into municipality's initiatives • Full implementation of the People -Led Adaptation Pan
Vulnerable and Marginalized Groups	• Early warning systems. • Cleaning and unclogging drainage systems within the informal settlements. • Proactive relocation strategies for vulnerable groups in high risk areas.	• Empowerment of women and girl child to increase their adaptive capacity to effects of climate hazards •	• Development of an elderly care facility /rescue center • Relocation of the vulnerable groups from hazard areas •
Natural Assets			
Urban Green Infrastructure	• Early warning systems . • Planting of indigenous ,drought resistant vegetation in drought prone areas. • …	• Installation of bioretention area to absorb flood waters. • Adopt a checklist for designing green infrastructure that can withstand extreme weather.	• Nature -based solutions and community Led initiatives guided by the locally Led People's Adaptation Plan • Enforcing sustainable land use planning • Upgrading drainage systems
Urban Blue Infrastructure	• Early warning systems. • Planting of trees along the shoreline, • Enhancing waste collection services to prevent debris from blocking drainage channels. • Public awareness snd education on conservation of blue infrastructure.	• Sustainable drainage systems. • …	• Replacing, elevating or upgrading water and sanitation systems • Enforcing zoning regulations that restrict development in hazard prone zones • Implementing the People s Adaptation Plan
Peri-urban and Agricultural Systems	• Early warning systems. • Creation of awareness and education to farmers. • …	• Rehabilitation of water storage structures. • Promotion of tree planting and vegetation cover to reduce soil erosion. • …	• Shifting from reliance on single crops to mixed farming. • Adoption of drought tolerant ,early maturing crop varieties

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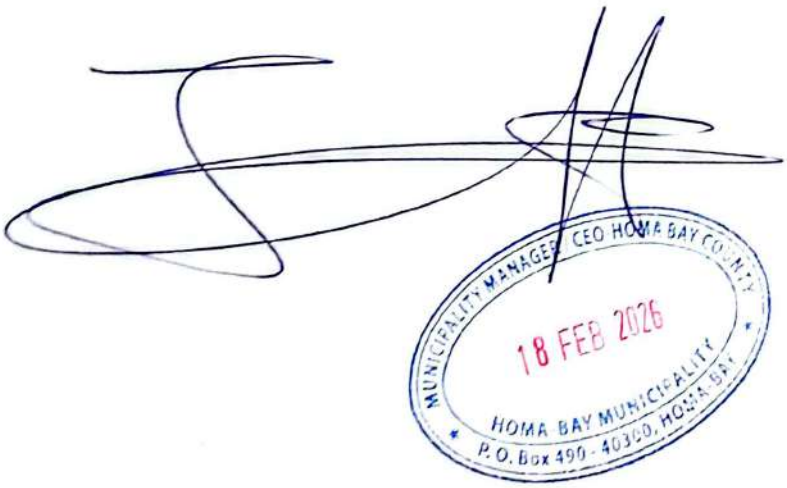

Annex N1. Historical Hazard Events.

Hazard Event/Type	DROUGHT
Date or Period	Late November 2016 -early 2017.
Location	Homa bay Town and peri -urban areas
Intensity	Severe Drought.
Social Impacts	Food security and malnutrition. Water scarcity and health risks Increased burden on women and children. Forced migration and social disruption. Education interruptions.
Physical Impacts	Infrastructure stress Environmental degradation. Livestock mortality. Health hazards.
Economic Impacts	Reduced agricultural and livestock productivity. Increased household costs and income Reduced economic activity in markets.
Ecological Impacts	Degradation of Aquatic Ecosystems. Loss of Biodiversity and Habitat. Land degradation and soil erosion. Destruction of water sources.