Kisumu County

Participatory Climate Risk Assessment Report

Financing Locally-Led Climate Action

MAY, 2023

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Acronyms

DANIDA- Denmark Development Cooperation

CCAP- Climate Change Action Plan

CGK-County Government of Kisumu

CIDPs- County Integrated Development Plan

CSOs- Civil Society Organizations

DOSH-Directorate of Occupation Safety and Health

EWS- Early Warning System

FLLOCA-Financing Locally Lead Climate Action

GHG-Green House Gas

GIZ- German Agency for International Cooperation

GIS- Geographical Information System

ICIPE- International Centre of Insect Physiology and Ecology

ICT- Information Communication Technology

IPCC- Intergovernmental Panel on Climate Change

JICA- Japan International Cooperation Agency

KALRO - Kenya Agriculture and Livestock Research Institute

KEFRI- Kenya Fisheries and Research Institute

KFS- Kenya Forest Service

KFW-German Development Bank

KIWASCO- Kisumu Water and Sanitation Company

KISIP- Kenya Informal Settlement Improvement Project

KMD- Kenya Meteorological Department.

KRCS-Kenya Red Cross Society

MOH-Ministry Of Health

NCCAP- National Climate Change Action Plan

NDC- Nationally Determined Contributions

NEMA- National Environment Management Authority

NGK-National Government of Kenya

NGO- Non-governmental Organization

PCRA - Participatory Climate Risk Assessment

PWDs-People With Disabilities

SDI- Slum Dwellers International

UNFCCC- United Nations Framework Convention on Climate Change

UoN-University of Nairobi

VMGs-Vulnerable and Marginalized Group

WECC&NR- Department of Water, Environment, Climate Change and Natural Resources

WRA - Water Resources Agency

WRUAs- Water Resources Users' Associations

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Executive Summary

The participatory Climate Risk Assessment was conducted in the County between 2nd May, 2023 to 20th May, 2023. The objective of the PCRA was to conduct community assessments of hazards, vulnerabilities, and local coping strategies in a participatory way to provide a basis for the development of more effective and sustainable adaptation strategies and investments can support vulnerable groups. The validation was done together with local stakeholders in rural and urban communities.

The choice to involve people in driving their own agenda in climate action through public participation leads to sustainable development. It is important to implore the slogan "leave no one behind" when identifying and prioritizing projects for implementation. Participatory Climate Risk Assessment (PCRA) was conducted in 35 wards in Kisumu as a way of involving the community who are in reality with impacts of climate change.

Cumulatively, drought, storms, extreme temperatures and flooding have resulted in the displacement of families, loss of crops and livestock, malnutrition among children and outbreak of water born diseases. A clear understanding of the resources that communities own were identified through mapping and processed by the people themselves. The communities also proposed priorities that can be turned to investment opportunities in every Ward through climate finance. Financing Locally Led Climate Action (FLLOCA) which supported this work has given a condition that for Counties to meet minimum conditions, they must conduct Participatory Climate Risk Assessment.

To enhance the spirit of togetherness the Technical Working Group that was appointed reflected the phase of inclusivity in gender, PWD, institutions of higher learning (Maseno University), National Government, Muungano group from urban settlements and the NGOs in the City. The findings can be shared with, amongst others students from universities and colleges

It's hoped that the PCRA will support the priorities proposed by the community and will guide the process of implementation as well as enhance Climate adaptation and mitigation in the community. Kisumu County has established a bottom-up structure for climate actions and this gives the community a voice about their investments.

Chapter One: Context of the Participatory Climate Risk Assessment (PCRA)

1.1 **Background**

Kisumu County is one of the 47 Counties in Kenya. It lies within longitudes 33° 20'E and 35° 20'E and latitudes 0° 20'South and 0° 50'South. The County is bordered by Homa Bay County to the South, Nandi County to the North East, Kericho County to the East, Vihiga County to the North West and Siaya County to the West. The County covers a total land area of 2,009.5 km^2 and a total water area of 567 km^2. The , said land area representing about 0.36% of the total land area of Kenya. The population of the County according to the 2009 Population and Housing Census was estimated at 1,155,524 million people, with the main ethnic groups being the Luo. Out of the said total persons, some 560,942 males and 594,609 females and 23 Intersex. The said total figure has been projected to increase to 1,290,016 in 2025 and 1,329,805 in 2027 respectively. The rapidly increasing population stated above requires increased investments in basic social infrastructure and utilities such as schools, health infrastructure, water, sanitation and services.

The County consists of seven constituencies namely: Kisumu East, Kisumu West, Kisumu Central, Seme, Nyando, Muhoroni and Nyakach. There are a total of 35 wards in the County.

Kisumu County is among the most-at-risk and most vulnerable Counties to climate change impacts in Kenya. The climate risks, which include flooding, drought, high temperatures and lake level rise make many communities exposed due to inadequate coping mechanisms and absolute poverty, which currently stand at 60%. Climate Change action in the County is guided by the National Climate Change Act, 2016 as well as the National Climate Change Action Plan (NCCAP, 2018-2022). In the recent past, mainstreaming of climate change action has been achieved through incorporation in the County Integrated Development Plan (CIDP) process. Besides that, sectoral working groups and departmental strategic plans have been enriched through sensitization and capacity building workshops and strategic meetings aimed at mainstreaming climate change in various sectors of the county operations. However, inadequate data and nominal community involvement still remains a challenge that affects implementation of climate action, especially at the local (ward) level.

In the year 2020, the County Government of Kisumu conducted a Climate Risk and Vulnerability Assessment in the entire County, with support from Transparency International. The findings indicated that high temperatures, flooding as well as drought are among the serious risks that need to be checked to enhance adaptation and resilience in the communities. According to the Assessment Report, temperatures are steadily rising across the County, and all the Intergovernmental Panel on Climate Change (IPCC) scenarios show that temperature will continue to increase significantly until the end of this century. In the Kano Plains for example, yearly flood-related losses are estimated at US$ 850,000 (Masese et al., 2016), while relief needs

amount to US$ 600,000 annually. Such events represent significant barriers to food security and poverty alleviation efforts in the County. The vulnerable population which includes children, youth, women, elderly and marginalized groups are particularly adversely affected. Kisumu County is therefore vulnerable to climate change, necessitating the design and implementation of an ambitious climate change adaptation strategy. This Participatory Climate Risk Assessment (PCRA), supported by the FLLOCA Program, has come at the most opportune time to provide the necessary evidence needed to cushion the vulnerable segment of the population who bear the highest burden from climate change impacts.

1.2 **Policy Context**

Kenya acknowledges that climate change is a global phenomenon that impacts on vulnerable communities and therefore requires instituted policies and statutes to address the issue. Some of the key frameworks from the national landscape are highlighted in the table below;

1.2.1 National Framework

National Framework	Description
The Kenya Constitution	Stipulates that every Kenyan has a right to a clean and healthy environment free from pollution or other disruptions that affects them from healthy living. It further provides for sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits;
Kenya Vison 2030	Encourages all Kenyans to work towards meeting the target of 10% tree cover by 2030 as well as managing solid waste sustainably.
Climate change Act, 2016	All sectors including the Counties to mainstream climate change in sector planning, budgeting and implementation
National Climate Change Action Plan (2018-2022)	sets out bold measures to ensure that our development remains sustainable in the event of any adverse climate change impacts, including droughts, floods, and other extreme climate events that have in the recent past occasioned far-reaching negative implications on our economy.
H.E President Ruto's directive on 22nd December, 2022	Aims to encourage all Kenyans to plant 15 billion trees to restore degraded landscapes by 2032

1.2.2 County Policies and Legislation

To build on the existing national frameworks the County Government of Kisumu has domesticated the policies to contribute the Nationally Determined Contributions (NDC) as well as be in line with the global

agenda of reducing green hose gas effects below 1.5 % . These policies are implemented by key agencies in the respective line ministries in which the specific policies are domiciled.

County Policies and Legislation	**Description**
Kisumu County Climate change policy, 2019	In view of Kisumu's high vulnerability to adverse impacts of climate change, in particular extreme events, adaptation efforts are the main focus of this policy document while not forgetting the need for mitigation. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. These cover policy actions addressing sectors such as water resources, agriculture, forestry, biodiversity and various vulnerable ecosystems.
Kisumu County Climate Change Act, 2020	Is a mirror of the National climate change Act, 2016 with the aim of stipulating the roles and responsibilities of various institutions to the ward level where locally led actions are implemented. It also explains and provides the County Climate Change fund mechanism where 2% of development is to be set aside for climate change investments.
Public Participation policy, 2023	Alludes to the fact that every development trajectory be subjected to public involvement and participation where the vulnerable and marginalized are all given chance to contribute in decision making process.Specifically, the County Public Participation Policy requires that not more than 2/3 of either gender, male or female should dominate a forum and that participants should be given adequate notice to attend such meetings.
Kisumu County Climate Fund Regulations,2023	The regulation provides for a pathway to prudent utilization of resources meant for climate change activities as well as the responsible persons.
Kisumu County Integrated Climate Change Action Plan 2023-2027	Provides an integrated framework for climate action in the County bringing together state and non-state actors to respond to climate change

To ensure inclusivity and optimum community participation, the County Climate Change management and coordination structure starts from the ward level to the County Climate Council, chaired by the Governor.

1.3 Key Steps in the County's PCRA process

1.3.1 Creation of the Technical Working Group

This was initiated by first informing the Chief officer on the proposed membership through the Director Climate Change. To ensure it was exhaustive and representative we considered sector representation and Academia, National Government, technical committee members and the Climate Change Unit members. The County had an existing climate change technical working group from which we brought some members. A total of 33 members formed the technical working group were identified for training. Other considerations for appointment to the technical working group included gender, commitment to create time for the work, past experience in working on similar tasks. The team was divided into 7 to cover 7 sub-counties in Kisumu.

1.3.2 Training of Technical Working Group

The Technical Working Group was trained for three days by facilitators who were trained on PCRA process. The training centered on the PCRA process, how to handle the community members, the stakeholders in the respective wards and Sub- County. It was also a learning session for the technical team to refresh themselves with policies relevant to the process. Templates were shared and mock focus group discussions per ward were conducted to bring out the real picture of the work ahead. The training also incorporated the Sub-county administrators and opinion leaders to guide on administrative aspects and to appreciate the importance of the PCRA process.

1.3.3 Stakeholder Identification and Analysis

The stakeholders were identified by the Technical Working Group during the training session with the support from the Sub-County administrators who attended the meeting. The workshop was divided into seven representing the seven Sub-counties and the teams to confirm their activities from the ground. The organizations from different wards included; community based organizations, learning institutions, NGOs, farmer groups, Government institutions and small Micro-Enterprises. The strengths and weaknesses were also discussed about the stakeholders.

1.3.4 Preparation of Ward Level Engagements

A letter was drafted and signed by the Chief officer and disseminated to the Director Administration who was to dispatch the same to Ward administrators and Sub-county administrators. The letter had a schedule with dates of the meeting and number and categories of participants who were to be invited to the workshops. The technical working group facilitated the session during the ward engagements. Tools and materials and venue allocation was done earlier to facilitate a smooth process.

1.3.5 Engagement of Communities at the Ward level on PCRA

The ward level engagement was done with a group of 25 participants representing each ward. Two wards were combined in one session of 50 participants and during assessments each ward did their own. The

participants consisted of community members including Ward climate change planning committees, National government administrative officials, Youths, PWDs, Community Based Organizations, The program guideline was followed where opening, introductions and expectations were done, followed by mapping, Historical seasonal calendar and vulnerability assessment.

1.3.6 Data Analysis and Preparations for the County Level Participatory Climate Change Risk Assessment

A report from the field was compiled from every team/sub-county by the technical teams then forwarded to a select technical team which analyzed the data and put up a report in a five day's workshop held in Homa Bay. Sketch maps, hazard maps capturing the main hazards and prioritized action per ward and sub-county level and investments in every ward were captured and finally an M&E matrix was developed to ensure the process is complete.

1.3.7 County Level Workshop on Participatory Climate Change Risk Assessment

To comply with public participation act of the County, a one-day workshop was held with the main objective of validating the findings from the wards where representatives from different sectors such as, agriculture, (farmers), business, meteorological, National government and county, academia, women, youths, children and the people with disability and Ward Climate Change Planning Committees (WCCPC) were represented.

1.3.8 Participatory Climate Risk Assessment Report

The report was developed by a select team from the main technical team of knowledge experts from academia, sectors such as Environmental planning, Water, social services, and agriculture. The CCU then finally produced a PCRA report by publishing copies for dissemination and onward transmission to the Project Implementation Unit (PIU).

In a nutshell, the entire PCRA process (illustrated in Figure 1.1) took Kisumu County about 30 days. It ensured inclusivity. The PCRA guidelines provided key information and support for effective delivery. The need to consider 50% vulnerable participants in the meetings was strictly adhered to in identifying participants in the community workshops (lists of attendance attached). In each Ward, the mobilization of participants was carefully done through collaboration of the Village Administrator, Ward Administrators and Area Chiefs. The County department of communication publicized the PCRA meetings and informed people about the PCRA activities by creating awareness through social media and targeted postings on the County Website. Plate 1.1 and 1.2 illustrates community engagement

Figure 1.1 Participatory Climate Change Process

Plate 1.1 Members of Ahero Ward in Nyando Sub-County Participating listing and prioritization of adaptation strategies for climate hazards within their communities

Plate 1.2 Women members of Kajulu Ward in Kisumu Sub-County Completing their community hazard map

Chapter Two: County Climate Profile

2.1 Current and Historical Climate Hazards and Trends

2.1.1 Hazards and Trends

In Kisumu County, the long rainfall season (March–April–May) has shown a long-term drying trend between 1986 and 2007. Since 2005, drought frequency has doubled from one in every six years to one in every three years. While at the same time, the short rains (October–November–December) have shown a long-term wetting trend from the 1960s to present causing increases in frequency of floods as attested by community members. Figure 2.1 depicts historical trends on common hazards within Kisumu County. Floods and drought remain a common challenge as shown in the historical data.

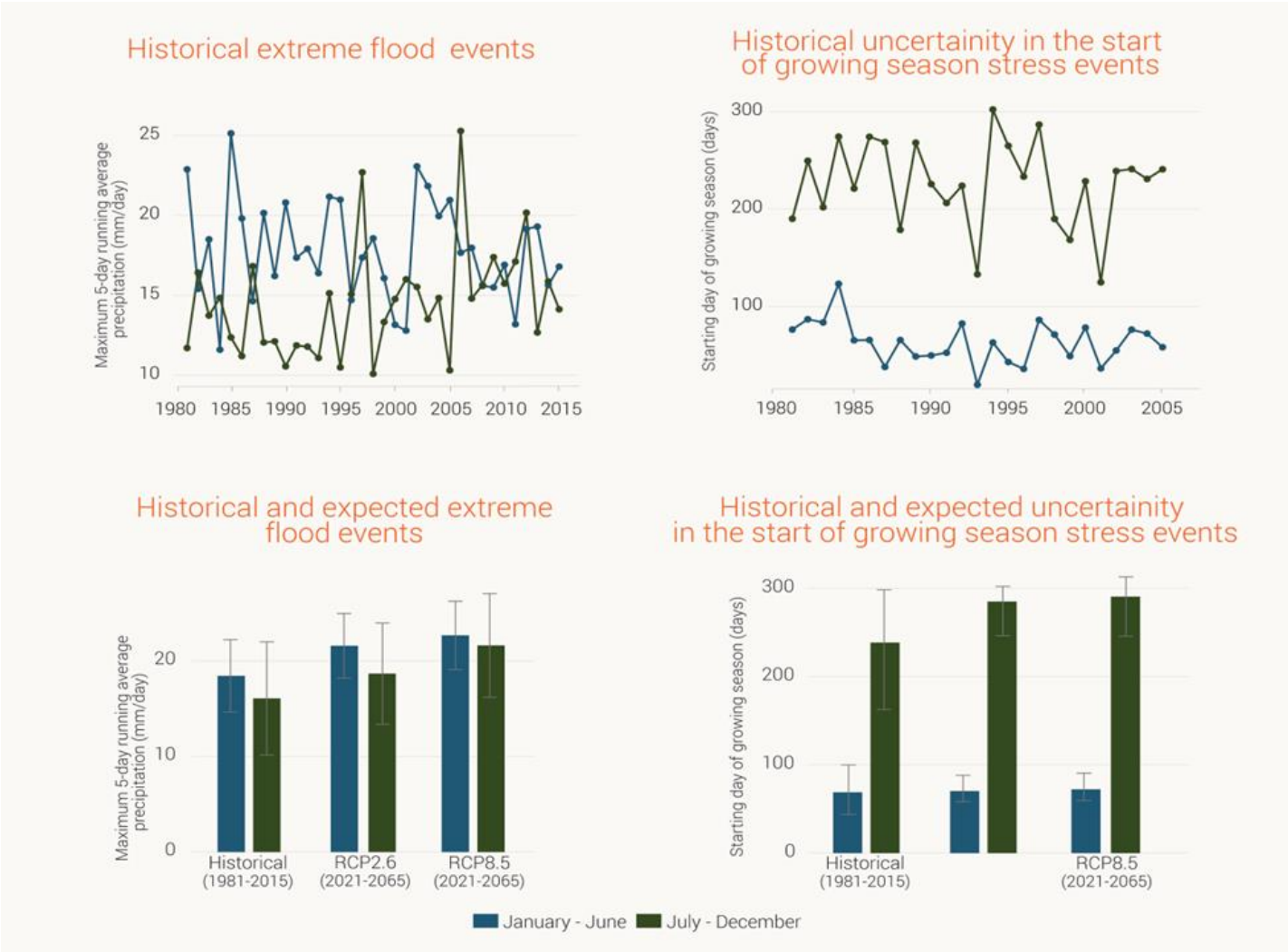

Figure 2.1 Historical Climate Hazards

2.2 Exposure and Vulnerability Profiles of the County

2.2.1 Vulnerability

The most vulnerable groups in Kisumu County consists of the resource-poor households who are 61% of the total county population.[1] From the latest census reports, women constitute 51.4%, youth, 40 %, PWD, 1 %, elderly, 2.9% of the total county population. All these groups are deemed vulnerable and in need of targeted interventions in terms of climate action. There are also the marginalized groups such as the Nubians who have settled in Kibos, Manyatta Arabs, Kaloleni, Mkendwa areas of Kisumu City and in parts of Muhoroni Town. In this group are also the street families, child- and female-headed households. These groups are

[1] Kenya Household Budget Survey, 2018

greatly exposed to climate risks due to several predisposing factors which increases their vulnerability. The characteristics of the vulnerable groups are as follows:

2.2.2 Resource Poor Households

They have settled mainly in the rural areas of Kisumu County and informal settlements like Obunga, Nyalenda, Manyatta and Bandani. The major characteristics of these households is that they are food- poor. The malnutrition rate is high for example in Nyando Sub- County, with stunting rates of 40%. They are mainly engaged in subsistence farming of crops and livestock. Localized variability in climatic factors adversely affect the subsistence productive systems within the rural areas. The same is true for small and micro enterprises, which perform poorly due to low purchasing power. On the other hand, most of the informal settlements in Kisumu are located within urban flood prone areas and often bear the brunt during heavy flood episodes, compromising the sanitation services. The rate of school dropout is high and the children are involved in child labour

2.2.3 Women

The women are disproportionately affected by floods, drought and changes in temperature within Kisumu County mainly because of their physiological status and traditional gender roles. Pregnant and lactating mothers are more at risk. The women majorly rely on surface water for domestic use and forest for fuelwood. They are also engaged in farming, being mostly the tillers of the land. In addition, most of them do not own land. They are engaged in selling vegetables and fruits (mama mboga), tailoring, hotel industry, mitumba business, saving and loaning schemes and majority are house wives. Income flows from these sources have drastically decreased as a result of climatic hazards There is also high increase in gender-based violence, mostly at the evacuation centers in flood prone areas. Furthermore, undignified shelter has also adversely affected the psychological well-being of women and young girls seeking refuge at evacuation and rescue centers.

2.2.4 Youth

The youth in Kisumu County are about 40% of the County total population as per 2019 population census. The unemployment rate is at 61% (County CIDP review, 2022). The majority in urban centers are in informal work mainly jua kali and boda-boda sectors. Those in the rural areas are engaged in brick-making, sand harvesting, horticulture, poultry farming, tree nursery, fishing, or in sugar and rice irrigation schemes as casual laborers. The youths are mainly concentrated in urban and peri-urban informal settlements, which are located within the areas prone to climatic risks. The climate risks interfere with their SMEs. In addition, most youths do not own land, which denies them access to credit facilities that otherwise would make their businesses more resilient. The female youth are even more vulnerable because of being young mothers and 28.8% are in early marriages (Kisumu County Fact Sheet, 2019).

2.2.5 Persons with disabilities

Persons with disabilities are about 1% of the total county population and have different forms of impairment like visual, speech, physical and hearing. This puts them at great risk when exposed to climate hazards as their conditions puts them at a disadvantaged position, exacerbating vulnerability. The characteristics are mainly engagement in small and micro enterprises like selling of water, sweets, or as cobblers. They mainly operate within the market centres, they are discriminated when it comes to climatic actions although they make efforts to engage in adaptation matters such as afforestation.

2.2.6 Other Marginalized Groups: Elderly, Children, Street Families and the Nubian Community

The elderly, children, street families and the Nubian community, are usually left out when it comes to decision-making process on climate issues, yet they are equally exposed to climate risks. Often, there survival is pegged on menial jobs with income hardly enough to take them through the tough economic times occasioned by climate change where many livelihoods have become precarious. Table 2.1 give summary of exposure and adaptive capacities of different vulnerable groups within Kisumu County.

Table 2.1 Vulnerable Groups, Exposure and Adaptive Capacity to Climate Hazards

Hazard /Risk	Impact	Vulnerable Group/Regions	Reasons On Vulnerability		
			Exposure	Sensitivity	Adaptive Capacity
Unpredictable seasons	Change in crop cycle	Peasant farmers, school going children urban poor, women PWDs, Youths	Over reliance on rain fed farming	Undiversified livelihood	Lack of access to early maturing seeds and weather information Lack of awareness on changing weather patterns
Droughts	Crop failure/ high food prices and Nutritional diseases	Peasant farmers and the urban poor, children and women, PWDs	Over reliance on rain fed farming	-use of seeds that are not early maturing -Poor soil management Low purchasing power limiting food options Food rationing	Lack of weather information Access to early maturing crop varieties Lack of diversified livelihoods Lack of access to food
	Water availability for small scale irrigation	Small scale irrigation farmers PWDs	Their sources of water are at risk off long dry spells (water pans, wetlands, shallow wells, rivers)	Water sources are small shallow Rivers are silted	Lack of access to intermittent irrigation systems Improper soil conservation measures such as mulching
	Lack of pasture	Livestock farmers, dairy farmers	Over reliance on natural pasture	-Natural pastures are sensitive to drought -Competing land uses -land in fragmentation due to increase in population	Lack of fodder conservation and preservation technology
	Lack of water for domestic use/ high prices	Women Young girls Public institutions such as Schools and hospitals school going children urban poor PWDs Elderly	Heavy Reliance on natural water resources that are sensitive to drought	The water sources are sensitive to drought such as rivers, pans, wells	Lack of domestic water storage facility

Hazard /Risk	Impact	Vulnerable Group/Regions	Reasons On Vulnerability		
			Exposure	Sensitivity	Adaptive Capacity
	Pest and diseases	Crop and livestock farmers, PWDs	Open and uncontrolled grazing Prolonged dry spells leading to pest and disease build up	Use of common pasture and water sources	• Lack of access to animal farm input
	Human diseases - Food borne diseases- cholera, respiratory diseases	Children Women The elderly Vegetable, fruit and fish vendors Youths in boda-boda PWDs	Poor sanitation and hygiene	Poor sanitation facilities and access to health services	• Inadequate finance to put up proper domestic sanitation facilities
	Human wildlife conflict	Shoreline communities Women, children Shoreline farmers Fishermen Fishmongers Communities ordering forest	Proximity to the wildlife habitats	Poor management of wildlife	• Inadequate capacity of Kenya wildlife Service to manage wildlife • Lack of community sensitization
	School absenteeism	School going children and students	Lack of food/ hunger	They need frequent meals.	• Inability to contain hunger
Droughts	Invasive species	Fish vendors, fishermen (water hyacinth and hippo grass)	Location (river mouth and lake inlets)	Polluted waters, sediments	• Lack of technology to manage invasive species
	Declining fish stock and species	Fish vendors, fishermen,	Location (winam gulf)	Shallow waters due to siltation coupled with warming leading to migration of fish to deep waters	• Inadequate finance to acquire appropriate fishing gears (motor oats, coolers, • Inadequate finance, and infrastructure to promote aquaculture value chain
	Post harvest losses	Crop farmers, grain vendors	Location (open markets	The crops are perishable	• Inadequate finance to establish climate proof fresh produce markets
	Heat stress to dairy cattle	Dairy farmers	Location	Milk production is sensitive to heat	• Inadequate technologies to control temperatures in the dairy units • Lack of technology to up develop heat stress breeds

Hazard /Risk	Impact	Vulnerable Group/Regions	Reasons On Vulnerability		
			Exposure	Sensitivity	Adaptive Capacity
Floods	Displacement of people	Communities along the shoreline, riverine, sloppy areas, and poorly drained areas, PWDs	Location Poorly drained soil Topography	Most houses are earth walled hence washed away by flowing waters poor drainage siltation of rivers	• Inadequate technology to construct flood resilience houses • Lack of early warning information and adherence to early warning system • Lack of capacity to de-silt rivers • Poor drainage systems along the roads
	Infrastructural destruction	The rural poor Public institutions Transport operators (youths) School children and teachers Traders (SMEs) PWDs, The elderly	Location and topography	Construction and building materials (buildings, roads and bridges)	• Inadequate funds to climate proof the infrastructures
	Water pollution	Water service providers, young Girls, women	Proximity to polluted water	Their activities revolve around water	• Lack of alternative water sources • Inadequate access to domestic water treatment
	Loss of crops and livestock	Communities in flood prone areas especially riverine and shoreline floods	Location (riverine and shoreline flood prone areas.	Prolonged days of water logging leading to crop root rot hence crop failure. Prolonged days of water logging leading to cold related infections in livestock	• Poor land use practices from the upstream communities • Inadequate finance to rehabilitate the shoreline to cushion the shoreline communities from lake water intrusion to land
	Disruption of learning	School going children, students and teachers	Location and topography	Construction and building materials (buildings, roads and bridges). Type of soil	• Inadequate funds to climate proof the infrastructures • Inadequate technology to put up climate structures in water logged areas

2.3 Differentiated Impacts of Climate Trends and Risks

Climate change impacts on the vulnerable groups differ mainly as a result of the multi dimensions of poverty, gender inequality, environmental degradation and the heavy burden of disease as shown on the Table 2.2 below.

Table 2.2 Interest Groups, Climatic Trends and Livelihoods Affected

Special Interest Groups	Climate & None Climate Risks	Climatic Impact on livelihoods
Women	Increased water borne diseases as a result of floods and drought	Women are most likely to be infected /affected by malaria and diarrheal diseases because of the vulnerability as expectant and lactating mothers.
	Increased floods and drought	Women SMEs are likely not to cope with shocks of climatic hazards and are likely to swept by floods because of their physic. In case of floods displacement, they are exposed to undignified living conditions and sexual harassment.
	Drought and Floods effect on land production	Women do not own land and yet bear the great burden in agricultural production. Often gender-based violence arise as a result of sharing of the meagre farm produce During droughts women go through so much distress in search of safe water for domestic use
Youth	Drought exacerbates natural resource Conflicts	Unsustainable utility of scarce natural resources has contributing to degradation of environment and compromised natural capital that otherwise would support community livelihood. Degraded lands are at high risk of catastrophic events.
Persons with Disability	Repercussions of displacement as a result of floods	At the evacuation centers the sanitation facilities are not disability friendly Inadequate information on climate change e.g. few sign interpreters, lack of braille The persons with severe disability suffer the brunt of negligence when it comes to rescue measures in times of emergency
Elderly	Food insecurity as result of droughts	Most suffer from chronic diseases that require specialized diet, during droughts they are not able to meet their dietary intake
Children	Malnutrition occasioned by crop failure due to floods and drought	Droughts, famine adversely affect children, floods affect the feeding schedule of infants, famine make children not to meet the minimum acceptable diet
	Poor school performance	In adverse climatic conditions children cannot access schools, schools are used as evacuation centers, school feeding program is disrupted, high rate of absenteeism because children are engaged in child labour
Marginalized groups	Poor housing located in fragile ecosystems affected by floods	They have mainly settled in informal settlements, during floods they suffer from poor drainage, houses are submerged and the environment is insecure

2.4 Spatial Distribution of Risks

Kisumu County experiences a modified equatorial climate. It is generally warm with minimal monthly variation in temperatures between 23^0C and 33^0C throughout the year. The rainfall is determined by a modified equatorial climate characterized by long rains (March to May) and short rains (September to November). The average annual rainfall varies from 1000- 1800mm during the long rains and 450-600 mm during the short rains. The altitude in the county varies from 1,144 meters above the sea level on the plains to 1,525 meters above sea level in the Maseno and Lower Nyakach areas. Coupled with land lake breeze greatly influences temperatures and rainfall in the County. Convectional rainfall is dominant in the lower regions (Kano, lower Nyakach, Seme, Nyando) while relief in upper regions (Maseno, Kajulu and upper Nyakach, Muhoroni). In view of the above climate trends, the following hazards are likely to occur within the county. Figure 2.2 and Table 2.3 indicate the spartial distribution of the climatic hazards and risk within the county.

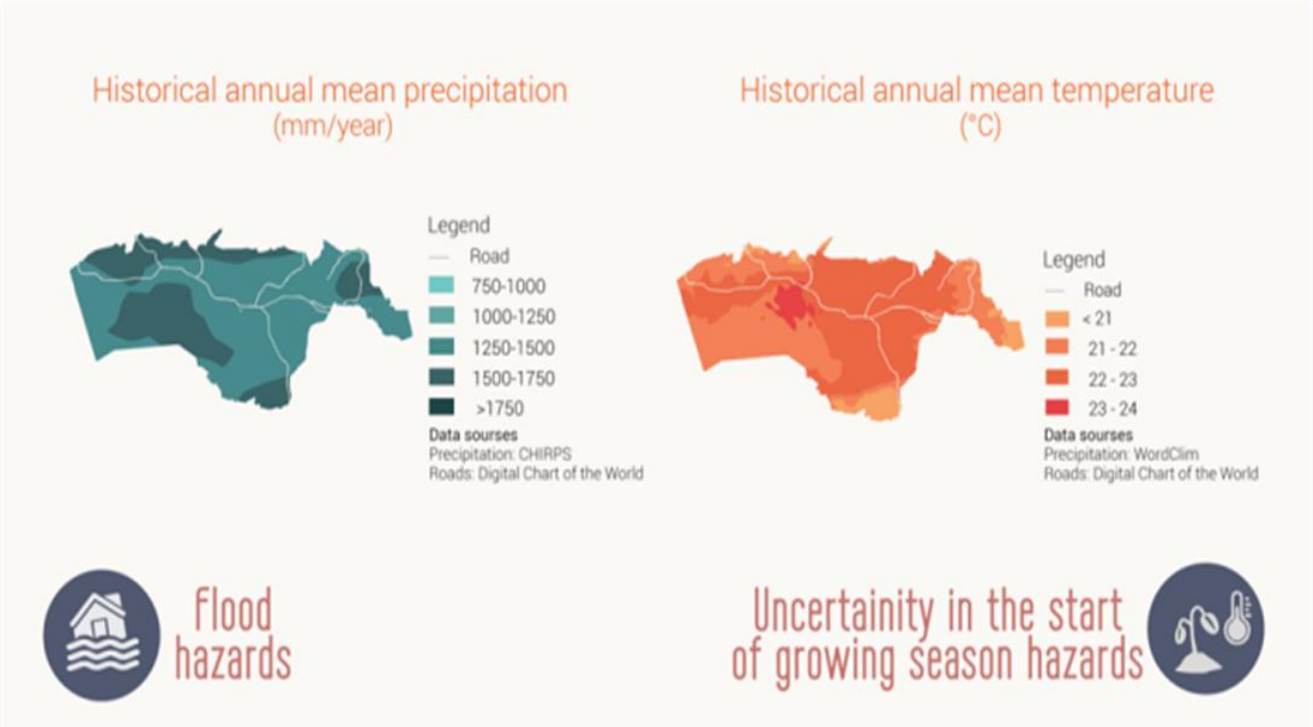

Figure 2.2 Spatial Distribution of Climate Hazards in Kisumu County

Table 2.3 Distribution of Risks by Sub-County and Economic Sector

		Sub-County						
		Kisumu Central	Kisumu East	Kisumu West	Nyando	Seme	Nyakach	Muhoroni
Hazard	**Risk**							
Heavy rainfall	Floods		✗	✗	✗	✗	✗	✗
	Landslides			✗			✗	
	Destruction of property	✗	✗	✗	✗	✗	✗	✗
	Damage of dwellings	✗	✗	✗	✗		✗	✗
	Damage of infrastructure	✗	✗	✗	✗	✗	✗	✗
	Loss of crops and livestock		✗	✗	✗	✗	✗	✗
Floods	Soil erosion		✗	✗	✗	✗	✗	✗
	Loss of human life	✗	✗	✗	✗		✗	✗
	Water pollution	✗	✗	✗	✗	✗	✗	✗
	Water-borne diseases	✗	✗	✗	✗	✗	✗	✗
	Destruction of infrastructure	✗	✗	✗	✗	✗	✗	✗
	Destruction of property	✗	✗	✗	✗	✗	✗	✗
Drought	Crop failure		✗	✗	✗	✗	✗	✗
	High food prices	✗	✗	✗	✗	✗	✗	✗
	Water scarcity	✗	✗	✗	✗	✗	✗	✗
	Disease outbreaks	✗	✗	✗	✗	✗	✗	✗
	Human-wildlife conflicts		✗	✗				
	Crop/livestock insecurity/theft	✗	✗	✗	✗	✗	✗	✗
	Warming lake waters/biodiversity loss	✗	✗		✗	✗	✗	
	Heat stress	✗	✗	✗	✗	✗	✗	✗
	Post harvest loses (fish, vegetables, fruits)	✗	✗	✗	✗	✗	✗	✗

Chapter Three: National and County Downscaled Climate Projections

3.1 Overview of Climate of Kenya

Kenya's climate is influenced by global, regional and localised climate conditions. Some of the variability in the country's climate is due to the El Niño Southern Oscillation which has caused periods of drought and flooding in the country over decades. The El Niño and La Niña episodes have had disastrous effects on the country's economy and infrastructure and caused loss of lives. The El Niño Southern Oscillation periods have caused economic losses and slowed down agriculture value-added growth in Kenya. The seasonal migration of the Inter Tropical Convergence Zone (ITCZ) following the overhead sun also affects climate and weather of our country. Kenya has a diverse topography which influences the significant variations in temperature across the landscape. The highlands experience cooler temperatures than the coastal and lowland zones. Average temperatures range between 18^0C at the higher elevations to 26^0C along the coast. Rainfall varies considerably across the country with less than 250 mm falling in the arid zones in the north to over 2000 mm per year in the central and western parts of the country.

3.1.1 Climate Change Scenarios

Climate change scenarios or socioeconomic scenarios are projections of future greenhouse gas (GHG) emissions used by climate modellers to assess future vulnerability to climate change. The scenarios and pathways surveys any long term routes and explore the effectiveness of mitigation and this will allow us to envision the future of human environment system. Producing scenarios requires estimates of future population levels, economic activity, the structure of governance, social values, and patterns of technological change.

The future climate change projections are based on the Representative Concentration Pathway (RCP). RCP is a GHG concentration (not emissions) trajectory adopted by the Intergovernmental Panel on Climate Change (IPCC). Four RCP pathways were used for climate modeling and research for the IPCC Fifth Assessment Report (AR5) in 2014. The pathways describe different climate change scenarios, all of which are considered possible depending on the amount of GHG emitted in the years to come. The RCPs – that is RCP2.6, RCP4.5, RCP6.0, and RCP8.5 – are labelled after a possible range of radiative forcing values that levels off by the year 2100 (2.6, 4.5, 6, and 8.5 W/m^2, respectively).

The higher values mean higher GHG emissions and therefore higher global temperatures and more pronounced effects of climate change. The lower RCP values are more desirable for us as humans but require more stringent climate change mitigation efforts to achieve them. For simplification, these scenarios are referred to as a low (RCP2.6); a medium (RCP4.5) and a high (RCP8.5) emission scenario in this profile. The CMIP5 (Coupled Model Inter-comparison Project phase 5) global climate models (GCMs) data

ensemble were utilized in generating the climate change scenarios. The national climate change projections are provided below.

3.2 National Climate Change Projections

3.2.1 Temperature Projections

Temperatures in our country Kenya are projected to continue increasing nationally by 1.7°C (between 1.2 and 2.2°C) by 2050s and by about 3.5°C (between 2.7 and 5.1°C) at the end of the 21st century, with warming greatest in the west. The number of hot days and hot nights will increase, with hot days projected to rise by 19%-45% of days by mid-century. Hot nights are projected to increase even more rapidly, projected to rise by 45%-75% of nights by 2050, and to increase by 64%–93% of nights by end of century. This will result into increased duration of heat and extreme heat conditions by about 9 to 30 days. The rise in temperature will make cold days and cold nights to become increasingly rare. The temperature projections in Kenya will continue to rise across all emissions scenarios. This will have significant implications for human and animal health, agriculture, and our natural ecosystem.

3.2.2 Rainfall Projections

Precipitation in Kenya is projected to remain highly variable and uncertain. The average rainfall is expected to increase by 2050 (projections range from -3 to +28 percent), especially during the 'short rains' which occur between October and December. Minor increase is projected for March to May. The coast and the highland areas will likely benefit more from the projected increases in the average annual rainfall.

The spatial and temporal distribution are expected to be irregular. Extreme rainfall events (heavy rainfall events) are projected to increase in frequency, duration and intensity. The period between heavy rainfall events will likely increase, with increased interseason variability. The duration of dry spells will decrease but there will be increase in severity (-2 to +27 percent). The proportion of heavy rainfall that occurs in heavy rainfall events is likely to increase. The rainfall in the arid zones are generally projected to decrease. The annual average precipitation is expected to increase slightly by the year 2100 under a high emissions scenario (RCP8.5).

3.3 Disasters (Increased Frequency)

Kenya is highly exposed to many natural hazards, the most common being floods and droughts. It is estimated that over 70% of natural disasters in Kenya are attributable to extreme climatic events. Typically, major droughts occur approximately every ten years, and moderate droughts or floods every three to four years. Repeating patterns of floods and droughts in the country have had large socio-economic impacts and high economic costs. For example, the 1998 to 2000 drought cost an estimated $2.8 billion, principally due to crops and livestock loss, as well as forest fires, damage to fisheries, reduced hydropower generation, reduced

industrial production and reduced water supplies. Recurring disasters, particularly droughts and floods, have significantly impacted livelihoods and the country's economic development agenda. Flood and drought events are becoming more frequent, with drought cycles occurring every 2–3 years instead of every 5–10 years. Future climate change may increase the risk and intensity of extreme weather events, such as droughts and floods potentially worsening impact. Climate impacts are likely to have extreme effects on the poor, the marginalized, aged and disabled. Such groups have fewer resources to adapt to climatic changes and therefore are more vulnerable to climatic change impacts.

3.4 Drought

Drought is the prime recurrent natural disaster in Kenya. Recurrent drought causes severe crop and livestock losses, famine and population displacement. A severe and prolonged drought from 2008–2011, affected 3.7 million people, caused USD 12.1 billion in damages and losses especially in agriculture and livestock, slowed down the GDP by an average of 2.8 per cent per annum, and cost over $1.7 billion in recovery and reconstruction needs. Droughts affect more people and greatly impacts the economy (loss of 8% of GDP every five years). The frequency of droughts appear to be increasing in frequency. The future rising temperatures will further put the 18 or the 20 poorest counties in the arid and semi-arid areas at risk from increased aridity and prolonged drought. The prolonged drought may increase water scarcity which may result in significant economic losses, damage to agricultural lands and infrastructure as well as human casualties.

3.5 Floods

Excessive flooding in Kenya occurs relatively frequently (on average every three to four years) and is linked to El Niño or La Niña episodes that can lead to extreme weather in the country and region. Annual rainy seasons in Kenya are becoming progressively wetter, with sudden and/or late onsets bringing with them floods and inundation. Major floods periodically afflict the Winam Gulf of Lake Victoria, Lower Tana basin and the coastal regions. Geographically, the western, northern, eastern, central and southeastern parts of the country are quite susceptible to seasonal floods in the wet seasons of MAM and OND. Riverine floods are the most dominant floods in Kenya, although the ASALs are particularly vulnerable to flash floods.

3.6 County Future Climate Scenarios

The temperature and rainfall projections are mainly based on RCP4.5 and RCP8.5 emission scenarios.

3.6.1 Temperature Projections

The average annual mean surface temperatures in Kisumu County are projected to continue rising with 0.7°C by 2035 and with about 1.4°C by 2050. Additionally the average annual mean surface temperature will also continue changing in respect with the various seasons. During JF, MAM, JJAS and OND seasons, average mean surface temperatures are projected to increase with 0.60 – 0.8°C by 2035 and with about 1.2 – 1.7°C by 2050. The average annual and seasonal minimum and maximum surface temperatures are projected to rise with 0.6 – 0.8°C by 2035, and with 1.0 – 1.6°C by 2050. Figures 3.1, 3.2 and 3.3 provides historical and projected average mean, minimum and maximum surface air temperature respectively over Kisumu County across all emission scenarios.Therefore, the number of hot days and nights will increase, with 'hot days' projected to rise by 30% of days by mid-century. Hot nights are expected to increase more quickly, projected to go up by about 50% of nights by mid-century and on 64%–93% of nights by end of century. Cold days and nights are expected to become increasingly rare. The historical temperature projects area provided in (figure 3.1,3.2 and 3.3).

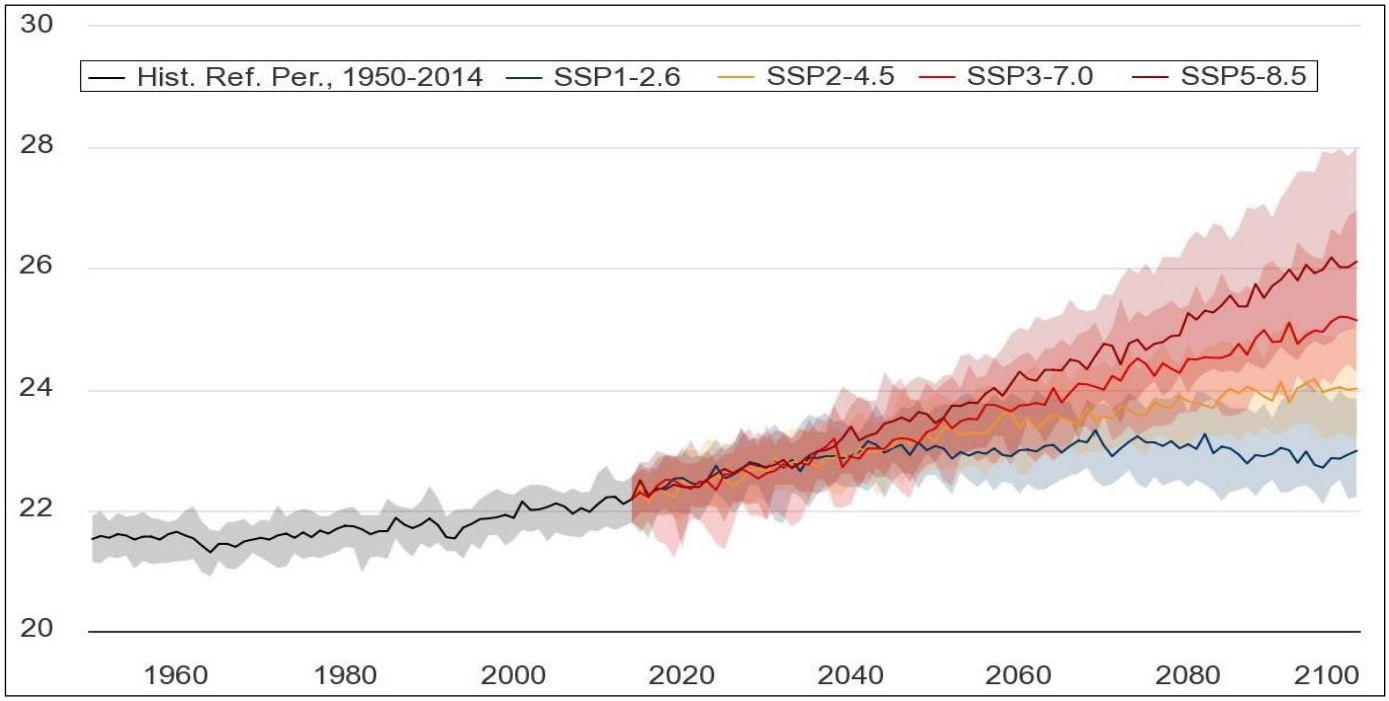

Figure 3.1: Historical and projected average mean surface air temperature over Kisumu County from 1950 to 2100 across all emission scenarios.

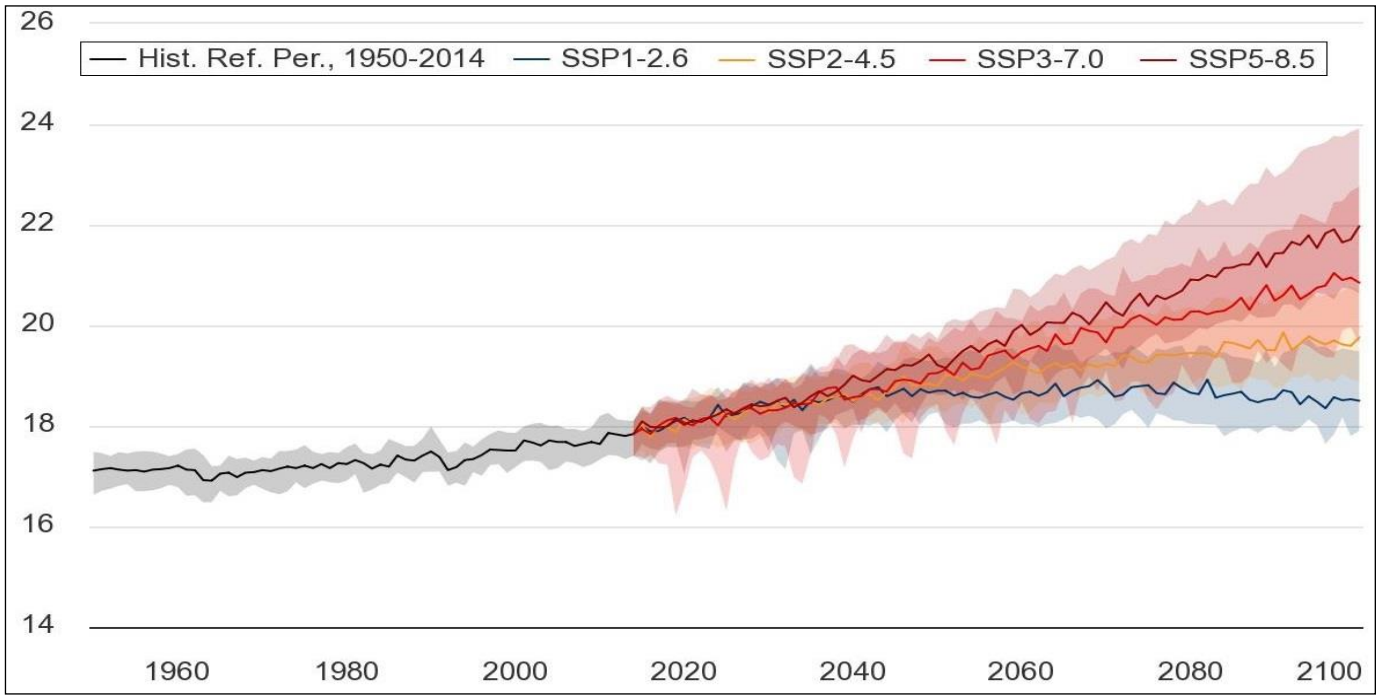

Figure 3.2: Historical and projected average minimum surface air temperature over Kisumu County from 1950 to 2100 across all emission scenarios

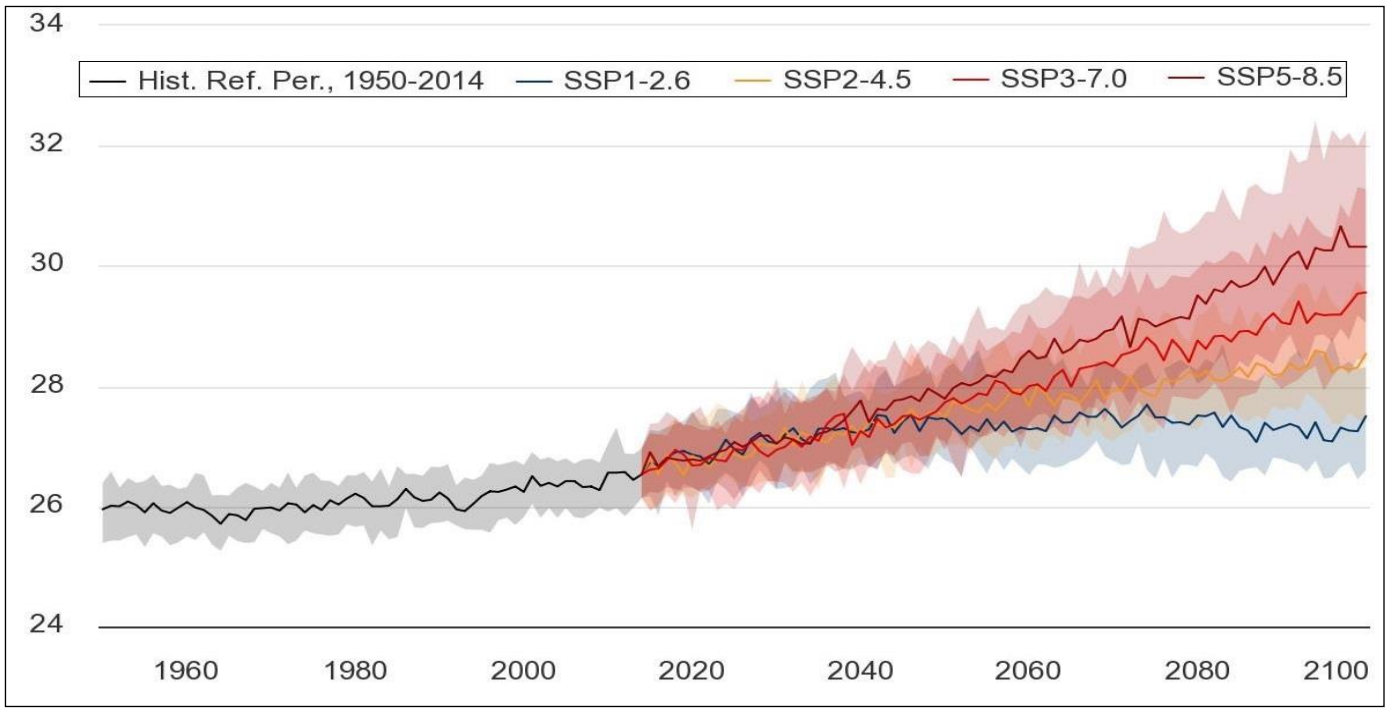

Figure 3.3: Historical and projected average maximum surface air temperature over Kisumu County from 1950 to 2100 across all emission scenarios

3.6.2 Rainfall Projections

Kisumu County will experience a projected increase in annual rainfall of about 42.1 – 51.5mm by 2035 and of about 69.6 – 123.2mm by 2050. The highest projected increase in rainfall will be experienced over the sub-counties in high altitude, while sub-counties bordering the lake will experience minimal increase in annual rainfall based on both the RCP4.5.and RCP8.5 scenarios. The annual rainfall is projected to increase in the sub-counties of Muhoroni, Nyakach and many areas of Nyando by 4.6 – 7.1% by 2035, and rise of 10.3 – 14.9% by the year 2050 based on RCP4.5. The same sub-counties, based on RCP8.5 will experience lower percent increase of 2.1- 6.3% by 2035, and rise of 4.1 – 13.5% by the year 2050. However, the sub-counties of Kisumu West, Central and East and Seme will experience a lower annual rainfall increase of 0.9 – 4.6% by 2035, and increase of 3.2 – 10.2% by year 2050.based on RCP4.5 scenario. If based on RCP8.5 scenario, these sub-counties will either witness a reduction, no significant change or small increase in annual rainfall of -0.8 – 2.0% by 2035, and -2.2 – 4.1% by year 2050. Figures 3.4 and 3.5 gives the projected percentage change in annual rainfall for the periods 2010-2035 and by 2036-2050 over Kisumu County using RCP4.5 and RCP8.5 emission scenarios respectively.

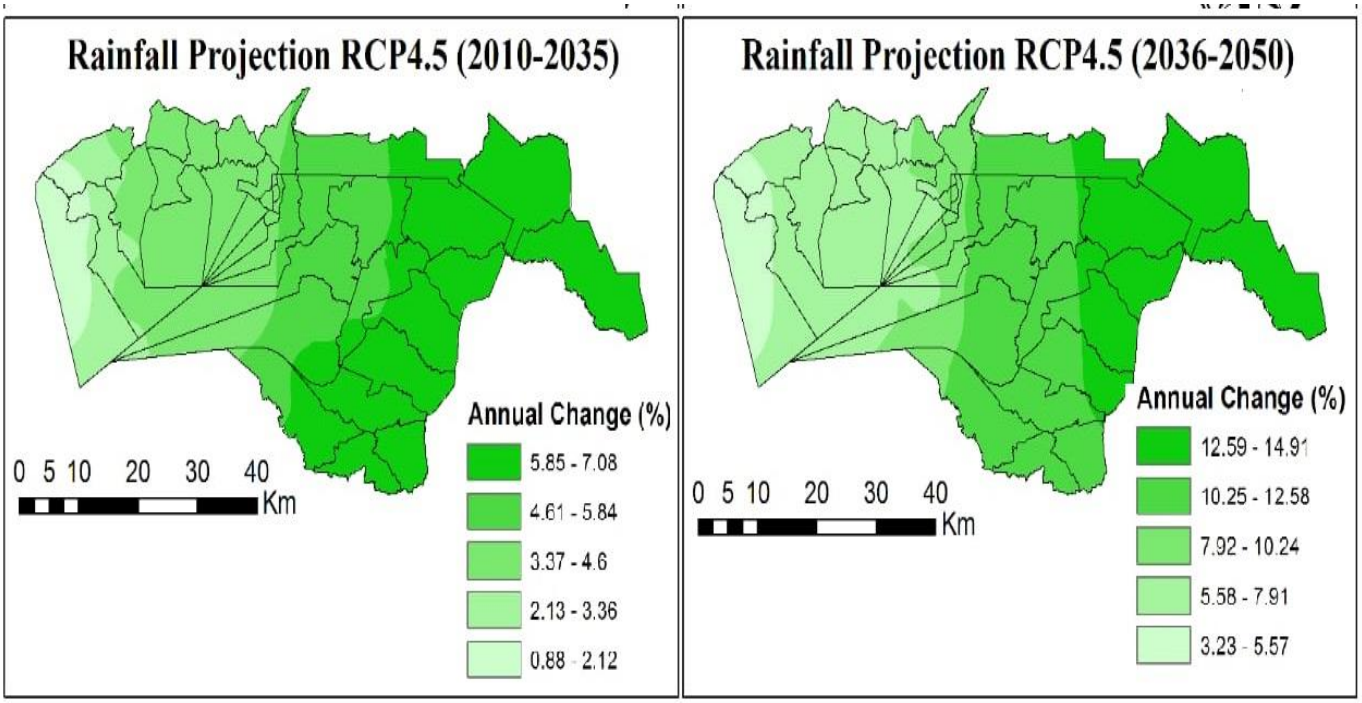

Figure 3.4: Projected percentage change in annual rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP4.5 emission scenario.

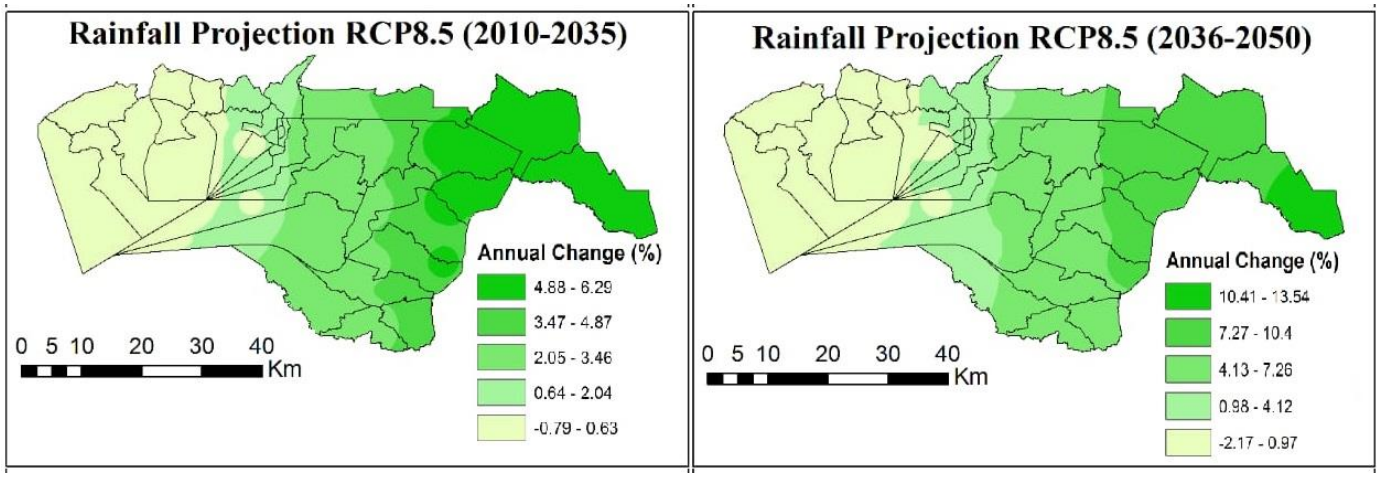

Figure 3.5:Projected percentage change in annual rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP8.5 emission scenario

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There are seasonal changes in projected average rainfall amounts across the county. The significant increases in rainfall are expected during JF, MAM and OND with minimal changes or reduction in rainfall during JJAS period. The JF rainfall in Kisumu County are expected to increase by 15.1 – 19.1mm by 2035 and by about 30.7 – 40.0mm by 2050, while the MAM rainfall will experience increase of 9.5 – 18.0mm by 2035 and of 20.2 – 30.3mm by 2050. Muhoroni and Nyando Sub-Counties will experience a MAM rainfall percentage increase of 0.9 – 6.4% by 2035, and rise of 6.5 – 11.8% by the year 2050 based on RCP4.5. with increase of 4.2 – 6.2% by 2035, and of 3.2 – 12.9% by 2050 based on RCP8.5. MAM rainfall is projected to increase in Nyakach sub-county based on both RCP4.5 and RCP8.5.

On the other hand, Seme and Kisumu West and Central Sub-Counties will experience a reduction in MAM rainfall of -2.8 – 0.9% by 2035, and thereafter increase in rainfall of 3.0 – 6.5% by year 2050.based on RCP4.5 scenario. However, based on RCP8.5 scenario, these sub-counties will experience increase in MAM rainfall of 2.8 – 4.2% by 2035, but thereafter a reduction of 0 – 3.2% by 2050. Kisumu East Sub-County will also face a marginal rainfall drop of and then rise of -0.9 – 2.7% by 2035, and increase of 4.8 – 8.3% by the year 2050 based on RCP4.5, but will also experience a rise of 3.5 – 4.9% by 2035, and a 0 – 6.4% increase based on RCP8.5 scenario by 2050. Figures 3.6 and 3.7 gives the projected percentage change in March to May rainfall for the periods 2010-2035 and by 2036-2050 over Kisumu County using RCP4.5 and RCP8.5 emission scenarios respectively.

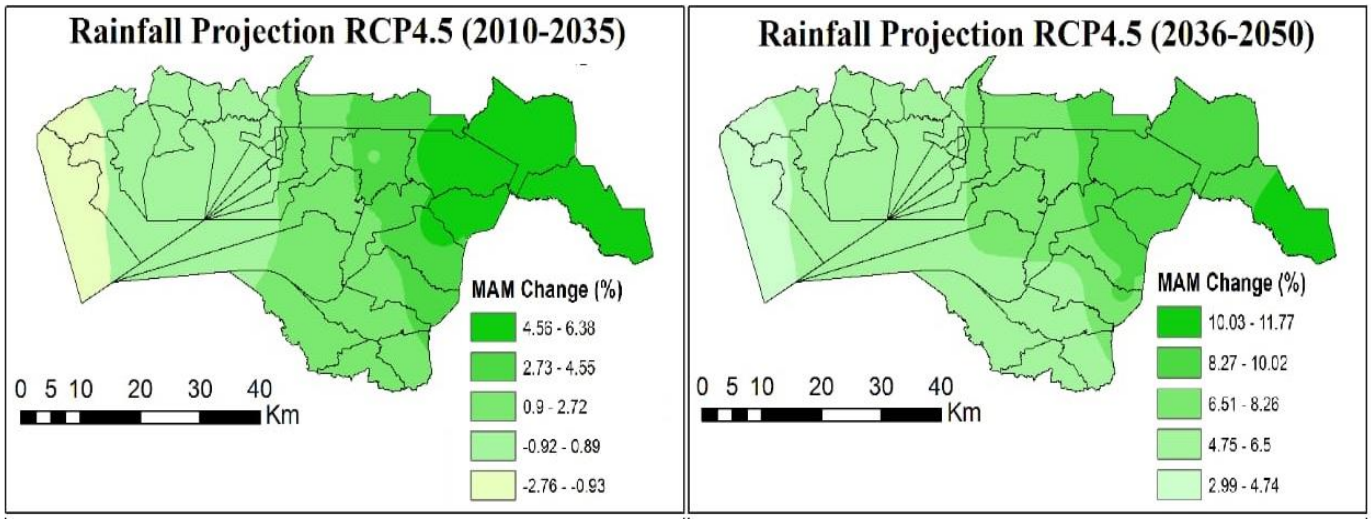

Figure 3.6: Projected percentage change in March to May rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP4.5 emission scenario

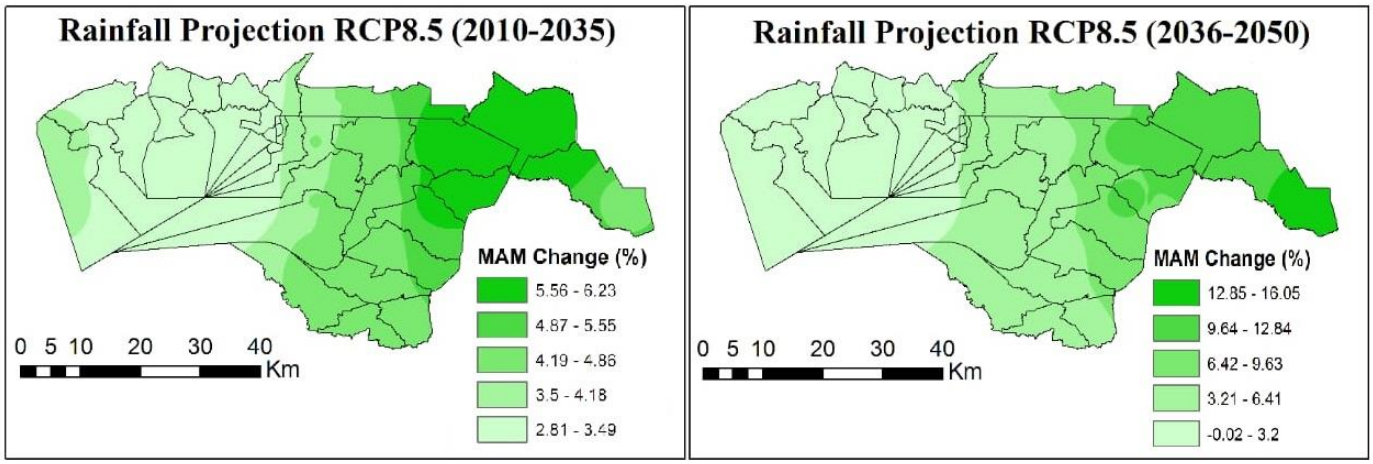

Figure 3.7: Projected percentage change in March to May rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP8.5 emission scenario

Rainfall during JJAS period is expected to marginal rise of 1.1 – 3.6mm by 2035 and reduction of 1.4 – 8.1mm by 2050 over the County. During the July to August (JJA) period the projected percentage change increase is small, and will likely reduce from RCP4.5 to RCP8.5. Seme and Kisumu West Sub-Counties will experience no significant percentage change in JJA rainfall of -2.6 – 2.1% by 2035, and of -0.8 – 2.3% by 2050 based on RCP4.5 sceanrio. However, basing on RCP8.5, these sub-counties will expect percentage reduction in JJA rainfall of -5.1 - -3.0% by 2035, and of -4.5 - -1.6% by 2050. Kisumu Central and East Sub-County will expect a marginal percentage increase in JJA rainfall based on RCP4.5 scenario, but based on RCP8.5, their rainfall is projected to reduce. Figures 3.8 and 3.9 gives the projected percentage change in June to August rainfall for the periods 2010-2035 and by 2036-2050 over Kisumu County using RCP4.5 and RCP8.5 emission scenarios respectively.

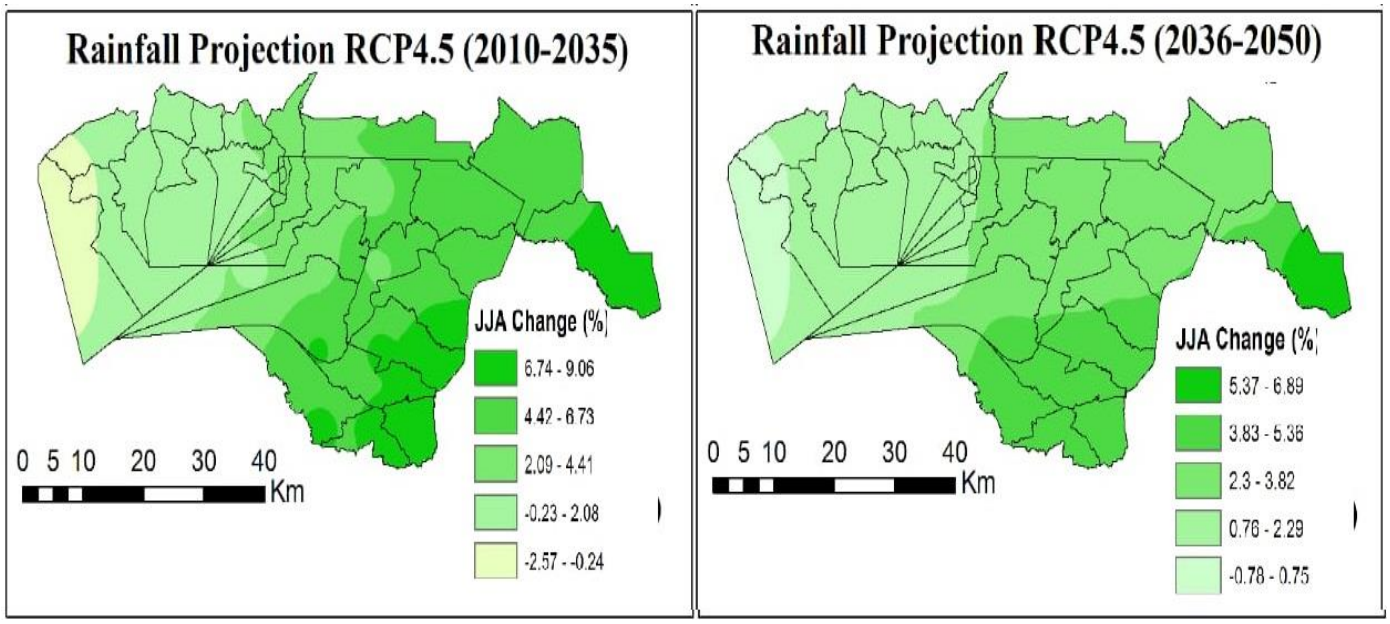

Figure 3.8: Projected percentage change in June to August rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP4.5 emission scenario

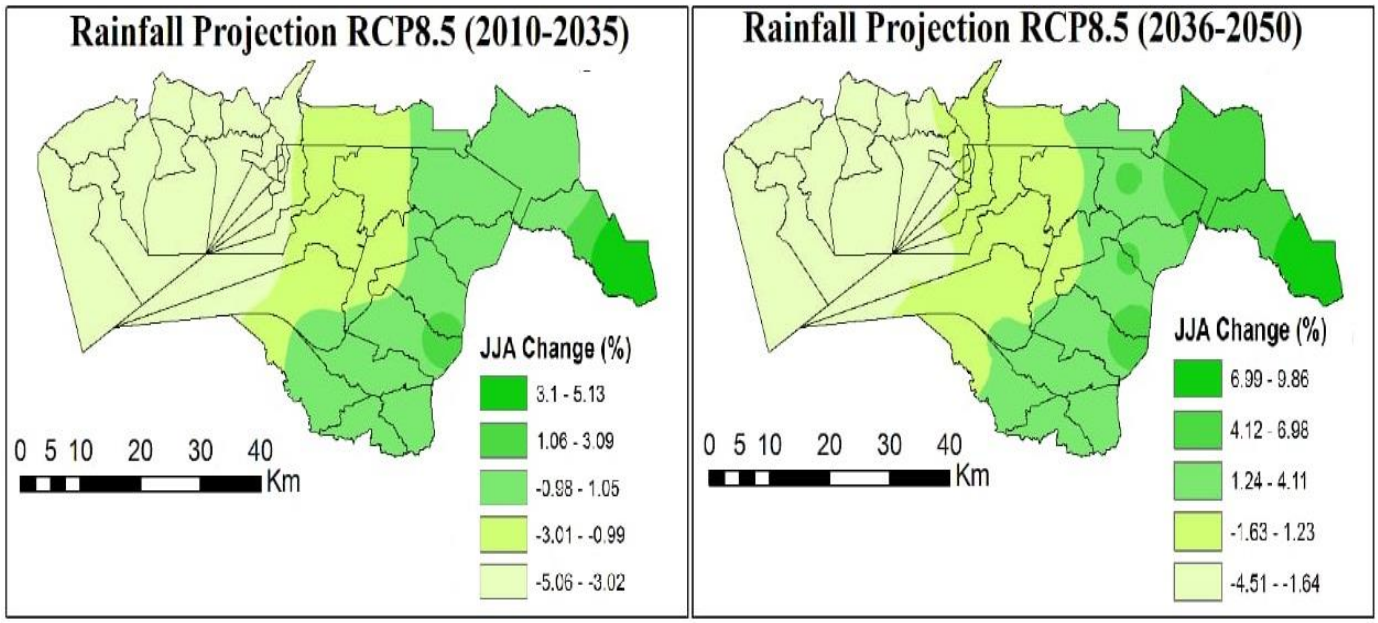

Figure 3.9: Projected percentage change in June to August rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP8.5 emission scenario

The OND rainfall is projected to increase with 10.8 – 16.4mm by 2040 and with about 26.7 – 45.2mm by 2060 over the County. Figures 3.10 and 3.11 gives the projected percentage change in October to December rainfall for the periods 2010-2035 and by 2036-2050 over Kisumu County using RCP4.5 and RCP8.5 emission scenarios respectively.

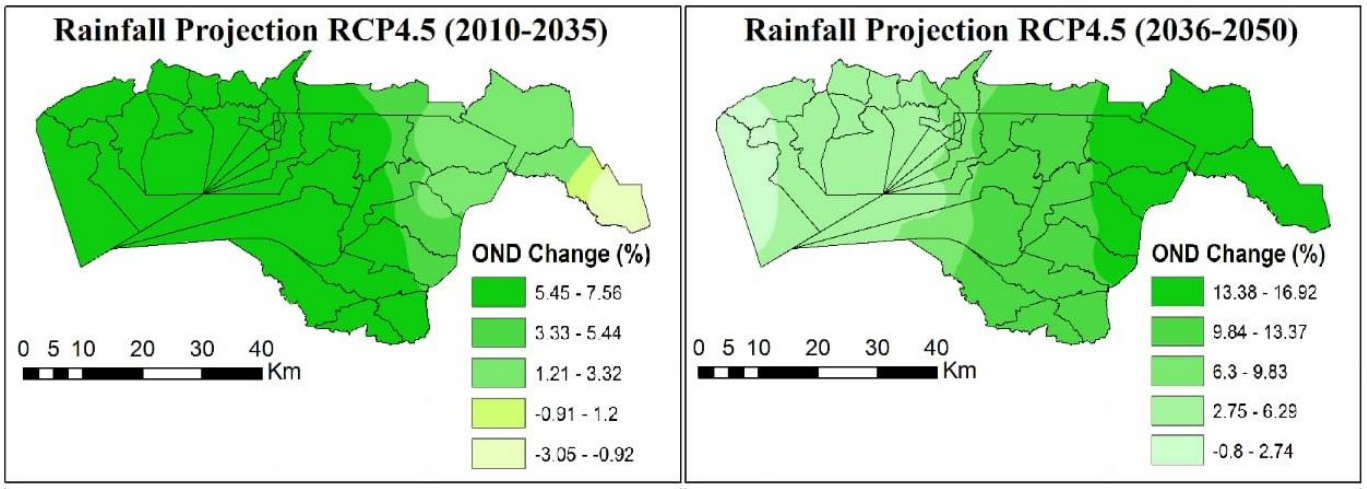

Figure 3.10: Projected percentage change in October to December rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP4.5 emission scenario

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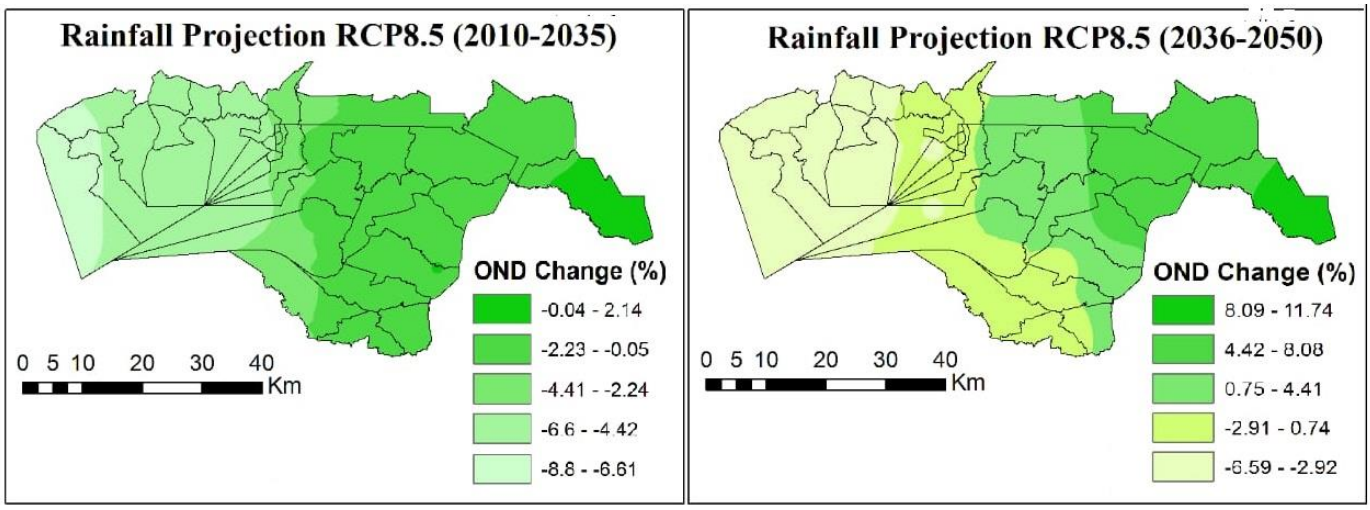

Figure 3.11: Projected percentage change in October to December rainfall for the periods 2010-2035 (left) and by 2036-2050 (right) over Kisumu County using RCP8.5 emission scenario.

There is a high Increased duration (+9–30 days) of heat waves expected. Heat stress is also expected to increase significantly under both scenarios, the number of days with a mean temperature above 35°C in the second season being particularly affected and expected to rise from an historical average of just under 10 days to over 15 days under the conservative emissions scenario and 20 days under the high emissions scenario. These changes represent an increase in the number of heat stressed days by approximately 50% and 100% respectively. There is likely to be increased inter-seasonal rainfall variability. There will be increase in frequency and intensity of heavy rainfall events. There will also be likely decrease in duration of dry spells but increase in severity (-2 to +27 percent). Under both RCP4.5 and RCP8.5 emissions scenarios rainfall quantity and intensity are expected to increase along with an increase in flood risk during JF, MAM and OND seasons, with minimal or reduction during JJAS period. Although the projections of future climate change under the two GHG emissions scenarios show some differences, both indicate the likelihood of significant changes in the weather and climate over the County.

3.7 Seasonal Rainfall Projections/future climate

The March to May and October to December season frequency and intensity of heavy precipitation events are projected to increase, leading to more flooding events. Flooding events may occur in terms of increase in intense heavy precipitation events, flash floods and intensity of hailstones which may occur within a few numbers of days. Seasonal rainfall duration is projected to increase during OND with no significant change during MAM. In view of the above climate trends, the following hazards are likely to occur within the county. Table 3.1 shows the climatic trends within Kisumu, whilst Table 3.2 shows the vulnerability and impacts to the risks.

Table 3.1 Climatic Trends and Projections in Kisumu County

Current locally experienced trend	Relevant climate projection	Likely future hazard scenario
Unpredictable seasons - The current trend is that there is usually a late onset coming during the third to fourth week of either March or October and an early cessation during the second to third week of May, while for the short rains the cessation might come during the first to second week of December.	Seasonal rainfall distribution has mainly been irregular, the space and time distribution has been poor. The duration of the seasonal rains has reduced from 75 to 85 days to slightly between 50 and 70 days, The length of dry spells has increased from less than 5 days to mainly more than 10 days. The long rainfall season (March–April–May) has shown a long-term drying trend and also the short rains (October–November–December have shown a long-term wetting trend from the 1960s to present.	There is more uncertainty in start and end dates duration and intensity of rainfall affecting crop cycle and water availability.
Increased long periods of droughts	The combination of increased temperatures and decreased precipitation make for an increase in drought risk. drought frequency has doubled from one in every six years to one in every three years	A highly likelihood of more drought i.e., the long rains of March-May in 2022 and 2023 failed within the whole country leading to increased crop failure, water scarcity, human-animal and crop diseases, scarcity of pasture, human wildlife conflict (hippos feeding on farm) and school absenteeism across the county.
Frequent flooding due to intense rainfall	The short rains (October–November–December) have shown a long-term wetting	High probability of flooding events. In April 2023 several

Current locally experienced trend	Relevant climate projection	Likely future hazard scenario
(Flash riverine, flash and lake shore)	trend from the 1960s to present. Increase in frequency of floods and increase in rainfall frequency occurring within a few numbers of days. The OND season has experienced increase in precipitation. Riverine flood observations suggests that there has been an increase Model results vary with scenario and region, but they suggest that present 1 in 100-year floods could become as frequent as 1 in 40 years under low warming scenarios and 1 in 20 under higher warming. Water level in the lake is rising due to extreme rainfall and/or the deposition of sediment brought in by the rivers upstream.	homes and farms were submerged by floods due to heavy down poor in central and Kolwa East within Kisumu East Sub- County and Nyando sub county displacing more than 600people leading to water pollutions, deaths, destruction of properties and infrastructure (Rota bara access road in Kisumu west), displacement of people and discontinuity of learning in schools.
Increased extreme temperatures	Analysis of temperature trends in the county over 25 years (1980 to 2005), showed that although mean OND season temperatures have remained relatively constant, there has been a significant increase of approximately 0.5°C in mean MAM season temperatures. Mean temperatures have increased by 0.7°C to 1°C from 1973 to 2013, depending on the season. The temperature projections at 1.5°C, 2°C, and 3°C of global warming above pre-industrial levels, mean annual temperatures are projected to be 0.6°C, 1.1°C, and 2.1°C	High likelihood of increase of temperatures coupled with water pollution enhancing water hyacinth and hippo-grass leading to declined fish stock and species and difficulty in accessing fishing zones within the lake, post-harvest losses for perishable products (fish, vegetables and fruits) and heat stress to dairy cattle reducing milk production.
Amplified hailstones/storms/lightening	Increase in frequency of rainfall can come with increase in hailstones/storms /lightening within a few numbers of days	Climate change is going to lead to larger hailstones. The rains in April 2023 were accompanied with hailstones destroying rice schemes in Nyando sub county. In Maseno

Current locally experienced trend	Relevant climate projection	Likely future hazard scenario
		town Kisumu West Sub- County. Lightening caused power outage and destruction of electrical appliances for the institutions and small and medium enterprises. Strong wind storms lead to destruction of houses and soil erosion in Kobura, Kabonyo-Kanyagwal in Kadibo Sub-County

Chapter Four:

Analysis of Existing Adaptation Strategies to Current and future Climate Risks

4.1: Introduction

This section presents the strategies that various stakeholders are currently implementing within the county to address climate related risks and hazards. Various actors including county government, national government, non-governmental organizations and parastatals together with communities have been implementing various actions to deal with the impacts of climate change. The strategies include both software and hardware components like construction of infrastructure and humanitarian services, capacity building and awareness creation among others. Examples include construction of evacuation centers by JICA and NEMA, research on flood-resistant housing by University of Nairobi, building of dykes and irrigation schemes by the Ministry of Irrigation, opening up of drainages and streams by the County Government, flood response and recovery by Kenya Red Cross Society (KRCS).

4.2 Cumulative Impacts

Cumulatively, droughts, storms, extreme temperatures and floods have resulted in displacement of families, loss of crops and livestock, malnutrition among children and outbreak of water-borne diseases. Other impacts have included increased absenteeism by school-going children and inability to access critical services. There is also pollution and contamination of water sources through open defecation and effluent discharge. In general, vulnerable and marginalized groups (VMGs), persons living with disability (PWDs), women, children and the elderly have particularly borne the burden of these climate-related risks and their impacts (Plate 4.1) .

Plate 4.1: Residents of Ombaka in Kabonyo Kanyagwal displaced by flooding moving to higher grounds

Source of Photo: County ICT Press Unit 2021

4.3 Effectiveness of Adaptation/Resilience Strategies To Future Climate Risks

This section highlights the main adaptation/resilience strategies envisaged under future scenarios of climate-related risks. The climate regime within the Lake Victoria Basin, in which Kisumu County falls, is highly variable with a higher natural susceptibility to frequent extremes than neighbouring regions. Women, Children, VMGs, PWDs and the elderly have particularly felt the burden of these impacts. The following sections outline some of the strategies envisaged under various conditions of climate variability and change. Some of the sectors impacted by these climatic hazards and their priority copying strategies and involvement of various groups is summarized in the Table 4.1 and 4.2 .

Table 4.1 Priority Resilient /Coping Mechanism and Groups Involved

Risk / Hazard	Sectors Affected/ Sub-Sector Affected	Climate Resilient Strategies	Stakeholder Group Applying the Strategy	Vulnerable Groups Affected
Drought	Trade, Agriculture, Water, Health and Environment	1. Construction and drilling of climate smart water pans and boreholes; provision of water storage tanks and water harvesting strategies 2. Promotion of drought resistant crops and hybrid seeds, artificial insemination, drought-resistant livestock breeds, preservation of hay and fodder crops and uptake of feed supplements. 3. Support for setting up of modern irrigation systems 4. Value-addition of agricultural produce 5. Promotion and support for briquette making 6. Adoption of Climate Smart Agriculture including promotion of Integrated Pest Management 7. Introduction of highland rice varieties	Department of Meteorology CGK Department of Renewable Energy Lake Basin Development Authority National Water Harvesting and Storage Authority GIZ,ICIPE,KISIP, JICA,M-Kopa Solar CGK Department of Gender and Social Services	Children Women Minorities Elderly PWDs
Floods	Infrastructure, Agriculture Trade, Housing, Education Health and Environment	1. Desilting of rivers 2. Construction of dykes and gabions; construction of canals along rivers 3. Tree planting and bamboo planting 4. Construction of climate smart roads and houses 5. Promotion of hydroponics and other modern farming technologies 6. Construction of raised livestock pens	CGK Department of Roads CGK Department of Livestock CGK Directorate of Irrigation CGK Directorate of Environment and Climate Change KMD, UN -Habitat National Housing Cooperation	PWDs Children Elderly Minority groups

Risk / Hazard	Sectors Affected/ Sub-Sector Affected	Climate Resilient Strategies	Stakeholder Group Applying the Strategy	Vulnerable Groups Affected
Extreme Temperatures, Whirlwinds	Agriculture, Trade and Health	1. Promotion of modern irrigation technologies 2. Putting up of appropriately-sited *juakali* sheds	CGK Directorate of Trade CGK Directorate of Irrigation	Children Women elderly
Storms	Masons and construction work Fishing Crop farming	1. Planting trees as wind breaks 2. Promotion of agroforestry 3. Installation of lightening arrestors on buildings	Directorate of Environment and Natural Resources	PWDs Elderly women

Table 4.2: Effectiveness of Current Adaptation Strategies

Hazard/ Risk	Economic & Social Sectors	Current Adaptation Strategies	Stakeholders	Vulnerable Groups	Effectiveness of the Strategies
Floods	Housing	Moving to higher grounds Building of flood-resistant houses Construction of evacuation centers in Nyando/Kadibo Sub-Counties	CGK/NGK, KRCS, NEMA, Partners (JICA, UoN)	PWDs, Women, Children, Elderly, Youth	Building of flood resistant houses is highly effective compared to moving to higher grounds and building evacuation centers
	Agriculture, Livestock & Fisheries	Planting flood tolerant crops e.g., rice in Nyando Food preservation e.g., Obambla	CGK/NG, NGOs,	PWDs, Women, Farmers, Children, Elderly, Youth	Planting flood tolerant crops is considered effective
	Water	De-siltation of rivers, pans, drainages, streams Construction of dykes, bridges, Culverts	CGK/NG, KRCS, NEMA, Partners, NGOs	PWDs, Women, Farmers, Children, Elderly, Youth	All the strategies are considered to be highly effective
	Transport & Infrastructure	Construction of bridges, culverts, Drainages	CGK, NG,	PWDs, Women, Farmers, Children, Elderly, Youth	Highly effective
	Trade	Drainage of flooding markets Upgrading of markets (Kibuye, Uhuru)	CGK, NG,	PWDs, Women, Farmers, Children, Elderly, Youth	Highly effective
	Environment	Planting of trees River-bank protection (Nyando, Awach)	CGK, NG, CSOs, KFS, WRUAs	PWDs, Women, Farmers, Children, Elderly, Youth	Highly effective

Hazard/ Risk	Economic & Social Sectors	Current Adaptation Strategies	Stakeholders	Vulnerable Groups	Effectiveness of the Strategies
	Sanitation & Health	Medical outreaches Construction of modern toilets	CGK, KRCS, MOH, NGOs	PWDs, Women, Farmers, Youth Children, Elderly	Highly effective
	Special Programs & Disaster Management	Aid and relief Early warning systems from Meteorological department	CGK, KRCS, NG, NGOs, KMD	PWDs, Women, Farmers, Children, Elderly, Youth	Early warning systems is considered to be more effective compared to the aid and relief
Drought	Agriculture, Livestock & Fisheries	Promotion of horticulture and drought-resistant crops/value-chains Promotion of Irrigation and kitchen gardening Buying food from boarder counties	CGK, KCSAP, NG, NGOs	PWDs, Women, Farmers, Children, Elderly, Youth	Buying food from bordering counties is less effective
	Water	Drilling of boreholes Rain-water harvesting	CGK, KRCS, NG, NGOs	PWDs, Women, Farmers, Children, Elderly, Youth	Highly effective
	Environment	Planting of trees	CGK, NG, CSOs, KFS	Women, Farmers, Children, Elderly, Youth	Highly effective
	Energy	Promotion of solar energy and improved cook-stoves Solarization of water boreholes	CGK, NG, CSOs, GIZ	PWDs, Women, Farmers, Children, Elderly, Youth	Highly effective

Hazard/ Risk	Economic & Social Sectors	Current Adaptation Strategies	Stakeholders	Vulnerable Groups	Effectiveness of the Strategies
Storms (hailstones, thunderstorms, lightning	Agriculture, Livestock & Fisheries	Planting dwarf crops and hail-resistant crops in Seme & Kisumu West sub-counties	CGK, NG,	Women, Farmers, Children, Elderly, Youth	Highly effective
	Housing	Installing lightning arrestors in buildings Planting of trees to serve as wind-breakers	CGK, NG, KFS	Women, Farmers, Children, Elderly, Youth	Highly effective
Higher Temperatures	Environment	Outdoor activities/green spaces Planting of trees	CGK, NG, CSOs, KFS	Women, Farmers, Children, Elderly, PWD, Youth	Highly effective

4.4 Augmenting interventions

Over and above the climate resilient strategies listed in the foregoing, there is need for other interventions to supplement the existing strategies, particularly to address the wider scope of risks, some of which might not necessarily be climate risks. Accordingly, a number of interventions are proposed to buttress those summarized in the table above.

4.4.1 Technology, ICT Education

Adoption of technology, particularly in the design and operation of early warning systems (EWS) and disaster preparedness is deemed crucial. This will facilitate among other things, accessibility by farmers to timely weather information through appropriate MET apps and or media platforms. This would boost farmers use of reliable information as compared to current trends where many rely heavily on traditional ways of weather forecasting. In addition, there is need for the county to set up a climate change Information Centre(s) where locals, including students, can easily learn and educate themselves on climate trends and acquire practical knowledge and skills on adaptation strategies for climate change.

This will not only ensure that residents are equipped to make informed decisions on factors contributing to global warming as well as the individual role they can play in adaptation and mitigation. Adoption of geo-information technology will also enhance climate change adaptation planning. For example, a GIS flood maps would be of great help in infrastructure planning. Such maps can also enable farmers to make sound decisions in the choice of crops as well as support spatial multi-criteria evaluation in setting up emergency response systems and evacuation centers. In the building and construction industry, construction materials will need to be more climate-resilient, with designs that can withstand extreme weather conditions.

4.4.2 Strengthening Existing Disaster Preparedness Systems

Given the projected trends of increased intensity and frequency of the current hazards, there will most likely be more emergencies. It is therefore necessary to strengthen existing emergency response systems and improve on their effectiveness. There is need for personnel to be better trained and equipped to handle these cases, including issues of mental health. In addition, emergency systems operations need to leverage modern technologically to enhance efficiency and effectiveness.

4.4.3 Conservation Alongside Livelihoods

This is a concept that is key in the conservation and sustainable utilization of natural ecosystems such as wetlands and forests. Many of the wetland ecosystems across the county are currently threatened through unsustainable fishing and harvesting of papyrus reeds and other wetland resources, in the process destroying breeding grounds for fingerlings. While conservation without economic benefit may be counter-productive, when supportive livelihood aspects such as eco-tourism are included, community groups are more likely to participate in conservation interventions. Climate action programs in these areas therefore need to be designed in such a manner as to involve locals in biodiversity conservation through training and other appropriate and sustainable incentives.

4.4.4 Needs of The Vulnerable/Inclusion

Climate risks tend to affect vulnerable populations more disproportionately. As such, women, elderly, children, PWDs, and other minorities tend to bear the brunt of climate impacts, decimating their livelihoods and general ability to cope in an uncertain future. There is therefore need for targeted specifically aimed at cushioning these populations, including social protection schemes designed to boost coping adaptation and coping mechanisms.

4.4.5 Enforcement and Review of Existing Policies

Although there exists a rich corpus of climate-relevant policies and legislation, most of these are not effectively implemented, with little or low penalties imposed on offenders. Without proper enforcement of the Forest Act of 2016 for example, deforestation on hilltops continues unabated, negating the current afforestation efforts and tree planting in other areas leading to slow or stagnating forest recovery rate. The efforts to take up solar energy, green or renewable energy are also slowed by the subsequent Finance Acts that have been pronounced over the past 3 years. Therefore, despite the desire and need for transition to solar energy, the uptake of solar power for domestic use including cooling, heating lighting and cooking has been minimal. There is therefore need to streamline existing policies to promote these and other similar technologies.

4.4.6 Agricultural Insurance

Just as homes, commercial properties and goods are insured against risk, farming too a key livelihood activity accounting for 60% of jobs in Kenya, needs to be insured across the value chain. Insurance companies and other stakeholders need to work out modalities to facilitate rolling out insurance policies tailor-made to suit the small-scale farmer against the vagaries of a changing climate.

Chapter Five: County Climate Strategic Adaptation Investment/Actions

5.1 Introduction

This section of the report presents priority adaptation strategies by sector and hazards as prioritized in respective Wards within Kisumu County. The section flows sequentially indicating the hazards, priority actions by Ward and the vulnerable beneficiary groups. Investments have ideally been prioritized based on the following priority sectors: Water, Environment, Agriculture, Infrastructure (Roads and Public Works), Energy, Health and Disaster risk management. Table 5.1 gives a summary of the community prioritized adaptive investments by targeted groups, wards and sector.

Table 5.1 Hazard, Strategic Adaptation Investment and Ward

Risk/ Hazard	Strategic Adaptation Investments	Sector	Sub-County and Ward
Drought	Construction of resilient and multipurpose water pans for water storage, water supply and irrigation	Water Irrigation Public works Agriculture	**Muhoroni:** Masogo/Nyang'oma, Chemelil/Tamu, Ombeyi, Miwani **Nyando:** Ahero, East Kano/Wawidhi, Awasi/Onjiko **Nyakach:** West Nyakach, North Nyakach, Central Nyakach, South East Nyakach **Kisumu East;** Kolwa Central, Kolwa East **Seme;** North Seme
	Supporting crop value chain through introduction of drought resistant seeds, crops and livestock	Agriculture Livestock	**Muhoroni:** Masogo/Nyangoma, Chemelil/Tamu Miwani **Kisumu West:** North West Kisumu
	Drilling and equipping of boreholes fitted with solar panels and elevated water tanks	Water Energy	**Muhoroni:** Masogo/Nyang'oma, Chemelil/Tamu **Nyando/Kadibo:** Ahero, East Kano/Wawidhi **Kisumu East;** Kolwa Central, Manyatta B **Kisumu Central;** Kaloleni/Shauri Moyo **Kisumu West;** West Kisumu, South West Kisumu **Seme;** Central Seme
	Supporting of fodder establishment, conservation and preservation technologies e.g., hay conservation and silage preservation	Agriculture Livestock	**Muhoroni;** Masogo/Nyang'oma, Chemelil/Tamu, Ombeyi **Nyando/Kadibo:** Awasi/Onjiko, Kobura, Kabonyo/ Kanyagwal **Kisumu East:** Kolwa East, Nyalenda A **Kisumu West:** North West Kisumu
	Promotion of conservation	Agriculture Forestry	**Muhoroni:** Chemelil/Tamu, Miwani, Ombeyi

Risk/ Hazard	Strategic Adaptation Investments	Sector	Sub-County and Ward
	agriculture-Kitchen gardening, urban agriculture		**Kisumu Central:** Migosi, Railways, Kondele
	Rehabilitation and expansion of water projects	Water	**Muhoroni:** Miwani, Ombeyi **Nyando/Kadibo;** Ahero, Kabonyo/Kanyagwal **Kisumu East;** Kajulu, Kolwa East **Kisumu Central;** Railways, Nyalenda B, Kondele **Kisumu West;** North West Kisumu, North Kisumu **Seme:** Central Seme, West Seme
	Promotion of livestock value chains (poultry, apiculture, dairy)	Livestock	**Muhoroni:** Masogo/Nyang'oma, Chemelil/Tamu North West, West Kisumu **Nyando/Kadibo:** East Kano/Wawidhi, Kobura **Kisumu East;** Kajulu, Kolwa Central, Kolwa East, Nyalenda A **Kisumu Central;** Nyalenda B **Kisumu West;** North West Kisumu, North Kisumu **Seme;** North Seme
	Promotion of aquaculture	Fisheries	**Nyando:** East Kano/Wawidhi
	Supporting of water and energy saving irrigation systems through provision of solar water pumps and promotion of intermittent irrigation	Irrigation	**Muhoroni:** Chemelil/Tamu, Ombeyi **Kisumu East:** Manyatta B **Seme;** Central Seme, West Seme
	Construction and installation of water kiosks and water dispensers	Water Climate Change	**Kisumu Central:** Market Milimani, Kondele, Kaloleni Shauri Moyo **Nyakach:** South East Nyakach
Floods	Construction/ Opening of flood control structures (Dykes, water pans, rivers, gabions and canals)	Infrastructure & Water	**Muhoroni:** Masogo/Nyang'oma, Chemelil/Tamu Miwani, Ombeyi **Nyando/Kadibo:** Ahero, East Kano/Wawidhi, Kobura, Kabonyo/Kanyagwal **Kisumu East;** Kajulu, Kolwa Central, Kolwa East, Nyalenda A **Kisumu Central:** Nyalenda B, Kaloleni Shauri Moyo

Risk/ Hazard	Strategic Adaptation Investments	Sector	Sub-County and Ward
			Kisumu West: West Kisumu, North West Kisumu, South West Kisumu **Seme:** East seme **Nyakach;** Central Nyakach, West Nyakach
	Catchment protection through establishment of bamboo buffers and bamboo planting	Climate Change Environment and Natural Resources	**Muhoroni:** Chemelil/Tamu, Koru/Muhoroni **Nyando/Kadibo:** East Kano/Wawidhi **Kisumu East;** Kajulu, Kolwa central, Manyatta B, Nyalenda A **Kisumu West:** North West Kisumu
	Establishment of evacuation centres equipped with ecosan toilets	Health and Sanitation and Disaster	**Muhoroni:** Ombeyi **Kisumu Central;** Migosi
	Establishment of bio toilets and biogas plants at market and Beach areas	Health and Sanitation Energy	**Muhoroni:** Koru/Muhoroni **Kadibo;** Kobura
	Climate proofing of access and feeder roads (Bridges, culverts, drainages.	Infrastructure Public Works	**Muhoroni:** Koru/Muhoroni, Masogo/Nyang'oma Chemelil/Tamu, Miwani **Nyando/Kadibo:** Ahero, East Kano/ Wawidhi, Kobura, Kabonyo/Kanyagwal **Kisumu East;** Kolwa Central, Kolwa East, Manyatta B, Nyalenda A **Kisumu Central;** Market Milimani, Kaloleni/ Shauri Moyo **Kisumu West;** West Kisumu, North West Kisumu, South West Kisumu, North Kisumu **Seme;** Central Seme, East Seme **Nyakach;** North Nyakach
Extreme temperatures	Promotion of clean energy options for lighting, cooking – Briquettes; biogas; solar, food preservation/processing, solar fruits and vegetables driers	Energy	**Muhoroni:** Masogo/Nyang'oma, Chemelil/Tamu Miwani, Ombeyi **Nyando/Kadibo:** Awasi/Onjiko **Kisumu central;** Kondele **Kisumu East;** Kajulu, Kolwa Central, Nyalenda A **Kisumu Central;** Nyalenda B, Kondele **Nyakach;** South East Nyakach

Risk/ Hazard	Strategic Adaptation Investments	Sector	Sub-County and Ward
	Afforestation through tree nurseries establishment, institutional greening projects, beautification of public place, roadside tree planting and establishment of recreational parks	Climate Change Directorate Environment and Natural Resources	**Muhoroni:** Masogo/Nyang'oma, Chemelil/Tamu Miwani, Ombeyi **Nyando/Kadibo;** Ahero, Kobura, Kabonyo/Kanyagwal **Kisumu West:** West Kisumu, North West Kisumu, South West Kisumu, North Kisumu **Seme;** Central Seme, East Seme, North Seme **Nyakach;** North Nyakach, Central Nyakach
	Solid waste management and establishment of waste transfer stations	Environment and Natural Resources	**Nyando/Kadibo:** East Kano/Wawidhi **Kisumu East:** Manyatta B, Nyalenda A **Kisumu Central;** Migosi, Railways, Kondele **Kisumu West;** North Kisumu **Nyakach;** North Nyakach
Storms	Climate proofing of infrastructure (Lightening arrestors), wind breakers	Infrastructure	**Nyando** (Ahero, East Kano Wawidhi, Awasi Onjiko, Kobura & Kabonyo-Kanyagwal) **Muhoroni** (Chemelil-Tamu) **Nyakach** (North Nyakach and West Nyakach)

Chapter Six: Conclusions and Recommendations

6.1 Conclusions

The impacts of climate change such as frequent flooding, drought, extreme temperatures and rainstorms within Kisumu County are already becoming a severe burden to the county's economic development and its people. The said is exacerbated by increased human activities in the said same areas like the invasion of wetland and riparian zones as well as the related increased waste generation and disposal.

The County is however addressing some of these risks; for example through the formulation and line policies and laws as well as by way of programmatic interventions aimed at the attainment of sustainable climate change actions for due community support and resilience. Other responses include the engagement of infrastructural measures such as the dredging of water-ways and the construction of roads in highly exposed areas.

The upsurge in climate change manifestations within the western part of Kenya, Kisumu County is extremely rapid and this places additional stresses on the capacity of the ecosystem to adapt and thus has adverse effect on the lifespan of the existing infrastructure. This locally - led assessment are herein carried out in this report will thus help the County develop a responsive framework for both short- and long-term interventions based on climate risks identified during the PCRA process. Kisumu County and by extension the national government as well as the NGOs/ CSOs and the local communities will therefore through this process, have an opportunity of building resilient systems for addressing the impacts of climate change therein her locality. This evidently require policy interventions and climate resilient financial investments that put stakeholders in the centre of planning. The implementation of PCRA actions will enhance professional and technical direction to the County mitigations and adaptations to the impacts of climate change. This PCRA report is thus a critical document in the preparation of a collectively driven process in the development of the County Climate Change Action for the year 2023-2028.

6.2 Recommendations

The following are the key recommendations this PCRA Report:

1. Development of an effective Climate Change Action Plan (CCAP) as a framework for the implementation of the suggested adaptation methods for the 2023-2027 five (5) - year period; the common climate threats being floods, drought, extreme temperatures and rainstorms.

2. The suggested Climate Change Action Plan (CCAP) actions should focus on the most susceptible categories in the County, and these include: agriculture, water, environment and disaster risk management.
3. Stakeholder engagement should be upscaled to enable the County Government of Kisumu (CGK) actualize the priority measures listed in the County Climate Change Action Plan (CCCAP); this notwithstanding the fact that the Plan should be duly updated in time in order to help address the contemporary issues with good efficacy.
4. Strengthening of the capacities of key players in the implementation (inclusive of a holistic monitoring and evaluation) and mainstreaming of climate action should be done as appropriate. The said including but not limited to the capacities of the County Climate Change Unit for the efficient coordination and monitoring of the implementation of prioritized climate change actions. As well, the Ward Climate Change Planning Committees, the County Climate Change Planning Committee and Steering Committees should respectively be strengthened for effective community-centered risk assessment and action planning for climate change; and due decision-making.

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Annexes

Annex 1: Adaptation Priority Per Ward

Annex 2: Attendance List

1.1 Ward level community engagement

https://drive.google.com/drive/folders/1yXAxahTqeqiHY114f-bZdGJRb-enGqAE?usp=drive_link

Annex 4: Photo Gallery

Annex 1 Adaptation Priority Per Ward

Table 1a: Adaptation Priority Muhoroni Sub-County

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
1. Ward: Masogo / Nyang'oma				
Agriculture	1. Supporting of crops value chain (drought resistant seed and seedlings	Directorate of Agriculture KALRO, KMD, NEMA, DOSH	Increased resilient food crops for household consumption	No. of farmers cultivating drought resistant crops
	2. Supporting of solar/biogas fruits and vegetables driers at Kogutu, Kagogo and Nyatao	Directorate of Agriculture Directorate of Renewable Energy	Reduced post-harvest losses of fruits and vegetable	No. of fruits and vegetables driers Kgs of fruits and vegetable dried
	3. Upgrading livestock breeds through subsidized Artificial insemination (AI) and fodder conservation	Directorate of Veterinary Services	Improved livestock breed	No. of accessing the services
Water and Energy	1. Construction of resilient and adaptive pans in Masogo, Ogwodo and Ngere Kagoro	Directorate of water, Directorate of environment and Natural Resources NEMA, DOSH	Increased water availability for community and livestock during dry seasons	No of Adaptive Water pans
	2. Drilling of boreholes (climate smart reservoir tanks and solar system in Masaki, Ngere Kagoro, Chemelil Market and distribution and tapping for households	Directorate of Water, Directorate of Renewable Energy, WRA, NEMA, DOSH	Increased access to safe water	No. of households accessing safe water from the drilled and equipped borehole
	3. Supporting of community solar units for lighting Milenye, Magadi, Kogutu	Directorate of Green Energy	Reduced dependency of kerosene	No. of solar lighting units promoted

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
Environment	1. Establishment of a tree Nursery at Ombaka	Directorate of Environment and Natural Resources, Directorate of Water	Increased green jobs Increased tree cover	No of seedlings produced No. of seedling
	2. Construction of canals from Masogo, Kogutu, Nyakungru and Nyadundo and Pawteng	Directorate of Environment and Natural Resources, Directorate of Water	Controlled flooding	Length in Km of canals
	3. Construction of Onyalo biro Simbi water canal	Directorate of Environment and Natural Resources, Directorate of Water, WRA, NEMA, DOSH	Controlled water canals	Length in Km of canals
Infrastructure	1.Climate Proofing and Improvement of existing feeder roads through bridges, culverts and drainages at Ngere to Masogo, Masaka to Nyarenda, Ogwodo to River Nyando, Kogutu to Nyando Chemelil Chiro	Directorate of Infrastructure Directorate of Climate Change NEMA, DOSH	Improved access	Length of Climate proofed road No of adaptive culverts and bridges
2. Ward: Chemelil/Tamu				
Agriculture	1. Supporting of fodder preservation technologies e.g., hay preservation	Directorate of Livestock	Increased livestock production during dry period	No. of farmer practicing fodder preservation
	2. Upgrading livestock breeds through subsidized Artificial insemination (AI)	Directorate of Veterinary Services	Improved livestock breed	No. of accessing the A.I services
	3. Supporting of poultry farming amongst the vulnerable groups	Directorate of livestock	Increased income	No. of vulnerable groups supported with poultry inputs

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
Water and Energy	1. Construction of adaptive water-pans in Kopere, Oseng, makindu Mashambani, Vale, Rapogi	Directorate of water Directorate of Environment and Natural Resources	Increased access to water by community and livestock during dry period	No. of adaptive water-pans constructed
	2. Supporting of solar lanterns	Directorate of Renewable Energy	Reduced usage of kerosene	No. of household using lantern
	3. Drilling of climate resilient boreholes at Holo, Guliago, Kibigori, Mashambani	Directorate of Water	Increased access to safe water	No. of households accessing safe water from the drilled and equipped borehole
Environment	1. Improvement of exiting tree nursery at chemelil roundabout through capacity building, Marketing and supporting of inputs	Directorate of Environment and Natural Resources, Kenya Forest Services, Tarde	Increased income Increased forest cover	No. of green jobs created No. of trees planted
	2. Catchment protection through bamboo planting along River Banks Osengeteti, Oroba and Nyando and sensitization on river conservation	Directorate of Environment and Natural Resources WRA	Increased Riverine buffer	No. of bamboos planted and maintained
	3. Supporting of Sustainable Agriculture Land Management through soil erosion control measure like cover crops	Directorate of Environment and Natural Resources	Improved soil conservation	No. of farmers practicing soil conservation measures
Infrastructure	1. Unclogging of existing drainages within Chemelil Town	Directorate of Infrastructure, Directorate of Environment and natural Resources	Improved flow in the drains	Length in Km of unclogged drainages
	2. Construction of adaptive Dykes and gabions in Chemelil, Mashambani, Kibigori and Lwala, Songhor	Directorate of infrastructure	Reduced flood incidences	Length in Km of Dykes and Gabions constructed

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
	3. Upgrading of all-weather roads and bridges including KaDan to Kopere, Rapogi Rd to Miti Tatu to Kochanje	Directorate of Infrastructure NEMA, DOSH	Increased accessibility	Length of road upgraded
3. Ward: Miwani				
Agriculture	1. Training on conservation agriculture including Supporting of green houses to women and youth groups	Directorate of Agriculture Directorate of irrigation	Increased food production Empowerment of vulnerable groups	No. of groups trained No. of operational green houses
	2. Supporting of crop value chain through drought resistant seeds to farmers 300 farmers	Directorate of crop production	Increased food production	No. of farmers issued with seeds Records of produce harvested
	3. Supporting solar of solar water pumps to women groups and youth	Directorate of Renewable Energy	Reduced crop losses Improved livelihoods Increased acreage under agriculture	No of women and youth groups trained No of vulnerable groups using solar pumps
Water and energy	1. Supporting of energy saving jikos and biogas installation Jua Kali	Directorate of Renewable Energy	Reduced dependency on charcoal	No of residents using biogas facility No of homesteads using energy saving jikos
	2. Establishment of Solar Lighting systems at Juakali, KEDA, Karunga, Kaeli	Directorate of Renewable Energy	Reduced dependence of paraffin for lighting Reduced respiratory diseases Improved livelihoods	No of solar lighting systems installed
	3. Water tapping, treatment and pipeline extension purification strategies at Jua Kali, Karunga	Directorate of Water	Reduced water borne diseases Improved living standards	No. water Kiosks set up No of connections

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
Environment	1. Planting of indigenous trees seedlings and bamboo along river banks Oroba, Nyakoko, Nyando, Hela and Angwecha	Directorate of Environment	Controlled soil erosion Controlled flooding	No of seedlings grown River bank areas protected No of youths engaged in planting
	2. Construction of gabions along river Oroba, Keda area	Directorate of Environment, Directorate of irrigation	Controlled flooding of homesteads	Areas protected from the floods
	3. Capacity building of women groups to produce charcoal briquetting	Directorate of Renewable energy	Reduced dependency on charcoal for cooking Improved livelihoods	No of women groups trained No of briquetting projects done by women No of briquetting machines provided to groups
Infrastructure	1. Building of a spring bridge at Omayi	Directorate of infrastructure	Improved livelihoods Improved access to basic services especially health and education	No of locals using bridge
4. Ward: Ombeyi				
Agriculture	1. Supporting of Solar irrigation pumps to women youth and PWDs groups	Directorate of Renewable energy	Reduced crop losses Improved livelihoods Increased acreage under agriculture	No of women and youth groups trained No of vulnerable groups using solar pumps
	2. Training on conservation agriculture including Supporting of Green houses to women and youth groups	CGK Directorate of crop Directorate of irrigation	Increased food production Empowerment of vulnerable groups	No. of groups trained No. of operational green houses
	3. Agroforestry training and initiatives for farmers	CGK Directorate of Agriculture	Increased biodiversity and resilience on farms Improved livelihoods	No of farmers trained No of agroforestry seedlings provided

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
Water and Energy	1. Construction of resilient and adaptive water pans at Kiliti and Achuodho	CGK Directorate of Water NEMA, DOSH	Increased food production Improved livestock production Improved living standards	No of residents directly using water pan No. of livestock watering points set up
	2. Water pipeline extension from Ramula Dispensary to Kowuor Village	CGK Directorate of Water, NEMA, DOSH	Improved living standards Reduced water borne diseases	No of residents connected to tapped water No of water kiosks set up
	3. Supporting of energy saving jikos and awareness on renewable energy	CGK Directorate of Renewable energy	Reduced dependency on charcoal	No of homesteads using energy saving jikos
Environment	1. Training on Briquette production centre for domestic use by women groups	CGK Directorate of Renewable energy NEMA, DOSH	Reduced dependency on charcoal for cooking Improved livelihoods	No of women groups trained No of briquetting projects done by women No of briquetting machines provided to groups
	2. Set up of an Indigenous youth group managed tree nursery at Kasese and Ombeyi	CGK Directorate of Renewable Energy NEMA, DOSH	Improved livelihood Environment protection along River Ombeyi and Aredo	No of youths engaged in seedling production
	3. Desiltation of River Ang'wecha, Aredo, Ombeyi	Directorate of Environment., NEMA, DOSH	Reduced incidences of flooding of farms and homesteads	No of kilometers desilted
Infrastructure	1. Upgrading of road form Kasese to Kasongo	Directorate of infrastructure, NEMA,DOSH	Improved accessibility to markets and basic services	Areas upgraded

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
	2. Construction of resilient gabions along River Ombeyi	Directorate of Public works NEMA, DOSH	Reduced flooding of farms Reduced soil erosion and siltation	Size of gabions and length constructed
	3. ECOSAN toilets at Ombeyi Centre	Directorate of Public health Directorate of trade Directorate of Renewable energy,NEMA, DOSH	Reduced incidences of water borne diseases Reduced water contamination Reduced water pollution	Ecosan toilets put up at Ombeyi Population of traders using the facility
5. Ward: Koru Muhoroni				
Agriculture	1. Training on modern husbandry practices and Supporting, Improved breeds and supporting of subsidized AI	Directorate of livestock production	Increased livestock farming Improved livestock production Improved livelihoods	No of farmers trained No of farmers that purchased AI
	2. Climate smart agriculture (with priority on soil testing)	Directorate of agriculture	Informed use on fertilizer uses and application rates Increased crop production	No of farmers trained on fertilizer use No of farmers that tested soils
	3. Training on forage production and hay preservation	Directorate of livestock	Improved livestock production Improved animal nutrition and product quality	No of farmers trained No of acres under forage production Quantity of hay preserved by farmers per season
Water and Energy	1. Equip existing infrastructure for tapped water at Koru and St. John to homesteads and institutions	CGK Directorate of Water NEMA, DOSH	Improved living standards Reduced water borne diseases	No of institutions and homes connected to piped water Length of pipeline extension

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
	2. Supporting of renewable energy and supporting of solar water pumps to women groups and PWDs	Directorate of Renewable energy NEMA DOSH	Reduced crop losses Improved livelihoods Increased acreage under agriculture	No of women and youth groups trained No of vulnerable groups using solar pumps No of water pumps given
	3. Bio toilet and biogas At Muhoroni Town Market and Koru Centre.	Directorate of Renewable energy Directorate of Trade NEMA, DOSH	Reduced incidences of water borne diseases Reduced water contamination Reduced water pollution	Ecosan toilets put up at Ombeyi Population of traders using the facility
Environment	1. Afforestation and maintenance on hills and special purpose lands	CGK Directorate of Environment	Conservation of catchment areas Reduced soil erosion Reduced flooding	Areas and acreage planted No of youths engaged
	2. Bamboo planting along Abwombo bridge, Menara Stream by youths	CGK Directorate of environment	Protection of infrastructure Reduced soil erosion	Length of bamboo planted No of youth engaged
	3. Upgrade of Menatra Tree nursery for indigenous tree species production and knowledge dissemination	CGK Directorate of Environment NEMA, DOSH	Awareness creation on indigenous tree species, medicinal and ornamental Increased tree seedling production	Perimeter fence extended Tree species tag identification and segregation No of visitors coming to the nursery

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results/ (Output)	Key Performance Indicators
Infrastructure	1. Upgrading of (Koru Ring Road and Mtuala ngeria to climate proof roads	Directorate of infrastructure NEMA, DOSH	Improved access to amenities and social services	Length of kilometers upgraded
	2. Repair and upgrade of Bridges – oyange/ homalime bridge, okalo, ruke bridge, kandege kowana bridge, ayoma bridge	Directorate of infrastructure NEMA, DOSH	Improved access to education and hospitals	No of bridges upgraded

Table 1b: Adaptation Priority Nyando / Kadibo Sub Counties

Sector	Adaptation priority	Coordinating Unit/ Agency	Expected results (output)	Key Performance Indicators
6. Ward: Ahero				
Agriculture	1. Desilting of Ng'adi, Gombe Nyatini, streams in Kochogo and Kakola,	Directorate of Agriculture Directorate of water (Survey works), NEMA, DOSH	Reduced effects of floods on farmlands	Length in km of canal
	2. Expansion of Siso II canal to reach Kochogo and lower Kakola	Directorate of irrigation	Increase in Area under irrigation	Acreage under irrigation
	3. Construction of resilient and adaptive water pans Sison central, Tura, Kakola and Ahero	Directorate of Agriculture, Public Works, Land and survey NEMA, DOSH	Enhanced water availability	Number of water pans
Water	1. Distribution of Ombaka Water Project to persons within a radius of $5km^2$	Department of water	Improved water access	Number of households with water access
	2. Construction of borehole at the chiefs' camp	Department of water NEMA, DOSH	Improved water access	Number of households served
Environment	1. Construction of proper drainage system within Ahero and its environs	Public works, Environment, Urban and Physical planning NEMA, DOSH	Improved drainage system	Controlled flood within the town
	2. Provide seedlings for forest cover to households	Department of Environment	Enhanced tree cover	Number of trees grown
	3. School / institution greening through growing of multipurpose trees	Department of Environment & Natural Resources	Enhanced multi-purpose tree cover	Number of multipurpose trees per institution
7. Ward: East Kano Wawidhi				
Agriculture	1. Empowerment of women and persons with disability through Supporting of poultry value chain (construction of poultry units and supply of feeds)	Directorate of livestock, Department of social services NEMA, DOSH	Increase in poultry production	Number of women groups and PWDs practicing poultry production
	2. Expansion of irrigation in flood prone areas. Nyachoda, Magina	Directorate of irrigation	Increase in area under irrigation	Acreage under irrigation
	3.Introduction of finger lings in Mica Atiang', Akich dam, Odego)	Directorate of Fisheries	Increase in fish production	Number of dams stocked
Water	1.Kochiewo borehole improvement and reticulation (solar pump and overhead tank) dug at 25	Directorate of Water NEMA, DOSH	Improved water access	Number of households with water access
	2. DE siltation of water pans Holo Orucho	Directorate of Agriculture Directorate Water, NEMA, DOSH	Water pans de-silted	No. of water pans desilted

Sector	Adaptation priority	Coordinating Unit/ Agency	Expected results (output)	Key Performance Indicators
	3.Desiltation of Katolo water pan	Directorate of Irrigation	Water pans de-silted	No. of water pans desilted
Environment	1.Desiltation River Nyando from Nyamunga bridge to Lake Victoria (About 7km)	Directorate of Environment & Natural Resources Directorate of Water (Survey works)	Sections of River Nyando Desilted	Km of de-siltation in river Nyando
	2. Planting of indigenous trees along the river banks (awach river)	Directorate of Environment & Natural Resources, WRA	Embarked river banks	No. of trees planted
	3.Solid Waste Management at Ayueyo Centre	Directorate of Environment& Natural Resources NEMA, DOSH	Value addition to waste	Quantity (kgs)of waste value added
Infrastructure	1. Magina-Okoth-Migeni access road	Directorate of infrastructure NEMA, DOSH	Improved road network	5km of road constructed
	2. Apondo school- Ayweyo center - Kopon		Improved road network	10km of road constructed
	3. Ayweyo center- kodete		Improved road network	7km of road constructed
	4. Kodete- katolo secondary school		Improved road network	7km of road constructed
8. Ward: Awasi Onjiko				
Agriculture	1. Supporting of pasture and crop production (drought resistant crops like cassava, sorghum, millet and improved legumes and pastures)	Directorate of agriculture NEMA, DOSH	Improved crop and pasture production	No. of farmers practicing crop and pasture production Acreage under pasture and crop
	2. Capacity build farmers on new technologies that are climate friendly, mechanization(ploughing)	Directorate Environment and Natural Resources NEMA, DOSH	Farmers capacity built	No. of farmers capacity built
	3. Supporting of farm inputs in Kobong'o area	Directorate of agriculture	Increased production	No of farmers reached
Environment and Energy	1. Supporting and awareness creation on energy saving jikos	Directorate of energy NEMA, DOSH	Households reached/using energy saving jikos	No of households reached No of households using energy saving Jikos
	2. Delineating riparian lands in Nyaidho and Agalla Rivers for reclamation (pegging) purposes (bamboo and other water friendly	Directorate of Environment & Natural Resources, Directorate of Lands and Physical Planning NEMA, DOSH	Conserved riparian	No of km pegged No of km under gabions and embankment

Sector	Adaptation priority	Coordinating Unit/ Agency	Expected results (output)	Key Performance Indicators
	trees), Construction of gabions of Nyaidho and Agalla Rivers			
	3. Construction of water- pan at Agalla	Department of agriculture, livestock, fisheries and irrigation	Improved water access	No. of water pans constructed
Water	1. De-siltation of existing dams Construction of new ones within the ward area, Kambago, Kagoro, Arue, Kasara, Kodwar, NEW- Along river Nyaidho, Along Agalla	Directorate of Water, Directorate of Infrastructure, Directorate of Environment and Natural Resources, NEMA, DOSH	Dams constructed Improved water quality and volume.	No of dams constructed No of dams desilted
	2. Construction of resilient and adaptive water pans in Kamunda Kochogo and Kanyipola		Improved water access	No of pans constructed
	3. Construction of Weir in River Nyando to enhance water supply through Boarder 2, Wang'anga, Boarder 1 to Kakmie	Directorate of Water, Directorate of Infrastructure NEMA, DOSH	Enhanced water supply	No of farms reached
9. Ward: Kobura				
Environment	1. Establishment of woodlots in schools and learning institutions across the ward	Directorate of Environment and Natural Resources	Woodlots established	No of woodlots established, No of trees
Planning, Disaster & special programs	2. Desilting of River miriu from Hongo Ogosa to the Lake (8-10 km)	Disaster & Special programs NEMA DOSH	Improved water flow	No of kilometers desilted
	3. River Ombeyi from jumbo area to the lake (about 6km)		Improved water flow	No of kilometres desilted
	4. Construction of evacuation centers Hongo Ogosa, Nyamkebe and Nyamware.		Constructed evacuation centers	No of evacuation centers constructed
Water	1. Drilling of bore holes (kayuore Market, Korowe Market, Market)	Directorate of Water	Enhanced water access	No of boreholes drilled
	2.Extension of piped water from Korowe to Ong'che		Enhanced water access	No of households reached
	3.Supply of water tanks to Hongo ogosa, Lela, Masogo health center		Enhanced water harvesting	No of tanks supplied

Sector	Adaptation priority	Coordinating Unit/ Agency	Expected results (output)	Key Performance Indicators
Agriculture	1.Expansion irrigation schemes South west kano irrigation scheme in Bonde areas value addition on rice produce (processing and packaging)	Directorate of irrigation	Increased acreage under irrigation	Acreage under irrigation
	2.Supporting of poultry value chain through construction of raised floor poultry units	Directorate of livestock	Increased poultry production/products	No of farmers raised poultry houses constructed
	3.Supporting of improved pasture production (drought resistant pastures (brachariah) and feed conservation through construction of hayban and silage making		Increased pasture production Improved feed conservation	Acreage under improved pastures No. Haybans constructed
Health	1. Enhanced vaccinations activities (Malaria, bilharzia)	Directorate of Health and Sanitation	Improved disease control	No. of vaccinations conducted
	2. Provide mosquito nets		Malaria prevention	No. of nets distributed and households reached
	3. Awareness creation on health-related issues		Improved health awareness	No. of forums conducted
Infrastructure	1.Construction of Kobura- kaluore climate proofed road	Directorate of infrastructure NEMA DOSH	Improved road network	Length Km of road constructed
	2.Construction of Namba Migingo to Nyamware beach climate proofed road,		Improved road network	Length km of road constructed
	3.Construction of Korowe to Nduru beach Climate proofed		Improved road network	Length km of road constructed
10. Ward: Kabonyo-Kanyagwal				
Water	1.Nyangande Market Water Project Pipeline Repair of Motar and Pipeline Extension (4km)	Directorate WECCNR, Market leaders NEMA, DOSH	Access to clean water	No of km of pipeline extension done
	2.Kanyagwal Water Project Expansion Pipeline Extension (6km)	Directorate WECCNR, Market leaders NEMA, DOSH	Access to clean water	No of km of pipeline extension done
	3. Reru Koduol Water Project Expansion Pipeline Extension (6km)	Directorate WECCNR, Market leaders NEMA, DOSH	Access to clean water	No of km of pipeline extension done

Sector	Adaptation priority	Coordinating Unit/ Agency	Expected results (output)	Key Performance Indicators
Environment & Natural Resources	1.Desiltation of major streams and canals; Aguko Omoro – Nyamrundu Primary school canal (6km), Kandarria-Ogenya beach stream (10km), Orogno – Alwala Canals Starts from DO Odiko – Nyachira- Komwaga- Kapiyo – Kolal Villages (7km)	Directorate of Environment & Natural Resources NEMA, DOSH	Controlled flooding, Reduced soil erosion	3No of streams and canals desilted
	2.Research / Feasibility study on the back flow of Lake Victoria and activities/ riparian vegetation that would protect the shoreline from further erosion.	Directorate of Climate Change, University of Nairobi, Directorate of Disaster management, NEMA, DOSH	A report for informed decision making	No of studies done
	3. Establishment of woodlots in the 28 learning institutions and 8 health facilities and 6 beaches (Obange, Oseth, Nduru, Singinda Kaloleni and Ogenya)	Directorate of Environment & Natural Resources NEMA, DOSH	A report for informed decision making	No. of woodlots Established
Agriculture	1. Supporting of agroforestry (Capacity building, Supporting of planting of multipurpose trees-fodder trees, medicinal, fruit and conservation trees)	Directorate of Agriculture, Irrigation, WECCNR NEMA DOSH	enhanced food security, Livelihood promoted for	No of groups benefiting from value chain development
	2. Enhance Supporting of food value chain through drought resistance crops, fruit trees and horticulture	Department of Agriculture, Irrigation, WECCNR, NEMA, DOSH	Enhanced food security, Livelihood promoted	No of groups benefiting from value chain development
Infrastructure	1. Upgrade to climate proofed road of Amboo complex-Oseth beach- Oseth Primary access road (4km)	Department of Roads, WECCNR, NEMA DOSH	Improved road network	No of kilometers of resilient and upgraded road
	2.Upgrade to climate proofed road Kadie bridge-Anyuro Chief's camp 4km	Directorate of infrastructure, WECCNR, NEMA, DOSH	Improved road network	No of kilometers of resilient and upgraded road
	3.Upgrade to climate proofed road for Nyang'ande-Kadete access road (4km)	Department of Roads, WECCNR, NEMA, DOSH	Improved road network	No of kilometers of resilient and upgraded road

Table 1c: Adaptation Priority Kisumu East Sub- County

Sector	Adaptation Priority	Coordinating Unit/ Agency	Expected Results (Output)	Key Performance Indicator
11. Ward: Kajulu				
Agriculture	1.Supporting of farm input accessibility in horticulture value chain (exotic vegetables and fast maturing fruits of avocado, paw Kajol Kajol and mangoes) 2.Supporting of dairy value chain (subsidized artificial insemination)	Directorate of Agriculture NEMA DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of cattle on artificial insemination
Water	1.Extension of pipeline water supply in Bukna and Ongadi area 2.Drilling and equipping of solarized boreholes in Oriang primary school 3.Upgrading of Aredo, Angira and Gari water pans (resilient and adaptive)	Directorate of Water WRA Directorate of Lands and Physical Planning, NEMA DOSH	Increased water access and availability	Length (km) of pipeline extended No. of boreholes drilled and solarized No. of resilient and adaptive water pans upgraded
Environment	1.Desiltation of River Awach and Kibos 2.Supporting of livelihoods in Kajulu forest and learning institutions through environmental conservation and forest value chain 3.Establishment of an integrated waste transfer facility at Mamboleo market	Directorate of Environment and Natural Resources WRA, Directorate of lands and physical planning, NEMA DOSH	Reduced flooding and destruction of households Improved living standards Improved market waste management systems	Length of river desilted Number of institutions engaged in environmental conservation Number of trees grown Number of waste facilities constructed
Infrastructure	1.Installation of solar floodlights at Soweto, Guba and Osiepe markets 2.Construction of sanitation facilities within markets (riat, obwolo, onga'di) 3. Construction of a foot bridge at Rae-riat bridge, sirigoi-abururu bridge, aredo-komonge)	Directorate of green energy Directorate of trade Directorate of lands and physical planning NEMA DOSH	Reduced water-borne diseases and infections Improved security Enhanced access to social amenities like schools	Number of solar floodlights installed Number of sanitation facilities constructed Number of footbridges done

Sector	Adaptation Priority	Coordinating Unit/ Agency	Expected Results (Output)	Key Performance Indicator
12. Ward: Kolwa Central				
Agriculture	1. Supporting of farm input accessibility in horticulture value chain (indigenous vegetables – cow peas, spider plant, black night shade, kales, spinach, clotalaria and passion fruit) 2. Supporting of poultry value chain (construction structures, Supporting of one day old improved kienyeji birds and feeds) Supporting of Agro-forestry	Department of agriculture and livestock Directorate of climate change Directorate of Environment and Natural Resources KFS KEFRI NEMA DOSH	Improved food security Increased agricultural production	Number of farmers benefiting with horticulture farm input Number of cattle on artificial insemination Number of agro-forestry trees grown
Water	1. Drilling and equipping of solarised borehole in Nyalunya health centre 2. Upgrading of water pans (Mowlem, nyakiti, kong'any)	Directorate of Water WRA Directorate of Lands and Physical planning, NEMA, DOSH	Increased water access and availability	Length of pipeline extended Number of boreholes drilled and solarised Number of resilient and adaptive water pans upgraded
Environment	1. Construction of climate proofed dykes/gabions at Akado, Otera, Ofunyu, Kamuga, Angenyoni, Bwanda and Oyola reas 2. Climate proofed desiltation of River Mahenya and River Nyamasaria 3. Climate proofed gabions along river kibos at kibos –kaloo and renja	Directorate of Environment and Natural Resources change, WRA Directorate of Lands and Physical Planning, NEMA, DOSH	Reduced flooding and destruction of households Improved living standards Improved market waste management	Length (Km) of river desilted Number of institutions engaged in environmental conservation Number of trees grown Number of waste facilities constructed
Infrastructure	1. Upgrading of Nyamasaria-jamilo-ouko brigde-chiga road (climate proofed) 2. Upgrading of Mahenya bridge connecting Angola to Rabuor 3. Installation of Flood lights at Ouko bridge, Bwanda, Ragumo, Mowlem, Kunya-Kiwasco	Directorate of infrastructure Directorate of green energy Directorate of trade Directorate of lands and physical planning NEMA, DOSH	Improved security Enhanced access to social amenities like schools	Number of solar floodlights installed Number of sanitation facilities constructed Number of footbridges done

Sector	Adaptation Priority	Coordinating Unit/ Agency	Expected Results (Output)	Key Performance Indicator
Energy	1.Supporting of energy saving jikos	Directorate of green energy, Directorate of environment and climate change, NEMA, DOSH	Improved clean cooking Reduced carbon emission	Number of clean cooking stoves promoted
13. Ward: Kolwa East				
Water	1. Construction of solarised borehole with reservoir tanks at Baptist church, bondo, nyamonge school and siany kokuto 2. Extension of water supply from chiga market to bungu, rweya, aguche and St. J ohns, landi matope market, okago pri 3. Upgrading of existing water pans (cor ner buoye, Aloo gumbi, kadwar and onyongo aloyo)	Department of water, environment and climate change, WRA, Department of lands and physical planning, NEMA DOSH	Increased water access and availability	Length of pipeline extended Number of boreholes drilled and solarised Number of resilient and adaptive water pans upgraded
Environment	1.Climate proof desiltation of river Mahenya, Obuso and Lie langa 2. Supporting of environmental conservation in learning institutions and along river Kibos (bamboo) 3. Establishment of an integrated waste transfer facility at chiga market and nyayo market/orongo	Department of water, environment and climate change, WRA Department of lands and physical planning, NEMA DOSH	Reduced flooding and destruction of households Improved market waste management systems Number of degraded areas reclaimed	Length (Km) of river desilted Number of institutions engaged in environmental conservation Length of river under conservation Number of trees grown Number of waste facilities constructed
Agriculture	1. Supporting of farm input accessibility in: Dairy value chain (Artificial insemination and introduction of improved dairy goats) 2. Horticulture value chain (watermelon, passion fruits, indigenous vegetables) 3. Poultry value chain (distribution of one day old improved kienyeji birds and feeds) 4.	Directorate of agriculture and livestock NEMA DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of cattle on artificial insemination

Sector	Adaptation Priority	Coordinating Unit/ Agency	Expected Results (Output)	Key Performance Indicator
Infrastructure	1. Construction of climate proof box culverts at okuta-omwom and kogonyo/kadongo 2.Construction of bridges at siany-kokuto and obuso-kosome streams 3.Construction of a climate proof evacuation centers at Nyambe and Rweya	Directorate of Lands and Physical planning Directorate of climate change Directorate of disaster management NEMA DOSH	Improved security Enhanced access to social amenities like schools Reduced flooding effects on health	Number of box culverts done Number of footbridges done Number of evacuation centers constructed
Energy	Supporting of energy saving jikos	Directorate of green energy, Directorate of environment and climate change, NEMA, DOSH	Improved clean cooking Reduced carbon emission	Number of clean cooking stoves promoted
14. Ward: Manyatta B				
Water	1.Drilling and equipping of a solarised borehole with raised reservoirs at Koyo dispensary 2.Installation of a Community water kiosk at gesoko	Directorate of water, environment and climate change, WRA, Directorate of lands and physical planning, NEMA, DOSH	Increased water access and availability	Number of boreholes drilled and solarised Number of water kiosks installed
Environment	1.Climate proof drainage desiltation for Kaego-nerea bridge, Baptist church-paw Remo, mbeme junction-Auji, Kothoth judea-auji, auji ndogo(nyaganda)-auji (desiltation of river auji and nyamas aria) 2.Supporting of environmental conservation along River Auji (bamboo tree planting) 3. Establishment of an integrated waste transfer facility at koyango, komer and kasawino Mkt	Directorate of Environment and Natural Resources WRA Directorate of lands and physical planning, NEMA DOSH	Reduced flooding and destruction of households Improved market waste management systems Improved riparian conservation	Length of streams desilted Length of streams under conservation Number of trees grown Number of waste facilities constructed
Agriculture	1.Supporting of farm input accessibility in: Poultry (distribution of improved kienyeji eggs/one day birds, feeds and construction of a raised structure)	Directorate of agriculture and livestock Directorate of climate change NEMA, DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of cone gardens developed

Sector	Adaptation Priority	Coordinating Unit/ Agency	Expected Results (Output)	Key Performance Indicator
	2.Supporting of cone garden and seed's introduction of improved dairy goat breed			
Infrastructure	1.Installation of flood lights at komer, kuoyo dispensary and kasawino markets 2. Construction of a climate proof box culvert on Kaegoo road (Nerea bridge) 3.Opening of koyango transformer to Avilla school road	Directorate of lands and physical planning Directorate of climate change NEMA DOSH	Improved security Enhanced access to social amenities like schools	Number of box culverts done Number of box culvert done Length of road opened
15. Ward: Nyalenda A				
Water	1.Pipeline Extension to St. mark nyabera and dago pri and kasagam	Directorate of Water, KIWASCO Directorate of lands and physical planning,	Increased water access and availability	Length of pipeline extended
Environment	1.Desiltation of auji and ouru stream, un clogging of drainages (kawater-st. john-samba –Auji, Nyaori-Auji, pinnochio-kanyakwar-catholic centre, western – auji) 2. Supporting of environmental conservation along river auji (bamboo tree planting) 3. Establishment of an integrated waste transfer facility at kowino market	Department of water, environment and climate change, WRA, Department of lands and physical planning, NEMA, DOSH	Reduced flooding and destruction of households Improved riparian conservation Improved market waste management systems Number of degraded areas reclaimed	Length of streams desilted Length of streams under conservation Number of trees grown Number of waste facilities constructed
Agriculture	1. Supporting of farm input accessibility in Poultry value chain (distribution of one day old improved kienyeji birds and feeds) 2. Supporting of Improved dairy goats 3. Supporting of solar water pumps to formal groups in namthoi and samba farms	Department of agriculture and livestock Directorate of climate change, NEMA, DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of solar water pumps promoted

Table 1d: Adaptation Priority Kisumu Central Sub-County

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results (Output)	Performance Indicator
16. Ward: Migosi				
Agriculture	1. Supporting of kitchen gardening and sensitization o management. 2.Supporting of farm input accessibility-horticultural crops, Poultry value chain (distribution of one day old improved kienyeji, broilers birds and feeds)	Directorate of Agriculture Directorate of Agriculture NEMA DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of poultry
Water	1.Extension of pipeline water supply in sigalagala and Ajejos area (Water kiosks) 2.Supporting of water tanks in public schools (Ezra gumbe, kondele, migosi, ken obura secondary and migosi hospital)	Directorate of water, environment and climate change, WRA, Directorate of lands and physical planning, NEMA DOSH	Increased water access and availability	Length of pipeline extended Number of storage tanks installed
Environment	1.Supporting of skips for waste collection at (green view, carwash and aliwa, lolwe, hekima and Kenya 2.Unclogging of drainages at sigalagala, aliwa, Ezra gumbe/cars	Directorate of water, environment and climate change, WRA, Directorate of lands and physical planning, NEMA, DOSH	Reduced flooding and destruction of households Improved living standards Improved market waste management systems	Number of institutions engaged in environmental conservation Number of waste facilities constructed
Infrastructure	1.Construction of sanitation facilities (sigalala, kibira, Ajejos) Drainage stone pitching along Dona/chakaliko/kings &queens' road, Dona kapenesu-road	Directorate of Renewable Energy, Department of trade, Department of lands and physical planning, NEMA, DOSH	Reduced water-borne diseases and infections Enhanced access to social amenities like schools	Number of sanitation facilities constructed Number of drainages done
17. Ward: Market Mililani				
Water	1.Supporting of water kiosk at maendeleo market, Maasai market and ondiek estate	Directorate of Water, WRA, Directorate of lands and physical planning, NEMA, DOSH	Increased water access and availability	Number of resilient and adaptive water kiosks installed

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results (Output)	Performance Indicator
Environment	1.Climate smart drainage at (Kisumu boys' roundabout, jubilee market, AP line) Supporting of skip bins at (maendeleo market, jubilee market, chichwa market, maasai market and public parks)	Directorate of Environment and Natural Resources, Directorate of lands and physical planning, NEMA DOSH	Reduced flooding and destruction of households Improved living standards Improved market waste management	Length of channel desilted Number of institutions engaged in environmental conservation Number of waste skip bins installed
18. Ward: Railways				
Water	1.Extension of water supply to Mbita /Obunga /Jua Kali. 2.Supporting of communal Water Kiosk upper railways (mbita).	Directorate of Water, WRA, Directorate of lands and physical planning, NEMA DOSH	Increased water access and availability	Length of pipeline extended Number of resilient water kiosk installed
Environment	1.Supporting of skips at blue hills / matela arabs, obunga 2.Supporting of trees along river KISAT and learning institutions (kudho primary school) 3.Climate smart Drainage stone pitching of river Kisat, from blue hill to mogombe	Directorate of Environment and Natural Resources WRA Directorate of lands and physical planning, NEMA DOSH	Reduced flooding and destruction of households Improved market waste management systems	Length of river desilted Number of institutions engaged in environmental conservation Length of river under conservation Number of trees grown Number of skips installed
Agriculture	1.Supporting of farm input accessibility in: Poultry value chain (distribution of one day old improved kienyeji birds and feeds) 2.Supporting of kitchen gardens and sensitization on management	Directorate of agriculture NEMA DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups
19. Ward: Nyalenda B				
Water	1.Extension of water supply in public schools. 2.Supporting of Automated community water kiosk at (UDS, pand pieri school Nanga and joel omino)	Directorate of Water WRA, Directorate of lands and physical planning, NEMA, DOSH	Increased water access and availability	Number of water kiosks installed Length of pipeline extended
Environment	1.Climate smart drainage desiltation for	Directorate of	Reduced flooding and	Length (km) of streams

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results (Output)	Performance Indicator
	river road.	Environment and Natural WRA, NEMA, DOSH	destruction of households	desilted
Agriculture	1.Supporting of farm input accessibility in: Poultry (distribution of improved kienyeji eggs/one day birds, feeds and construction of a raised structure) 2.Supporting of cone garden and seed's introduction of improved dairy goat breed	Directorate of Agriculture NEMA DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of cone gardens developed
Energy	1.Construction of community cooking center at (Pandpieri and UDS)	Directorate of environment and climate change, Directorate of green energy, NEMA DOSH	Improved clean cooking Reduced carbon emission	Number of community cooking centre installed
20. Ward: Kondele				
Water	1.Pipeline Extension and water kiosks in all markets within kondele	Department of water, environment and climate change, KIWASCO Department of lands and physical planning, NEMA DOSH	Increased water access and availability	Length of pipeline extended Number of water kiosks installed
Environment	1.Supporting of integrated waste collection centers at kondele, manyatta and carwash markets 2.Climate smart drainage for kona legio-call box-manyatta primary.	Department of water, environment and climate change, WRA, Department of lands and physical planning, NEMA, DOSH	Reduced flooding and destruction of households Improved market waste management systems	Length of channels drained Number of waste facilities constructed
Agriculture	1.Supporting of farm input accessibility in. Poultry value chain (distribution of one day old improved kienyeji birds and feed	Department of agriculture and livestock Directorate of climate change, NEMA, DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups
Energy	1.Supporting of briquette molding machines	Directorate of environment and climate change, Directorate of	Improved clean cooking Reduced carbon emission	Number of briquettes installed

Sector	Adaptation Priority	Coordinating Unit/Agency	Expected Results (Output)	Performance Indicator
		Renewable energy, NEMA, DOSH		
21. Ward: Shauri Moyo				
Water	1.Construction of water kiosks at Nubian, kaloleni village and Arina 2.Supporting of roof water catchment in public schools (highway primary, Bishop obiero, Kaloleni and Shaurimoyo)	Directorate of Water, KIWASCO Directorate of lands and physical planning, NEMA, DOSH	Increased water access and availability	Number of water kiosks done Number of roof catchment technologies done
Environment	1.Climate smart drainage from full gospel church /love bar/, drainage systems from kibuye to kondele mark 2.Supporting of tree nursery at Arina estate. 3.Supporting of integrated waste collection centers at Arina and Nubian	Directorate of Environment and Natural Resources WRA Directorate of Lands and Physical planning, NEMA, DOSH	Reduced flooding and destruction of households Improved riparian conservation Improved market waste management systems	Length of streams desilted Length of streams under conservation Number of trees grown Number of waste facilities constructed
Agriculture	1.Supporting of farm input accessibility in. Poultry value chain (distribution of one day old improved kienyeji birds and feed	Directorate of Livestock NEMA DOSH	Improved food security Increased agricultural production	Number of farmers reached through farmer groups Number of solar water pumps promoted
Energy	1.Supporting of community-based bio-gas generator plant	Directorate of Renewable Energy NEMA, DOSH	Improved clean cooking Reduced carbon emission	Number of community biogas generator plant installed
Infrastructure	1.Drainage unclogging of Nubian Estate - ShauriMoyo-police line- PEFA road	Directorate of Environment and Natural Resources, NEMA, DOSH	Reduced water-borne diseases and infections	Length of channel drained

Table 1e: Adaptation Priority Kisumu West Sub-County

Sector	Adaptation Priority	Coordinating Units/Agency	Expected Results/ Output	Key Performance Indicator
22. Ward: West Ward				
Water	1.Drilling a borehole at South Kapounja (Maembe Kodero Primary)	Ministry of Education, Directorate of Water, Directorate of Land and physical planning, NEMA, DOSH	Pupils and community access clean and safe water	1No. borehole drilled and equipped
	2.Drilling of borehole at Dwele Primary.	Ministry of education, Directorate of Water, Directorate of Lands & Physical Planning, NEMA, DOSH	Pupils and community access clean and safe water	1No. Borehole drilled and equipped
	3.Rain water harvesting at (Huma) Arude primary school and Nyaduong' school	Ministry of education Directorate of Water Directorate of Lands & Physical Planning NEMA DOSH	Pupils and community access clean and safe water	2 No. Schools equipped with rain water collection systems.
Environment	1.Desiltation and dykes of Magada 5km	Water Resource Authority Directorate of Environment and Natural Resources, Local administration, Directorate of Lands & Physical Planning, NEMA DOSH	Controlled flood water during heavy rains	Length in Km of Magada river desilted and KM dykes constructed
	2.Desiltation and dykes of 5km Kobonyo river		Controlled flood water during heavy rains	Length in KM of Kobonyo river desilted and Km dykes constructed
	3.Massive afforestation of Odhienyo Hills	Water Resource Authority Directorate of Environment and Natural Resources, Local administration, Directorate of Lands and Physical Planning, NEMA, DOSH	Trees grown on Odhienyo hills	No. of trees grown on Odhienyo hills
Agriculture	1.Supporting of dairy value chain (subsidized AI services)	Directorate of livestock NEMA DOSH	Improved livestock breeds	No. of livestock breeds improved
	2.Supporting of horticulture (African leafy vegetables-dek) and Value addition	Directorate of Agriculture NEMA DOSH	Improved production of African leafy vegetable	No of farmers practicing horticulture Kgs of African leafy vegetables produced

Sector	Adaptation Priority	Coordinating Units/Agency	Expected Results/ Output	Key Performance Indicator
	3.Supporting of poultry value chain (improved kienyeji one day old chicks) and feeds	Directorate livestock NEMA DOSH	Increased poultry production	No of farmers practicing poultry keeping. No of Eggs produced Kgs of poultry Meat produced
Infrastructure	1. Construction of Bridge at Madaga river	Directorate of Infrastructure Water Resource Authority Local administration Directorate of Lands and Physical planning, DOSH, NEMA	Community crossing river Magada during floods	1No. bridge constructed
	2.Construction of Foot bridge at wandega school		Community crossing river Wandega during floods	1 No. bridge constructed
23. Ward: North West				
Environment	1.Establishment of tree fruit nursery at Maseno University and Mbalawandu	Directorate of Environment and Natural Resources Kenya Forest Services NEMA, DOSH	Fruit tree nurseries established	2 No trees fruit nurseries established
	2.Protection of Karateng A and B hills (massive afforestation of tree and fruit trees)	Directorate of Environment and Natural Resources, Kenya Forest Services, Local administration Directorate of Lands and Physical Planning, NEMA, DOSH	Trees grown on Karateng A and B hills	No of trees grown on Karateng A and B hills
	3.Protection of Ataro River bank through dyking (10km)	WRA, Directorate of Environment and Natural Resources, Local administration, Directorate of Lands and Physical Planning, Directorate of Infrastructure, NEMA, DOSH	Controlled flood water during heavy rains	Length in KM of dykes constructed along Ataro river.
Water	1.Expansion of Kuoyo water project	Directorate of Water Directorate of Lands and Physical planning Ministry of Education NEMA DOSH	Pupils and community access clean and safe water	1No. water project expanded
	2.Expansion of Baranding'o Water project		Pupils and community access clean and safe water	1No. water project expanded
	3.Expansion of Sunga Water Project		Pupils and community access clean and safe water	1No. water project expanded

Sector	Adaptation Priority	Coordinating Units/Agency	Expected Results/ Output	Key Performance Indicator
Agriculture	1.Supporting of horticulture (mango, avocado and passion fruits)- at Mbalawandu	Directorate of Agriculture Directorate of Livestock NEMA DOSH	Improved production mangoes, avocados and passion fruits	
	2.Supporting of poultry value chain (improved kienyeji one day old chicks) and feeds at Eluhobe, Chulaimbo and bar Andingo		Increased poultry production	No of farmers practicing poultry keeping. No of Eggs produced Kgs of poultry Meat produced
	3.Supporting of dairy value chain (Dairy cattle) at Kuoyo, Sunga and Nyabera women groups	Directorate of Agriculture Directorate of Livestock NEMA DOSH	Improved dairy cattle livestock	No of dairy cattle distributed
Infrastructure	1. of Komoga bridge near Kuoyo Primary school	Water Resource Authority Directorate of Infrastructure Directorate of Lands and Physical Planning NEMA DOSH	Community and school pupil's cross river Komoga during floods	1No. bridge constructed
	2.Construction of Namesta Primary school Bridge-		Community and school pupil's cross river Nametsa during floods	1No. bridge constructed
	3.Climate proofing Sunga-Eluhobe access road 2.5km (Drainage and culverting)		Community access Sunga-Eluhobe Road during flood	KM of drainage and No. of culverts along and across Sunga-Eluhobe Road
24. Ward: South West				
Environment	1.Desiltation and dykes of Otodo stream Approx. 3km by 8m wide	WRA Directorate of Environment and Natural Resources KFS Directorate of lands and Physical Planning NEMA DOSH	Controlled flood water during heavy rains	Length in KM of Otodo stream river desilted and KM dykes constructed
	2.Desilatation and dykes of Kawasuna- Otodo- Rota stream Approx 3km by 5m wide		Controlled flood water during heavy rains	Length in KM of Kawasuna-Otodo river desilted and KM dykes constructed

Sector	Adaptation Priority	Coordinating Units/Agency	Expected Results/ Output	Key Performance Indicator
	3.Massive afforestation of Ribero hilltop		Trees grown on Ribero hills	No of trees grown on Ribero hills
Water	1.Drilling of borehole in Got Kokulo	Directorate of Water Directorate of Lands and Physical planning Ministry of Education NEMA DOSH	Pupils and community access clean and safe water	1No. borehole drilled
	2.Drilling of boreholes at Lisuka		Pupils and community access clean and safe water	1No. borehole drilled
	3.Drilling of boreholes at Kamwanda		Pupils and community access clean and safe water	1No. borehole drilled
Infrastructure	1.Climate proofing Rota access road (Drainage and culverting)	Water Resource Authority Directorate of Infrastructure Directorate of Lands and Physical Planning NEMA DOSH	Community access Rota Road during flood	KM of drainage and No. of culverts along and across Rota Road
	2.Climate proofing Bara access road (Drainage and culverting) 1km		Community access Bara Road during flood	KM of drainage and No. of culverts along and across Bara Road
Agriculture	1.Supporting of irrigation at Atemo (infrastructure establishment)	Directorate of Irrigation Directorate of Fisheries NEMA DOSH	Improved irrigation infrastructures at Atemo	No of irrigation infrastructures established
	2.Construction of fish banda at Rota beaches		Improved fishing at Rota beaches	No of fish banda consructed
	3.Supporting fish cages at Paga beaches		Improved fishing at Paga beaches	No of fish cages installed
	4.Supporting fish cages at Osiri beaches		Improved fishing at Osiri beaches	No of fish cages installed
	5.Climate proofing of Kisian market (Drainage)	Directorate of Lands & Physical Planning, Directorate of infrastructure, Directorate of Trade & Markets, NEMA, DOSH	Controlled flood water in the market during heavy rains	KM of drainage around Kisian market

Sector	Adaptation Priority	Coordinating Units/Agency	Expected Results/ Output	Key Performance Indicator
25. Ward: North				
Environment	1.Establishment tree nursery at Nyahera	Directorate of Lands & Physical Planning , Directorate of Environment and Natural Resources,KFS,NEMA,DOSH	Tree nurseries established	1No. tree nursery established
	2.Establishment of a material recovery center at Dago	Directorate of Environment and Natural Resources, Directorate of Infrastructure,NEMA,DOSH	Material recovery center established	1no Material recovery center established
Water	1.Rehabilitation and expansion of Nyahera Mkendwa water supply	Directorate of Water KIWASCO,Directorate of Lands and Physical planning,NEMA,DOSH	Pupils and community access clean and safe water within Nyahera and Mkendwa areas	1no water project expanded
	2.Protection of Kosida springs	WRA,Directorate of water, Local administration,Directorate of Lands and Physical Planning,NEMA DOSH	Pupils and community access clean and safe water within Kosida area	1no water spring protected
	3. of Wachara VTC water project	Ministry of education,Directorate of Water,School BOM,Directorate of Lands and Physical Planning	Students and community access clean and safe water within Wachara area	1no water project completed
Agriculture	1.Supporting of dairy value chain (Improved Dairy cattle and goats) to women groups	Directorate of Livestock,NEMA DOSH	Improved dairy cattle livestock and goats	No of improved dairy cattle livestock and goats distributed
	2.Value addition to cheese and butter- high returns. To SEKE women group	Directorate of Livestock NEMA DOSH	Improved cheese and butter returns	Kgs of cheese and butter produced by Seke women group
	3.Supporting of irrigation at Seke and Ulalo (infrastructure establishment)	Directorate of Irrigation NEMA DOSH	Improved irrigation infrastructures at Seke and Ulalo	No of irrigation infrastructures established
Infrastructure	1.Construction of Seke bridge near Sidika primary school and a foot bridge	WRA,Directorate of infrastructure Local administration, NEMA DOSH	Community and school pupil's cross river Seke during floods	1no bridge and constructed
Education	1.School feeding program	Department of education School BOM, Department of social services, NEMA,DOSH	Improved nutrition amongst children	Kgs of food distributed

Sector	Adaptation Priority	Coordinating Units/Agency	Expected Results/ Output	Key Performance Indicator
26. Ward: Central Kisumu				
Water	1.Desiltation and construction of dykes along Tiengre-Lower kotetni stream (2km)	Water Resource Authority Department of WECCNR,Local administration, Department of LAND and physical planning,NEMA	Controlled flood water during heavy rains	Length in KM of Tiengre-Lower Kotetni stream desilted and KM of dykes constructed
	2.Desiltation of Kemri- ochara pan	Water Resource Authority, Department of WECCNR,Local administration, Department of LAND,NEMA	Controlled flood water during heavy rains	1No of pan Desilted
	3.Lamara culvert rehabilitation and stream desilting to prison gate barrier(1.5km)	Water Resource Authority Department of WECCNR Local administration, Department of LAND,NEMA	Controlled flood water during heavy rains	Length in KM of stream. desilted and KM of dykes constructed
Environment	1.Greening of Otonglo market	Water Resource Authority Department of WECCNR, Local administration, Department of LAND,NEMA	Trees grown at Otonglo market	No of trees grown at Otonglo market
Infrastructure	1.Construction of Kadhiambo Bridge	Water Resource Authority Department of WECCNR Local administration,Department of LAND and physical ,planning, Department of roads and public works, NEMA	Community cross river Kodhiambo river during floods	1no bridge constructed
	2.Construction of Konoka-Kambi bridge	Water Resource Authority Department of WECCNR Local administration, Department of LAND, Department of roads and public works,NEMA	Community cross river Konoka- Kambi during floods	1no bridge constructed
	3.Construction of Tiengre-Rota Bridge	Water Resource Authority Department of WECCNR, Local administration,Department of LAND, Department of roads and public works,NEMA	Community cross river Tiengre-Rota during floods	1no bridge constructed

Table 1f: Adaptation Priority Seme Sub-County

Sector	Adaptation Priority	Coordinating units/ agencies	Expected Results (Output)	Key Performance Indicator
27. Ward: Central Seme				
Water	1.Sinking of a solarized borehole with a storage tank at Nyaketa	Directorates of water, renewable energy, lands, survey NEMA DOSH	Increased access to water around Nyaketa area Reduced operational costs	Solarized borehole sank with a storage tank Reduced cost on electricity
	2.Sinking of a solarized borehole with a storage tank at Oruga Primary	Directorates of water, renewable energy, lands, survey NEMA DOSH	Increased access to water around Oruga area Reduced operational costs	Solarized borehole sank with a storage tank Reduced cost on electricity
	3.Construction of Awach-Kombewa-Bodi water project	Directorate of water, lands, survey, public works NEMA DOSH	Increased access to water in Kombewa and Bodi	Pipeline water extension from Awach-Kombewa-Bodi
Agriculture	1.Small-scale irrigation using solar water pumps for farmer groups along Mboha valley	Directorates of Irrigation, Agriculture, Water, Lands, Physical Planning NEMA DOSH	Increased agricultural production Improved livelihoods	Area in hectares under irrigation Number of farmer groups supported though irrigation Number of solar water-pumps provided
Environment	1.Tree nursery at Pap Kadundo for agroforestry and conservation of river Awach and streams	Directorates of Environment and natural resources Agriculture, Livestock and Fisheries NEMA DOSH	Youth empowerment through green enterprise as an alternative source of livelihood Increased tree cover	Number of youths engaged Number of seedlings generated and grown Number of conserved rivers & streams
	2.Construction of nature-based dykes along river Nyamgun	Directorates of Irrigation, environment and natural resources, lands, public works NEMA DOSH	Controlled floodwater & erosion	Number of nature-based dyke built
28. Ward: East Seme				
Water	1.Supporting of water harvesting through distribution of water tanks for the vulnerable groups in Villages; Magwar, Nanga, Kanga, Kalaga, Karadigo, Ombo and Lungá	Directorates of water, social protection, trade, ministry of interior NEMA DOSH	Increased water harvesting Enhanced access to water	Number of vulnerable people harvesting water Number of water tanks distributed

	market			
	2.Construction of climate-resilient water-pans at Simbagero, Pap Kojuki, Dudi, Gul Kobuya, Nyaguda	Directorates of water, environment, lands, public works NEMA DOSH	Increased access to water for livestock & irrigation	Number of people benefitting from the water pans Number of water pans constructed
	3.Pipeline extension of Kaloka water project to Nanga and Kanga areas	Directorates of water, irrigation, lands & physical planning NEMA,DOSH	Increased access to water for domestic	Length in kilometres of pipeline water extended
Agriculture	1.Small-scale irrigation using solar pumps for farmer groups along Nyamgun, Nyandiwa and along the lake	Directorates of Irrigation, Agriculture, Renewable Energy, Water NEMA DOSH	Increased agricultural production Improved livelihoods	Area in hectares under irrigation Number of farmer groups supported though irrigation Number of solar water-pumps provided
	2.Building nature-based dykes along river banks	Directorates of Irrigation, Water, Environment and Natural resources NEMA,DOSH	Controlled floodwater and erosion	Number of nature-based dykes built
Environment	1.Establishment of tree nurseries at Magwar, Lunga, Siala, Kuja, Kunya	Directorates of Environment and natural resources, lands NEMA DOSH	Youth empowerment through green enterprise as an alternative source of livelihood Increased tree cover	Number of youths engaged Number of seedlings produced and grown
	2.Capacity building of farmers on agro-forestry in Villages (Magwar, Nanga, Kanga, Kalaga, Karadigo, Ombo, Kaloka, Runda)	Directorates of Agriculture, Environment,NEMA DOSH	Enhanced agroforestry practices	Number of farmers capacity built
29. Ward: North Seme				
Sector	Adaptation Priority	Coordinating Institutions	Expected Results (Output)	Key Performance Indicator
Water	1.Extension and solarizing of Olute water project to Amii, Korwenje, Bar to Urudi Ratta	Directorates of renewable energy, Water, lands & physical planning NEMA,DOSH	Improved access to water	Solarized water project at Olute Pipeline water extension to Amii, Korwenje, Bar, Urudi Ratta
	2.Construction of Awach water project	Directorates of water, environment, lands & physical planning,NEMA DOSH	Improved access to water	Constructed water project Number of people benefiting from the water project
Agriculture	1.Supporting of apiculture at Chienga Nyodundo and Aora	Directorates of Agriculture, Livestock, Lands, Environment,	Youth empowerment through apiculture as an	Number of farmer groups practicing apiculture

	Ondiek	NEMA DOSH	alternative livelihood	
	2.Supporting of sunflower value chain at Chienga Nyodundo	Directorates of Agriculture, Environment	Youth empowerment though sunflower production	Number of farmers engaged in sunflower value chain
	3.Small-scale irrigation using solar pumps for farmer groups along R. Awach	Directorates of Irrigation, Agriculture, Renewable Energy, NEMA,DOSH	Increased agricultural production	Area in hectares under irrigation Number of farmer groups supported though irrigation
Environment	1.River-bank protection with bamboo and indigenous trees along rivers Awach, Aora Ondiek, Arude, Arom, Amii, Magada, Owich, Midele	Directorates of Environment and natural resources, lands, WRUAs, NEMA,DOSH	Improved river-bank protection Reduced river floods	Number of rivers with protected river-banks
	2.Development of tree nurseries at Ratta primary school, Korwenje, Harambee chief's camp, Nduru Kadero school, Ndiru primary, Chienga Nyodundo, Bongu Konyango, Pundo Apwoche, Aora Ondiek	Directorates of Environment and natural resources, lands NEMA DOSH	Youth empowerment through green enterprise as an alternative source of livelihood Increased tree cover	Number of youths engaged Number of seedlings produced and grown Number of tree nurseries established
30. Ward: West Seme				
Sector	Adaptation Priority	Coordinating Institutions	Expected Results (Output)	Key Performance Indicator
Water	1.Construction of one borehole per sub-location (10)	Directorates of water, renewable energy, lands, survey NEMA DOSH	Improved water access in every sub-location	Number of boreholes constructed
	2.Rehabilitation and expansion of Kisumu-rural water project (Alder)	Directorates of Water, Environment and natural resources, lands, NEMA DOSH	Improved water access Rehabilitated & expanded water project	Length in kilometers of pipeline water extended
	3.Construction of a new water plant from the lake to supply the entire ward	Directorates of Water, Environment and natural resources, lands, Irrigation, Agriculture ,NEMA,DOSH	Improved water access for irrigation Constructed water plant	Constructed water plant
Agriculture	1.Supporting of solar-powered water pumps and horticultural seeds	Directorates of Irrigation, Agriculture, Water, Renewable	Increased agricultural production	Area in hectares under irrigation Number of farmer groups

	for small-scale irrigation. One water-pump for each sub-location	Energy,NEMA DOSH	Improved livelihoods	supported though irrigation Number of solar water-pumps provided Number of seeds in kgs provided
	2.Capacity building of farmers on modern farming techniques/Climate-smart Agriculture	Directorates of Irrigation, Agriculture, Water, Environment,NEMA,DOSH	Adoption of modern farming techniques Improved Agricultural production	Number of farmers capacity-built Number of training sessions held
Environment	1.Establishment of a tree nursery in every sub-location	Directorates of Environment and natural resources, lands NEMA,DOSH	Youth empowerment through green enterprise as an alternative source of livelihood Increased tree cover	Number of youths engaged Number of seedlings produced and grown Number of tree nurseries established
	2.Strengthening of community structures in form of capacity building on tree nursery management	Directorates of Environment and Natural Resources NEMA,DOSH	Improved tree nursery management	Number of groups capacity-built Number of training sessions held

Table 1g: Adaptation Priority Nyakach Sub-County

Sector	Adaptation priority/ Enabling action	Coordinating Institutions	Expected Results (Output)	Key Performance Indicators
31. North Nyakach				
Water	1.Rehabilitation and expansion of Nyakach Water supply (Sigoti Health Centre to Kandaria VTC	Water Directorate	Increased access to safe and clean water	3KMs of pipes laid.
	2.Protection of a spring at Soko Komwono in East Nyakach	Water Directorate	Increased water supply	Area in $100m^2$ protected 5000 No. trees grown 100 No. people sensitized
	3.Upgrading of water projects; Kowire borehole	Water Directorate	Increased to safe and clean water	2kms of pipes laid 800 No. of households connected to the pipeline.
Climate Change	1.De-siltation of Koyombe and Kamula Water pans	CC Directorate	Controlled downstream flooding	2.No of pans de-silted 2000 No. trees grown
	2.Construction of a dyke along River Nyando –5KM stretch at Siany in Wasare	CC Directorate	Reduced downstream flooding 5Kms covered	5 Kms of the river covered
Environment	1.Establishment of an integrated waste transfer facility at Gem Rae	Environment and Natural Resources	Reduced Waste accumulation	1 Waste transfer facility
	2.Institutional greening project (Katito VTC, 10 Primary schools, 3 health facilities in North Nyakach		Increased Tree cover	No. of trees grown in institution
	3.Beautification project of Katito Town (growing of flowers and ornamental trees along the 2 highways and 2 streets.		Enhanced aesthetic value	3000 No. of trees & flowers grown
Agriculture	1.Supporting of intermittent irrigation systems to registered farmer groups	Irrigation Directorate	Increased crop production	5No. of irrigation technologies promoted
	2.Supporting of apiculture value chain (Supply of apiary kits) to farmer groups	Livestock Directorate	Increased honey production	100No. of hives installed
	3.Establishment of a bull scheme for registered dairy farmers in Kandaria	Livestock and Veterinary Directorates	Improved dairy and beef production	1. No. of bull scheme established.
32. Ward: Central Nyakach				
Water	1.Rehabilitation and Expansion of Nyakach Water supply (Harambee, Bugo, Kusa and Kusa Beach)	Water Directorate	Increased access to safe and clean water	No. of KMs of pipes laid.
	2.Rain water harvesting in Primary Schools		Increased access to safe and clean water	15No. of schools harvesting water 100,000 litre tanks provided

Sector	Adaptation priority/ Enabling action	Coordinating Institutions	Expected Results (Output)	Key Performance Indicators
	3.Upgrading of Moro Primary Water Project	Water Directorate	Increased access to safe and clean water	600No. of people accessing piped water
Climate Change	1.Upgrading of Harambee water pan	CC Directorate	Increased access to safe and clean water	No. of people accessing
	2.Upgrading of kobambo water pan in West Kandaria		Increased access to safe and clean water	1 No. water pans upgraded
Environment	1.Beautification of road reserves from Asao Bridge to Kolweny market	Environment and Natural Resources	Increased tree cover and improve aesthetic value	2000 No. of trees grown
	2.Rehabilitation of old quarry sites and sand harvesting sites in Onywungo and Nyaksure areas		Reduced land degradation and increased	8000m2 Area in ha. Of land reclaimed 10,000 trees grown
	3.Beautification of Kusa and Komwaga Beach		Increased tree cover and improved aesthetic value	2000No. of trees and flowers grown
Agriculture	1.Supporting of apiculture value chain (Supply of apiary kits) to farmer groups	Livestock Directorate, KFS	Increased honey production	80No. of hives installed 100 people trained on apiary value chain
	2.Supporting of intermittent irrigation to registered farmer groups	Irrigation Directorate	Increased crop production 5 technologies promoted	No. of technologies promoted
	3.Establishment of a bull scheme for registered dairy farmers in Kabodho West	Livestock and Veterinary Directorates	Improved dairy and beef production	1. No. of bull schemes established.
Infrastructure Roads	1.Construction of check dams along Bodi-Polopiach-Pap Onditi-Wasare	Diretorate of Infrastructure	Reduced erosion of the roads	5No. of check dams done
33. Ward: West Nyakach				
Water	1.Expansion of Right Bankwater project from Apoko to Njogo and Apondo Kasaye	Water Directorate	Increased access to safe water	3kms of pipes laid. , No. of people water
	2.Expansion of Sang'oro water project from Sango buru to Nyawalo primary to Nyamanyinga, Nyadina primary to Obange Primary		Increased access to safe and clean water	3kms of pipes laid.
	3.Upgrading of Obanda 'B'Borehole (Solar water pumping and water tank)	Water Directorate	Increased access to safe and clean water	2 kms of pipes laid

Sector	Adaptation priority/ Enabling action	Coordinating Institutions	Expected Results (Output)	Key Performance Indicators
	4.Improvement of Nyaguda springs		Increased safe water supply	Area in 100m^2 protected 5000 trees grown
Climate Change	1.Upgrading of Oriang' earth dam	CC Directorate	Increased access to safe and clean water	No. of dam done.
	2.Construction of a resilient earth dyke along the shore line from kokuta beach to Nyadina		Reduced lake water intrusion/ backflow	8Km Dyke done
	3.De-siltation of Sondu-Miriu River mouth		Reduced downstream flooding	2km stretch desilted
Environment	1.Development of a management Plan for Koguta forest	Environment and Natural Resources	Increased forest cover	1No. of plans developed
	2.Institutional greening project in VTCs, Primary schools and health facilities		Increased forest cover	15,000No. of trees grown
Agriculture	1.Fitting of irrigation water supply pipes for the proposed Sondu-Miriu irrigation project	Irrigation Directorate	Increased crop production	1. No. of service lines laid
	2.Stocking of fish ponds, dams and pans in West Nyakach ward	Fisheries Directorate	Increased fish stocks	500,000 No. of fingerlings stocked
	3.Beautification of Sango Rota beach and biogas installation	Fisheries and Renewable Directorate	Improved aesthetic value of the beach	No. of beneficiaries
34. Ward: South East Nyakach				
Water	1.Rehabilitation of water pan at Ramogi, South East, Koguta	Water Directorate	Increased access to safe and clean water	4No. of water pans rehabilitated
	2.Construction of water kiosk at Nyamaroka centre	Water Directorate DOSH	Increased access to safe and clean water	1 No. of water kiosks constructed
Climate Change	1.Establishment of Bamboo Forest in Siany Nyalenda	CC Directorate KFS	Increased forest cover	Area in acres grown 10,000 bamboo trees grown
Environment	1.Establishment of a park at Pap Ndege	Environment and Natural Resources, Trade	Improved aesthetic value	1 acre of land park
	2.Establishment of a tree nursery in Sondu	Environment and Natural Resources	Increased tree seedlings and tree cover	1No. of nurseries established

Sector	Adaptation priority/ Enabling action	Coordinating Institutions	Expected Results (Output)	Key Performance Indicators
	3.Supporting of Integrated waste management in Nyabondo market and Sigoti market	Environment and Natural Resources	Reduced solid waste accumulation	No. of skip bins installed Kgs of value-added products from waste
Agriculture	1.Supporting of Bulls scheme to Nyabondo dairy farmers	Livestock and Veterinary Directorates,NEMA, Directorate of Lands and Physical Planning	Improved dairy and beef production	1. No. of bull schemes established.
	2.Supporting of poultry to registered CBOs in South East	Livestock Directorate	Improved poultry production	5000 No. of improved kienyeji birds provided
	3.Stocking of fish ponds and water pans in South East Nyakach ward	Fisheries Directorate	Increased fish stocks	500,000 No. of fingerlings stocked
Infrastructure Roads	1.Culverts at Sondu-Akiayi road	Roads and Infrastructure Directorates,DOSH, NEMA Directorate of Lands and Physical Planning	Reduced upstream flooding and enhanced accessibility	3No. of culverts constructed
	2.Construction of gabions along the feeder roads (Kaseda, Bamba, Dirubi, Nyamaroka, Bodi, Polo Piach)	Roads and Infrastructure Directorates, physical planning	Reduced erosion on the feeder roads	6No. of gabions constructed
Energy	1.Supporting of energy saving jikos to women in south east ward	Renewable Energy Directorate	Increased number of women using the energy saving jikos technology 100 women trained on jikos making 500 jikos provided	No. of jikos provided and households adopting the technology
	2.Establishment of a biogas centre at Sondu for waste management	Renewable Energy Directorate, trade and environment DOSH, NEMA, Directorate of Lands and Physical Planning	Increased uptake of renewable energy technology and reduction of organic waste 1 biogas plant installed	No. of biogas plant installed
35. Ward: South West Nyakach				
Water	1.Construction of water kiosk at oboch and othith, kagak, alara, miriu	Water Directorate	Increased access to safe and clean water 5 Water kiosk constructed	No. of water kiosks constructed

Sector	Adaptation priority/ Enabling action	Coordinating Institutions	Expected Results (Output)	Key Performance Indicators
		NEMA, DOSH, Directorate of Lands and Physical Planning		
	2.Supporting of rain water harvesting in VTCs, primary schools and health centers	Water Directorate	Increased access to safe and clean water	30No. of institutions harvesting water
Climate Change	1.Upgrading of water pan at siany	CC Directorate NEMA, Directorate of Lands and Physical Planning	Increased access to safe and clean water	Number of people accessing the water resource
	2.Improvement and equipping of Ogoro tree nursery	CC Directorate	Increased tree seedlings production and increased forest cover	50000No. of tree seedlings generated
Environment	1.Establishment of a community forest at Siany	Environment and Natural Resources, NEMA Directorate of Lands and Physical Planning	Increased tree seedlings production and increased forest cover	2 ha under forest
	2.Establishment of a public recreational center at Achich market in Siany	Environment and Natural Resources,DOSH,NEMA,Directorate of Lands and Physical Planning	Improved aesthetic value	1 No. recreational center
Agriculture	1.Promote soil conservation practices with farmers at ngope, koduong, bar kawadinga, kobongo, apoko, kodul, kamgan locations.	Agriculture Directorate, water and environment DOSH NEMA	Reduced land degradation and soil erosion .	No. farmers adopting soil conservation practices

Annex Photo Gallery

Participants during the PCRA process in Ahero Ward, Nyando Sub-County

Source: County Communication Unit

Community mapping in Kaloleni Shauri-Moyo Ward, Kisumu Central Sub-County

Source: County Communication Unit

Community engagement in PCRA Process in Nyalenda B, Kisumu Central Sub-County

Source: County Communication Unit

Kisumu County Technical Working Group training at Sarova Imperial Hotel, Kisumu

Source: County Communication Unit

Participants during the PCRA Process in Kolwa Central Ward, Kisumu East Sub-County

Source: County Communication Unit