COUNTY GOVERNMENT OF KILIFI

KILIFI COUNTY PARTICIPATORY CLIMATE RISK ASSESSMENT (PCRA, 2023)

MAY, 2023

FOREWORD

Climate change is the greatest challenge of our time globally. Climate change is already having an impact on human and natural communities. The impacts of climate change will only worsen as a result of increasing emissions from human activities. Even though developing countries like Kenya contribute the lowest emissions, they will disproportionately bear the brunt of climate change impacts.

The frequency and magnitude of extreme weather events is projected to increase with far reaching impacts across the country, including Kilifi County. In any case, large parts of the county fall within arid and semi-arid zones. Moreover, the county's economy is heavily dependent on climate-sensitive sectors. Majority of these sectors now fall within devolved functions. Therefore, the County Government of Kilifi has an obligation to address the impact of climate change for sustained economic growth and the general well-being of county residents.

This Participatory Climate Change Risk Assessment (PCRA) is an approach that enables communities to identify the climate change hazards, their impacts and propose practical solutions for evidence-based county Climate Change Action Planning and implementation. My government commits to supports all actions geared towards climate change adaptation and mitigation in Kilifi County. This includes formulating and implementing appropriate plans that address the impacts of climate change, strategies geared towards reduced impacts of climate change across sectors within the county and climate smart investment focusing on the most vulnerable groups in Kilifi County.

H.E GIDEON MAITHA MUNG'ARO, OGW
GOVERNOR
COUNTY GOVERNMENT OF KILIFI

ACKNOWLEDGEMENT

Participatory Climate Change Risk Assessment (PCRA) is an approach that enables communities to identify the climate change hazards, their impacts and propose practical solutions for evidence-based county Climate Change Action Planning and implementation. The approach provides information regarding historical, current and future climatic scenarios and evaluates their implication to livelihood systems while examining the existing drivers of vulnerability. PCRA informs sector-specific strategies to strengthen the community's resilience against the identified climate hazards. The first Kilifi County PCRA process was supported by the National Treasury and the Financing Locally Led Climate Action (FLLoCA) Program and is one of the requirements for accessing County Climate Resilience Investment (CCRI) Grants under the FLLoCA program.

This report is a collaborative effort from diverse stakeholders in Kilifi County. The success of this PCRA piloting was enabled by the goodwill and guidance of H.E Gideon Maitha Mung'aro, OGW (Governor, County Government of Kilifi). We wish to acknowledge the invaluable contributions from the Technical Working Group (TWG) led by Chief Officer, Environment, Forestry, Climate Change & Solid Waste management, Directors and the entire staff from the Department of Water, Environment, Forestry, Climate change, Natural Resources and Solid Waste Management. We also acknowledge the contribution from other county line Departments including Agriculture; Livestock & Fisheries; Finance & Economic Planning; Health; Gender, Youth & Sports; Energy; and Tourism. We cannot forget the contributions by relevant national government agencies, among others, National Environment Management Authority (NEMA), National Drought Management Authority (NDMA), Kenya Forest Service (KFS), Kenya Wildlife Service (KWS), and Coastal Forest Conservation Unit (CFCU) among others who may not have been mentioned.

We are also grateful for the contributions from development partners including Nature Kenya, Action Aid, World Vision, Arid Lands Information Network (ALIN), Voluntary Services Oversees (VSO), Kilifi Platform for Climate Governance (KPCG), Ward Climate Change committees, youth groups, women groups, and other vulnerable groups whose voices informed the PCRA Report.

HON. OMAR SAID OMAR
COUNTY EXECUTIVE COMMIITTEE MEMBER,
DEPARTMENT OF WATER, ENVIRONMENT, FORESTRY, CLIMATE CHANGE & SOLID WASTE MANAGEMENT.

EXECUTIVE SUMMARY

The County Government of Kilifi has acknowledged the devastating impacts of climate change. County Governments are the first line responders to community challenges including climate extremes. Participatory Climate Change Risk Assessment (PCRA) is an approach that enables communities to identify the climate change hazards, their impacts and propose practical solutions for evidence-based county Climate Change Action Planning and implementation. The approach provides information regarding historical, current and future climatic scenarios and evaluates their implication to livelihood systems while examining the existing drivers of vulnerability. The PCRA aims to inform the most effective sector-specific strategies to strengthen the community's resilience against the identified climate hazards.

The Kilifi County PCRA process was carried out in May 2023. The objective of PCRA is to guide the county to identify climate risks and hazards with their associated impacts within Kilifi County in order to inform the climate change action planning, integration of climate issues into the Kilifi CIDP (2023-2027) and the National Climate Change Action Plan (2023-2027). The County PCRA report is also one of the conditions for accessing the Climate Resilience Investment Grant from the National Treasury's Financing Locally Led Climate Action, (FLLoCA). The PCRA report documents prevalent climate risks, sources of vulnerability and the prioritized adaptation response actions in Kilifi County. The process of implementing the PCRA process involved: Formation and training of the Technical Working Group (TWG), stakeholder's analysis and mapping, community engagements at ward level, collection of historical, current and projected data of local climatic patterns, socio-economic conditions and vulnerability analysis, conducting county level workshop on climate change risk assessment as well as final report writing.

The assessment revealed that majority of Kilifi County residents depend on low-input rain fed agriculture, livestock production, fisheries and petty trade. With the frequent changes in rainfall patterns, most households that depend on agriculture are exposed to the impacts of climate change. Furthermore, women are the highest portion of laborers in the agricultural sector which further makes them more vulnerable to the effects of climate change. Impacts of climate change are compounded by human activities, among others, land use change, environmental degradation and unsustainable exploitation of natural resources especially sand, quarry, charcoal and fisheries. The main climate hazards identified in the county are drought, floods, storm surges, human-wildlife conflicts and emerging pests and diseases.

Based on the findings of the PCRA process, the County Government of Kilifi will prioritize strengthening climate change governance framework, mainstreaming of climate change across all sectors of the county economy, strengthening capacity to monitor and report climate action across the sectors at the county level and at ward level, expansion of water and sanitation systems, livelihoods diversification and gender-sensitive adaptation programs among other interventions. Furthermore, enhancing climate information

services and early warning systems shall be prioritized to reduce the impacts of climate change shocks among the communities.

We also prioritize to upscale implementation of climate resilience projects with emphasis on restoration of degraded ecosystems, strengthening livelihoods through climate smart agriculture, soil and water resources conservation, water storage and distribution. A County Climate Change Action Plan (2023-2027) shall be developed, guided by this PCRA report to give specific guidance on the response to the identified climate impacts. Taken together, these documents will help Kilifi County to achieve Sustainable Development Goals (SDGs), contribute towards attainment of Kenya's Vision 2030 and foster socio-economic development for improved livelihoods of county residents.

ZAMZAM A. ALI

CHIEF OFFICER

ENVIRONMENT, FORESTRY, CLIMATE CHANGE AND SOLID WASTE MANAGEMENT

COUNTY GOVERNEMT OF KILIFI

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DEFINITION OF TERMS

Adaptation refers to actions that help reduce vulnerability to the current or expected impacts of climate change. Examples of adaptation include planting crop varieties that are more resistant to drought or changing conditions, managing land to reduce wildfire risks, building stronger flood defenses, relocating infrastructure from coastal areas affected by sea level rise, and developing insurance mechanisms specific to climate-related threats.

Adaptive capacity: Ability of systems, institutions, humans, and other organisms to adjust to potential damage, take advantage of opportunities, or respond to consequences.

Climate is the average of weather patterns in a specific area over a longer period of time, usually 30 or more years, which represents the overall state of the climate system.

Climate change refers to the long-term changes in the Earth's climate that are warming the atmosphere, ocean and land. Climate change is affecting the balance of ecosystems that support life and biodiversity, and impacting health. It also causes more extreme weather events, such as more intense and/or frequent hurricanes, floods, heat waves, and droughts, and leads to sea level rise and coastal erosion as a result of ocean warming, melting of glaciers, ad loss of ice sheets.

C**limate crisis** refers to the serious problems that are being caused or are likely to be caused by changes in the planet's climate.

Climate justice means putting equity and human rights at the core of decision-making and action on climate change.

Climate finance refers to financial resources and instruments that are used to support action on climate change. Climate finance is critical to addressing climate change because of the large-scale investments that are needed to transition to a low-carbon global economy and to help societies build resilience and adapt to the impacts of climate change.

Disaster Risk Reduction: systematic approach to identifying, assessing and reducing the risks of disaster. Aims to reduce socio-economic vulnerabilities to disaster and the environmental and other hazards that trigger them

Disaster: the serious disruption of the functioning of society causing widespread human, material or environmental losses, which exceed the ability of the affected communities to

cope using their own resources. Disasters occur when the negative effects of the hazards are not well managed.

Disaster risk reduction: is a framework and a tool that determines the degree of risk and describes measures to increase capacities and reduce hazard impact on the elements at risk so that disaster will be avoided.

Greenhouse gases are gases that trap heat in the atmosphere, causing global warming and climate change. The main greenhouse gases released by human activity are carbon dioxide, methane, and nitrous oxide, as well as fluorinated gases used for cooling and refrigeration.

Global warming is an increase in the Earth's average surface temperature that occurs when the concentration of greenhouse gases in the atmosphere increases. These gases absorb more solar radiation and trap more heat, thus causing the planet to get hotter. Burning fossil fuels, cutting down forests, and farming livestock are some human activities that release greenhouse gases and contribute to global warming.

Hazard: is a potential source of harm. Substances, events, or circumstances can constitute hazards when their nature would allow them, even just theoretically, to cause damage to health, life, property, or any other interest of value

Mitigation refers to any action taken by governments, businesses, and people to reduce, sequester, or prevent greenhouse gas emissions. Examples of mitigation include transitioning to renewable energy like wind and solar, investing in carbon-free transportation, promoting sustainable agriculture and land use, planting forests to act as carbon sinks, and changing consumption practices and diet behaviors.

Nature-based solutions support climate change adaptation and mitigation by using natural systems and processes to restore ecosystems, conserve biodiversity, and enable sustainable livelihoods.

Resilience is the capacity of a community or environment to anticipate and manage dangerous climatic events and recover and transform after the ensuing shock, with minimal damage to societal wellbeing, economic activity, and the environment. Examples of increasing resilience in a community include long-term planning, early warning systems, training for new skills, diversifying the sources of household income, strengthening nature-based solutions, and building robust communal response and recovery capacities.

Risk: is the potential for negative consequences to something that is valued when the occurrence and degree of a future outcome is uncertain. Risks from climate change impacts arise from the interaction between a hazard (triggered by an event or trend related to climate change), vulnerability (susceptibility to harm) and exposure (people, assets or ecosystems at risk).

Risk assessment: qualitative and/or quantitative scientific estimation of risks.

Risk management: plans, actions, strategies or policies to reduce the likelihood and/or consequences of risks or to respond to consequences.

Vulnerability: Propensity or predisposition to be adversely affected. It encompasses sensitivity or susceptibility to harm, and lack of capacity to cope and adapt.

Weather refers to atmospheric conditions at a particular time in a particular location, including temperature, humidity, precipitation, cloudiness, wind, and visibility. Weather conditions do not happen in isolation, they have a ripple effect. The weather in one region will eventually affect the weather hundreds or thousands of kilometers away.

Impact: the result of an occurrence, effects, consequences of a hazard or risk, can be direct or indirect. In the context of climate change, impacts may include damage to or destruction of physical systems, particularly ecosystems.

Shock: is an unpredictable event. In the context of climate change, its unpredictable event that damages the sustainability of a community e.g., drought, floods, bad storm

Participatory: it is the act of allowing, involving people to take part in or become involved in an activity.

Assessment: it is the process of defining, selecting, designing, collecting, analysing, interpreting and using the information to increase the understanding of a specific subject.

ACRONYMS

AU	African Union
ADP	Annual Development Plans
AMCEN	African Ministerial Conference on Environment
BMU	Beach Management Unit
CBD	Convention on Biological Diversity
CFA	Community Forest Association
CSA	Climate-Smart Agriculture
CIDP	County Integrated Development Plan
CIMES	County Integrated Monitoring and Evaluation System
COP	Conference of Parties
CSA	Climate Smart Agriculture
CSP	County Spatial Plan
EAC	Intergovernmental Authority on Development
EMC	Environment Management Committee
ENSO	El Nino Southern Oscillation
EDE	Ending Drought Emergencies
FLLoCA	Financing Locally Led Climate Actions
ICZM	Integrated Coastal Zone Management
IDDRSI	IGAD Drought Disaster Resilience and Sustainability
IGAD	Intergovernmental Authority on Development
IPC	Integrated Food Security Phase Classification
IPCC	Intergovernmental Panel on Climate Change
KCCCAP	Kilifi County Climate Change Action Plan
M&E	Monitoring and Evaluation
MTP	Medium Term Plan
NCCAP	National Climate Change Action Plan
NDC	Nationally Determined Contributions
NIMES	National Integrated Monitoring and Evaluation System
PCRA	Participatory Climate Risk Assessment
PPP	Public-Private Partnerships
PWD	People with Disability
SDG	Sustainable Development Goals
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
WUA	Water User Association
WRUA	Water Resource User Association

1.0 BACKGROUND AND CONTEXT

1.1 Kilifi County

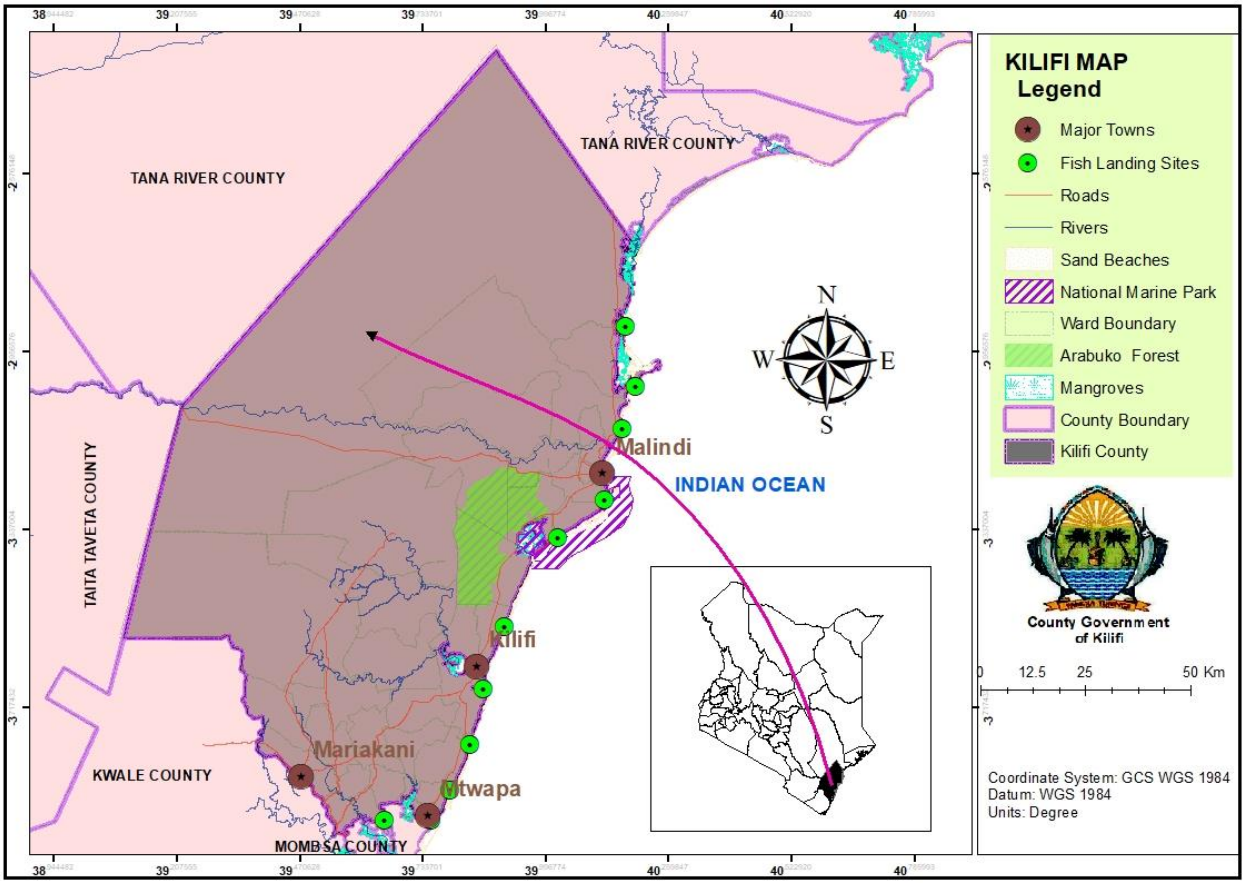
1.1.1 Geography

Kilifi County is one of the six coastal counties which form the Jumuia ya Kaunti za Pwani (JKP). It borders Mombasa County on the south, Kwale county on the South-West, Taita Taveta in the west, Tana River County in the North and Lamu county on the North-east direction. The county is geographically located at coordinates 3° 38' 0" South, 39° 51' 0" East. It covers a total surface area of 12,370.8 km^2 and accounts for 2.2% of Kenya's total surface area. The county has four major topographic features which include the narrow belt which forms the coastal plain and varies in width of 3km to 20km; foot plateau which falls between 60m and 150m altitude and slopes towards the sea; the coastal range which falls beyond the foot plateau and has distinct low range of sandstone hills and ranges between 150m to 500m high and the Nyika Plateau that rises from 100m to 340m above sea level and occupies about two thirds of the Kilifi County. Administratively, the county is divided into 7 official sub-counties namely; Kilifi North, Kilifi South, Ganze, Malindi, Magarini, Rabai and Kaloleni and 2 unofficial sub-counties namely Chonyi and Kauma. It has 35 wards, 54 locations, and 165 sub locations and 10 urban towns across the county i.e., Malindi, Mtwapa, Vipingo, Watamu, Bamba, Kilifi, Mariakani, Mazeras, Gongoni and Marereni.

Kilifi county has a coast line, a narrow belt that forms the coastal plain and lies below 30m above the sea level. Hinterland is the foot plateau that lies to the east of the coastal plain, characterized by a slightly undulating terrain that falls between 60m and 150m sloping towards the sea. The coastal range which falls beyond the foot plateau between 150m to 450m altitude, with distinct low range sandstone hills. Fourth is the Nyika plateau which rises from 100m to 340m above sea level covering about two thirds of the county area on its western side. This plateau is characterized by low population density, thin vegetation cover, shallow depressions and gently undulating terrain. These plateau plains form a bigger part of Ganze sub-county connecting to Tsavo east plateau plains.

The main river cutting through the county is the Athi-Sabaki river, and the only permanent river. A number of seasonal rivers and streams drain into the Indian Ocean directly or through Sabaki river. The seasonal rivers in Kilifi County include but not limited to Nzovuni, Rare, Goshi and Kombeni. The streams include Wimbi, Kanagoni, Masa, Muho mkulu and Mleji.

Kilifi County Boundary Map



1.1.2 Demography

According to the Kenya Population and Housing Census (KPHC) of 2019, the county's population stood at 1,453,787, of which 749,089 were women and 704,089 men, of this population, the youth comprises of 49%. Around 78.5% of the population resides in rural areas and depends on agriculture as the main source of livelihood. The County is characterized by a high rate of absolute poverty (71.7%) compared to the national average (47%).

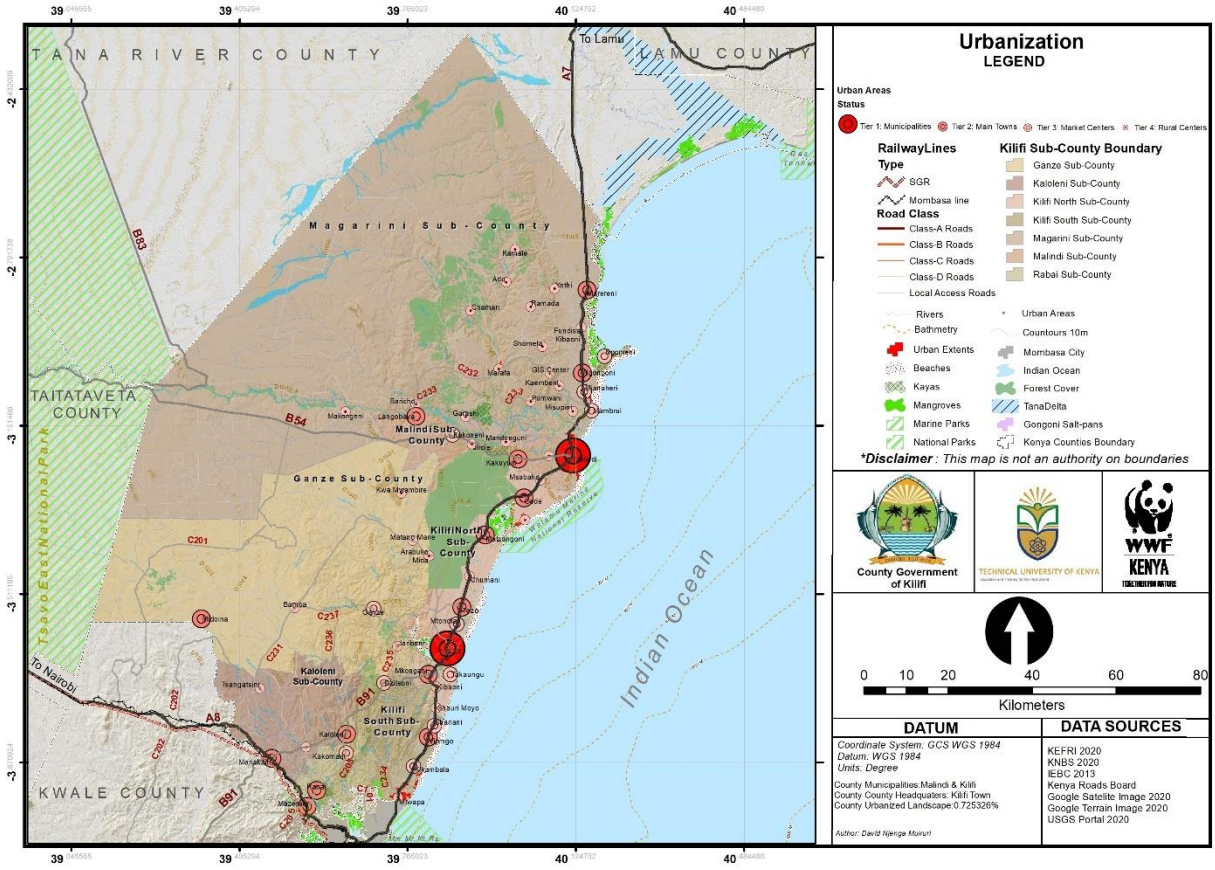
Several factors are tied to the high incidence of poverty, including: landlessness estimated at 11.3% of the households, limited access to piped water (48% of the population), and food insecurity evidenced by the high prevalence of stunting in children of 39.1%. Besides, access to education is affected by the distance that students must travel to school: 65% of primary schools and 72% of secondary schools are located more than 5 kilometers away from students' homes. Indeed, this complicates students' access to basic education and their ability to empower themselves socio-economically. Further, culture erosion has contributed greatly to the poverty levels in Kilifi County where older people

are being killed branded as witch and the siblings sale off the land cheaply to buyers. Again, the high uptake of drugs and substance abuse has left the youth in desperate state of poverty. There are prevalent of human-wildlife conflicts in Ganze sub-county which make the residents poor by not affording a harvest because of the marauding elephants all year round.

1.1.3 Economy and Urbanization

Most livelihoods in Kilifi County are based on agriculture. The main food crops include maize, cowpeas, green grams, and cassava, while the main cash crops are coconuts, cashew nuts, sisal, mangoes, and pineapple. Cash crops are typically cultivated in Kilifi South, Kilifi North, Malindi, Kaloleni, Rabai and Magarini. The main livestock include cattle (Zebu), goats, sheep, poultry and beekeeping. Majority of smallholder livestock herders keep indigenous breeds. The county has a total of 11 ranches where Boran and other exotic beef cattle are bred. Apiculture is equally a significant economic activity among small holder farmers in the County. The county has a total of 14,192 bee hives.

Kilifi County Map showing the urban towns



Kilifi County has a massive blue economy potential arising from is 265km long Indian Ocean coastline and its 200 nautical borders to its East. The county has a total of 4,713

artisanal fishermen operating along the county's shoreline. The total number of fishing vessels is estimated at 1,057, with an annual catch of approximately 443,689 tonnes. Marine fisheries is also carried out within the county including small scale mariculture in Ngomeni, Mida, Dabaso, Sabaki and Kilifi creeks.

The county's main urban centres include Malindi, Kilifi, Mtwapa, Kaloleni, Mazeras, Mariakani, Watamu, Magarini, Marereni, Majengo and Bamba. The county's urban population stands at 328,652 in 2019 (census report, 2019) constituting 36.8 percent of the total population. This proportion of urban population mirrors that of the country at 39 percent and that of Africa at 36 percent. Unfortunately, the rapid growth is taking place without corresponding capacity of urban management institutions to guarantee sustainable livelihoods. This is evidenced by a myriad of challenges including the proliferation of slums.

The County labor force constitutes 56% of total population. Of this population, the youth (ages 15-29) comprise 49%. The level of unemployment in the County has worsened due to recent tourism industry recession occasioned by Covid-19 and violent extremism that is linked to lawlessness in Somalia.

1.1.4 County Socio-economic Factsheet

Information Category		**County Statistics (as at 2022)**
County area (Km^2)		
Total area (Km^2)		12, 553
Non-arable land (Km^2)		6,891.2
Arable land (Km^2)		5,407.0
Size of gazetted forests (Ha)		191,063
Size of non-gazetted forests (Ha)		90,000
Forest cover (%)		12.17%
Approximate tree cover%		27.75%
No. of climate change adaptation projects/programs under CCF		21
DEMOGRAPHIC PROFILES		
Total population (Census 2019)		1453745
Total Male population (Census 2019)		704083
Total Female population (Census 2019)		749662
Sex ratio (Male: Female)		94:100
Projected Population	Mid of plan period (2025)	1686705
	End of plan period (2027)	1858772
Incidence of landlessness (%)		11.3
Total number of households		400,729
Average household size		3.9
WATER AND SANITATION		
Households with access to piped water (No.)		128571
Distribution of Households by Main Source of water (%)	Piped into dwelling	45%
	Piped	55%
	Rain/harvested	30%
	Borehole	20%
	Unprotected well	5%
	Stream	10%
	Water Vendor	35%
	Dam	0%

Information Category		County Statistics (as at 2022)
	Pond	20%
	Lake	0%
Water supply schemes (No.)		
Average distance to nearest water point (km)		Rural = 3, Urban = 0.3
Average time taken to withdraw water from the nearest water point (Minutes)		0 30,200 1-4 35,000 5-14 40,000 15-29 52130 30-59 32120 60+ 24835
No of HH access to piped water		
Households with latrines	Flush toilet	70000
	VIP Latrine	200
	Uncovered Pit Latrine	120000
	Bucket	0
	None	59800
Community distribution by type of waste/garbage disposal (percent):	Collected by local Authority	60%
	Collected by Private firm	25%
	Garbage pit	70%
	Burning	48%
	Public garbage heap	15%
	Farm Garden	3%
	Neighborhood Community group	15%
ENERGY		
% of trading Centres connected with electricity		91.96%
HHs distribution by main cooking fuel	Electricity	0.7
	Gas (LPG)	11.1
	Biogas	0.5
	Solar	0.1
	Paraffin	7.4
	Firewood	58.2
	Charcoal	21.9

Table 1: Kilifi County Socio-economic Factsheet

Policy context of the Participatory Climate Risk Assessment (PCRA) report

The need for PCRA for Kilifi County primarily stems from disproportionate climate change impacts felt by vulnerable communities at the grassroots. Firstly, as the primary governance instrument in devolved units, county governments are the "first line of responders" to community challenges including climate related disasters, and with the responsibility of confronting and responding to these challenges. An enabling PCRA report and regulatory environment provides an opportunity for coherent response actions and mechanisms by enabling Kilifi County to anticipate, respond and adapt to climate change impacts. Secondly, sectors such as agriculture, health, environment and water that are the most adversely affected by climate change have been devolved (Fourth schedule to the Constitution of Kenya (2010), providing an even stronger rationale for counties to play a leading role in addressing climate change. To effectively play such a role, a county PCRA, amongst other key policy instruments, will be required. Thirdly, under the devolved government structure, county governments play a significant role to contribute to national

climate change mitigation and adaptation efforts and targets, as outlined in a number of strategies, policies and laws. The Climate Change Act, 2016, for instance, stipulates that the Act shall be applied to all sectors of the economy by both the national and county governments. The specific functions expected from county governments such as Kilifi that include mainstreaming of climate change into planning, decision making and implementation; building resilience and enhancing adaptive capacity to the impacts of climate change; and facilitating capacity development for public participation in climate change responses through awareness creation, consultation, representation and access to information. The County Government of Kilifi has equally prioritized down-scaled climate finance to implement climate change mitigation and adaptation actions at the ward level.

1.2 Purpose of the PCRA Report

The PCRA report identifies major climate risks, sources of vulnerability and priority adaptation actions to address the identified risks. Through the PCRA process, communities in Kilifi County identified climate change hazards, risks and shocks in their wards, impacts of the hazards and prioritized response actions for incorporation into the Kilifi County Climate Change Action Plan (2023-2027) and the Kilifi CIDP (2023-2027). PCRA is also one of the conditions for accessing the Climate Resilience Investment Grants from the National Treasury's Financing Locally Led Climate Action, (FLLoCA).

The PCRA report provide a platform for government and none-state actors to compliment the county's climate change efforts by objectively prioritizing their climate actions based on the findings on this report. Climate change programs and projects by various actors including government agencies, Civil Society Organizations (CSOs) and Private sector in Kilifi County shall be guided by this report and the county climate change action plan. Devolving even further, the development of 35 wards PCRA reports and Ward Action Plans will result into ward specific hazards, risks, shocks and actions which will form the basis of climate change interventions. The County has equally prioritized down-scaled climate finance to implement climate change mitigation and adaptation actions at the ward level.

Kilifi county government will play a significant role mainstreaming of climate change actions in all sectors. This will include planning, decision making, implementation; building resilience and enhancing adaptive capacity to the impacts of climate change. Further, the county will facilitate capacity development for public participation in climate change responses through awareness creation, consultation, representation and access to information.

1.3 The Kilifi County PCRA Process

Step 1: Creation of the Technical Working Group (TWG). The technical working group was constituted by the Chief Officer in Charge of Climate Change. Considerations

for appointment to the technical working group were: representation of climate change relevant sectors such as environment, water, agriculture and gender; commitment to create time for the exercise, knowledge, skills and experience relevant to the task among others. This technical working group was supported by a wider consultative group which provided advice through the whole process. The wider group had a broader membership which included the Ward Climate Change Planning Committees, County Disaster Management Unit, Economic Planning, County Climate Change Steering Committee and County Climate Change Planning Committee, national government agencies such as NEMA and KMD, Members of the Civil Society organization, academia and private sector.

Step 2: Training of the Technical Working Group. The Technical Working Group was trained for three days on the PCRA process. The training involved understanding of the process, its relevance in development planning and implementation and how each step of the PCRA process should be conducted as described in the PCRA guidance templates. The training was coordinated by the director climate change, an expert from the county treasury supporting the process and a climate change practitioner from CSOs working in Kilifi County.

Group photo: Training of the Technical working group in preparation for the PCRA data collection at Turtle Bay hotel.

Step 3: Stakeholder Identification and Analysis. The stakeholders were identified by the Technical Working Group during the training session broadly categorized to represent: Individuals/organizations formally responsible for climate action and building resilience; involved in climate action and responses to climate impacts; those with knowledge and expertise relevant to climate adaptation and building resilience and community representatives and those impacted by climate change.

Table 2: Stakeholder mapping and analysis summary

High Influence, Low Interest • Commercial Banks (KCB, Equity Bank) • Chief Officers - (Water & Sanitation; Gender, Youth, Culture and Sports; Physical Planning, Lands and Urban Development; TVET, Transport and Infrastructure) • County Directors: TVET, Social Services, Finance Disaster Management, Transport and Infrastructure)	**High Influence High Interest,** • CECM –Water, Environment, Forestry, Climate Change & Solid Waste management • CO – Environment, Forestry, Climate Change & Solid Waste management • County Directors: Climate Change; Environment, Energy and Natural Resources; Meteorological Services; Public Health; Crops Development, Economic Planning; GIS; Water and Sanitation; Public Participation; and Social Services • Civil Society Organizations (Nature Kenya, ALIN, VSO, KPCG, PACJA, WWF, CSA, IDLO) • Kenya Forests Service and Kenya Wildlife Service • National Environment Management Authority (NEMA) • Politicians (MCAs, Member of Parliament, Senators, Women reps & Governor) • Community members representing the main livelihood groups in the county (farmers, livestock keepers, fisher folks, petty traders, youth, women, PWDs)
Low influence, Low Interest • Communication Officers • Secretarial staff • Students	**Low Influence, High Interest** • County Environment Committee (CEC) members • Environment officers • Sub County Water Officers • Ward Climate Change Planning Committee • Members Academic and Research Institutions (e.g., Pwani University, Kilifi Medical Training Centre, Secondary & primary schools) • Local media houses • Business community

Providers of scientific and statistical data such as the GIS team, the Meteorological, Social and County Planning Departments were also considered. The stakeholder analysis was conducted to categorize the stakeholders in terms of their interest and influence.

Step 4: Preparation for ward level engagements. The Climate Change Directorate sensitized the citizens on the upcoming climate change risk assessment exercise and mobilized participants with the support of Ward Administrators. The identified community participants were mobilized through the office of the respective ward administrators and the respective ward climate change planning committees. Programs, engagement tools and other materials relevant to the community engagements were prepared in advance. These materials include: the program, community guiding questions and the note takers feedback forms. The technical working group took 3 days to prepare for ward level engagements.

Step 5: Engagement of Communities at Ward Level on PCRA. An average of 15-20 participants were mobilized from the wards in line with the mobilization criteria stated above. For effective deliberations, 15 participants or slightly less were found to be a more ideal number while 25 were too many to accord a majority an opportunity to participate. The participants mobilized consisted of different livelihoods groups such as farmers and traders, marginalized, youth and PWDs in addition to the members of the Ward Climate Change Planning Committees. Other participants included ward agriculture officers, ward administrators, foresters and other technical officers with ward level mandate. The community engagement meetings started by a sketching a climate hazard and community assets map. Thereafter, the climate change risk assessment tools were administered to determine the main hazards, prioritize them, identify vulnerabilities, local response actions and propose adaptation strategies. The output of this process was that the community's identified key climate change risks and hazards and, priority response measures.

Ward PCRA data collection in progress at Watamu ward in Kilifi North sub-county.

Step 6: Data Analysis and Preparations for County Level Participatory Climate Change Risk Assessment. The data from the wards was summarized into reports and risk maps digitized by the GIS unit capturing the main hazards and prioritized response actions per ward and at the sub county level. This was followed by one-day meeting of technical committee to develop the workshop program and share responsibilities among team members as well as agree on the workshop execution strategy. The County Director Meteorology prepared an overview presentation on historical, current and projected climate scenarios for the county while the director economic planning prepared presentation on the socio-economic status of the county. The Directors GIS and Climate Change prepared to present the prevalent climate hazards and their geographic distribution in the county.

Step 7: County Level Workshop on Participatory Climate Change Risk Assessment. The 3-day workshop was held in the second half of May 2023 to validate the findings from the wards and have the multi-stakeholders incorporate their views into the Kilifi County PCRA process. The workshop participants included the PCRA Technical Working Group, government officers from line departments such as water, agriculture, environment, climate change and public health; representatives of Civil Society Organisations implementing climate change related projects; academia; community

representatives among others. During the workshop, participants prioritized the hazards, response measures as well as drivers of climate change vulnerability in Kilifi County.

Step 8: Participatory Climate Risk Assessment Report. The team then developed a PCRA report through consolidating the data gathered throughout the risk assessment process. It took about 1 week to develop the report, which was consolidated by the director in charge of climate change. The TWG provided the necessary backstopping and review of the report until final draft was developed.

Photo: Kilifi County Assembly committee of Water and environment taken through the PCRA/CCAP report before it was tabled in the full house for approval.

2.0 COUNTY CLIMATE HAZARD PROFILE

2.1 Agro-ecological Zones

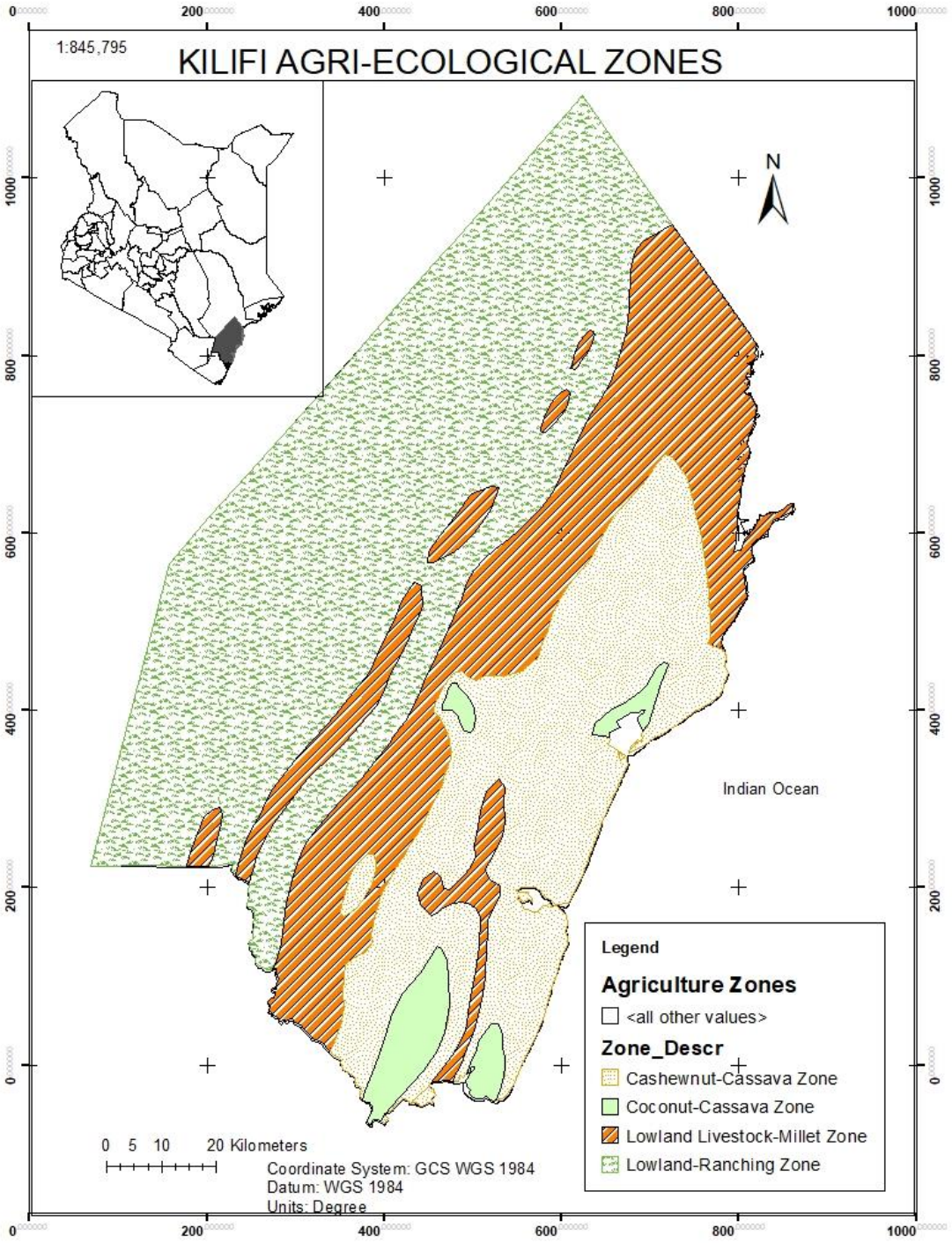


Figure 1: Agro-ecological zones

The county is divided into 5 agro-ecological zones defining areas with similar production related characteristics such as annual mean temperatures, vegetation and humidity.

Coconut-Cassava Zone: This zone covers the coastal uplands and the low-level coastal plains. It has the highest potential for crop production in the county. Major farming activities include fruit farming (mango, citrus, cashew nut and coconut), vegetable farming (chilli, brinjals, okra, amaranthas), foods (maize, bananas, cowpeas, upland rice, green grams), and dairy farming. The zone receives an average annual precipitation of 1,300mm per annum and a mean annual temperature of 24^0C.

Cashew nut-Coconut zone: This zone stretches northwards along the coastal plain up to Arabuko Sokoke forest. It receives an average precipitation of 900mm and mean annual temperature of 24^0C. It has agricultural potential with the same crop types as the coconut-cassava zone but with slightly less production.

Livestock-Millet Zone: This zone is of lower agricultural potential with annual precipitation ranging from 700mm to 900mm. It's suitable for dry land farming, supporting drought tolerant crops and ranching.

Lowland Ranching: This zone varies in altitude from 90m to 300m with annual mean temperature of 27^0 Celsius and annual precipitation of 350mm to 700mm. The major activities within this zone include ranching and wildlife conservation.

Coconut Cashew Nut – Cassava Zone: The smallest of all zones, mainly found in Kilifi South and North. It lies in the altitude between 30m to 310m above mean sea level with mean temperature of 27^0 Celsius and annual precipitation of 900mm per annum. The area has a similar potential for the crops found in the coconut-cassava and cashew nut-cassava zones.

2.2 Historical Climate Hazards and Trends

3 YEAR.	EVENT	NEGATIVE IMPACTS.	POSITIVE IMPACTS
1938	Njaa ya Kabushutsi	Breakage of social relationships Malnutrition. Deaths of people and livestock Starvation Low birth rate Migration.	Affordable meat prices as a mitigation for the death of livestock
1940	Ndugu Si Mutu Famine	Deaths Separation Starvation	Affordable meat prices as a mitigation for the death of livestock
1950	Nzige-Locust Invasion	Crop destruction Starvation	
1950	Ugonjwa wa Ndui	Deaths Skin diseases	

1961	Zimba Ra Amani Floods	Deaths of livestock. Displacement of people. Fertile land washing away Deaths of people. Water born Disease outbreak. Washing away Sabaki bridge	
1973	Solar eclipse	Disruption of daily activities Increased religious practices	Increased religious practices (prayers|) Increased time for reproduction
1980	Cholera Outbreak	Deaths of human beings	Lead to increased construction of toilets. Sensitization of CHVs
1980s	Njaa ya Changilo	Breakage of social relationships Malnutrition. Deaths of people and livestock Starvation Reduced human population Migration. Travelling long distance to search for food School drop out Human and wide life conflicts Domestic violence and conflicts Child labour	Adopting planting drought resistance crops.
1982	Jaribio ya mapinduzi ya nchi	Restricted movement High costs of living Increase in crime	Change of mind set in politics
1986-1992	Struggle for Multipartism	Loss lives Loss of jobs Loss of properties Displacement of people Democracy	Democracy Create job opportunities
1994	Shifta /Miani	Fear/ insecurity Displacement	Increased security personnel
1996-1997	Elnino	Deaths Water borne diseases i.e. cholera Destruction of infrastructure and properties Loss of lives Soil degradation	Increased fish production Enhance Production and increased crop yields. Increase pastures regeneration and production
1997	Kayabombo Violence	Violence and loss of lives Displacement of people Loss of Jobs Insecurity, rape cases Negative impact on tourism Economic decline Emotional trauma	Beefing up of security
2000	Mwisho wa dunia	Fear Mental disturbances	

2001	Kikambala Bomblast-Hotel Paradise	Kusabaratika of tourisim industry Loss of jobs Loss of life	Beefing up of security in the country on terror activities.
2006	Lanina Famine	Loss of human lives and livestock	
2006	Tsunami crisis	Interference of fishing activities	Increased fish production
2007/2008	Post-election violence	Loss of property. Displacement of people Loss of jobs	
2012/2013	MRC Revolution	Loss of lives. Displacement of people Loss of employment. Mental disturbances.	Create awareness on political rights
2016/2017	Njaa ya Magorowa	Loss of livestock Loss of coconut trees. Poverty Malnutrition School dropouts GBV	
2019/2020	Covid-19	Limited social interactions Early pregnancies Loss of employment High reproduction Closure of schools and worship area Deaths Relief food Disrupted cultural and religious beliefs	Enhanced health services Proper hygiene and sanitation Reduced air borne diseases. Created job opportunity Increased innovations Led to cost cutting of ceremonial expenses.
2021	Ngunea/nzige-Locust Invasion	Destruction of crops Low crop yields	Introduction of crop cover insurance
2023	Discovery of Shakahola massacre	Loss of lives/jobs	Create awereness on religious beliefs and practices

Table 3: Historical Climate Hazards and Trends

2.3 Spatial Distribution of Risks

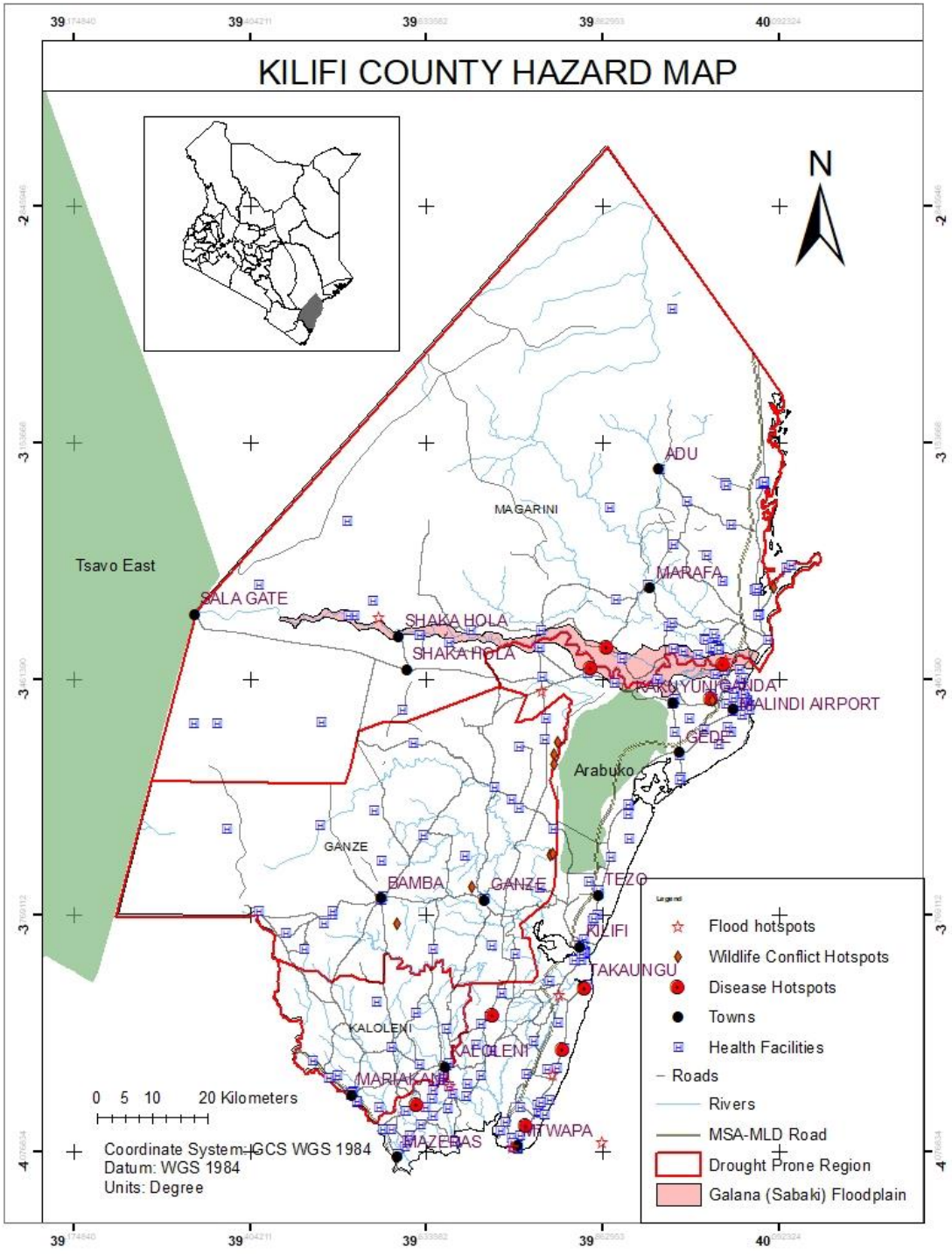
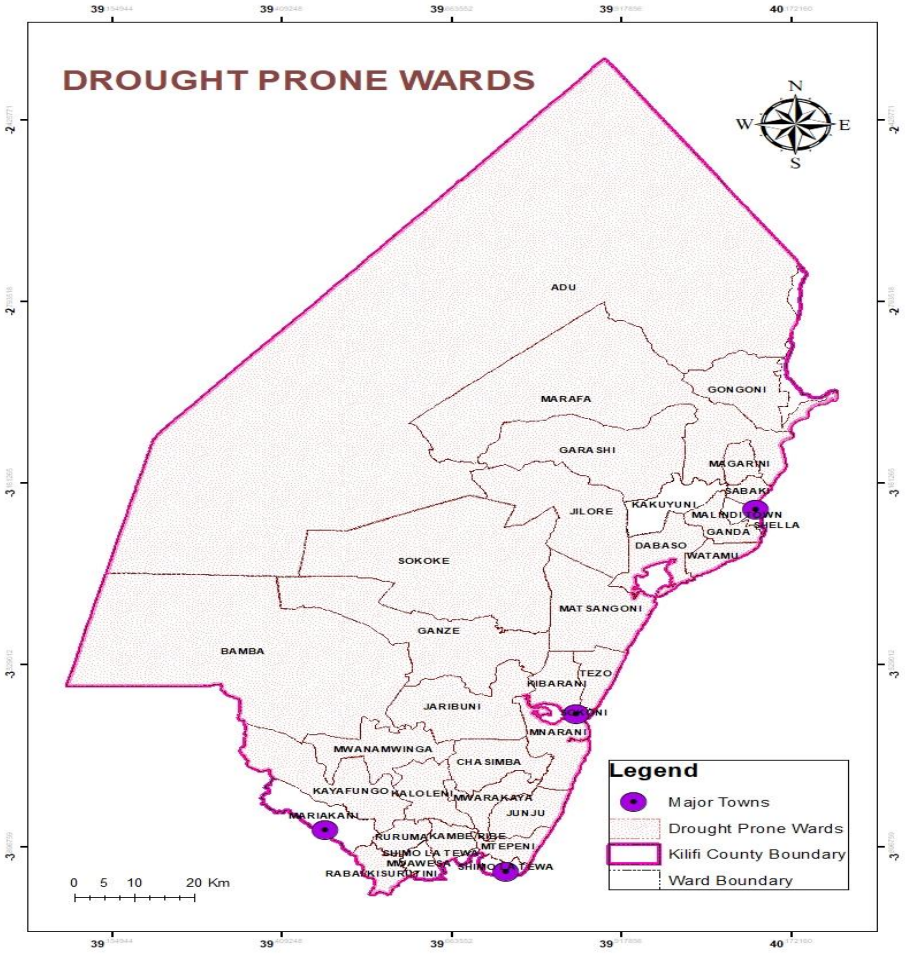


Figure 2: County Hazard Map

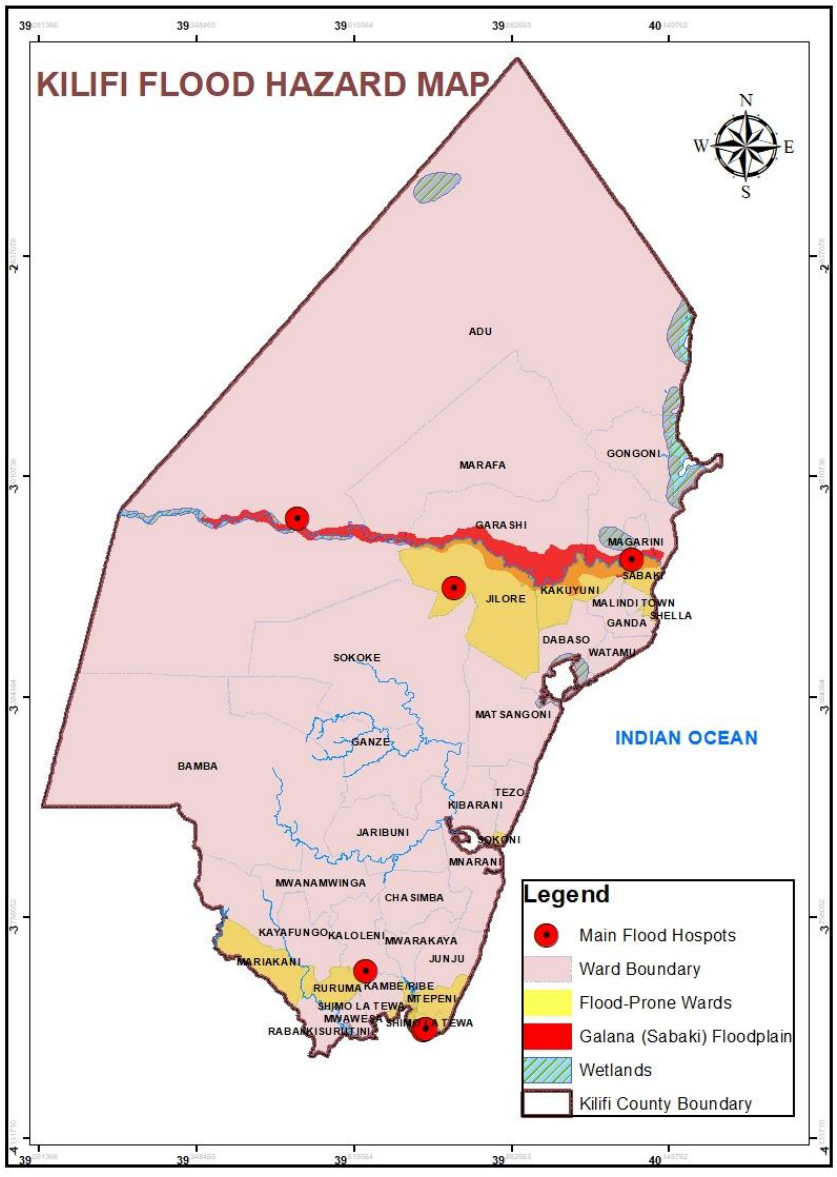
Drought: Almost three quarters of Kilifi County is frequently affected by droughts as marked by the red line (boundary) in the map above. Three (3) out of the seven (7) sub-

counties often experience frequent droughts including Ganze, Kaloleni and Magarini. Drought, and unreliable rains have undermined farmer's efforts to produce appropriate crops as there is recurring crop failures in the affected areas. Frequent droughts especially in the semi-arid lowlands of the county has led to many rivers drying up and poor water quality. Prevailing droughts also cause water shortages in most parts of the county that in turn affects livestock production due to inadequate pasture and drinking water. When water scarcity prevails in the arid and semi-arid Lands (ASALs) not only affects agricultural production but also natural resource management hence negatively impacting energy, manufacturing, agricultural production, and other economic sectors. As a result, the at-risk population (including vulnerable groups) have to travel longer distances searching for food (including over-dependency on relief food), water, and pasture for their animals and most often causing conflicts like human-human conflicts in struggling for water and grazing land and also human-wildlife conflicts as wild animals mostly break out of the protected/conservation areas into homesteads and farms.



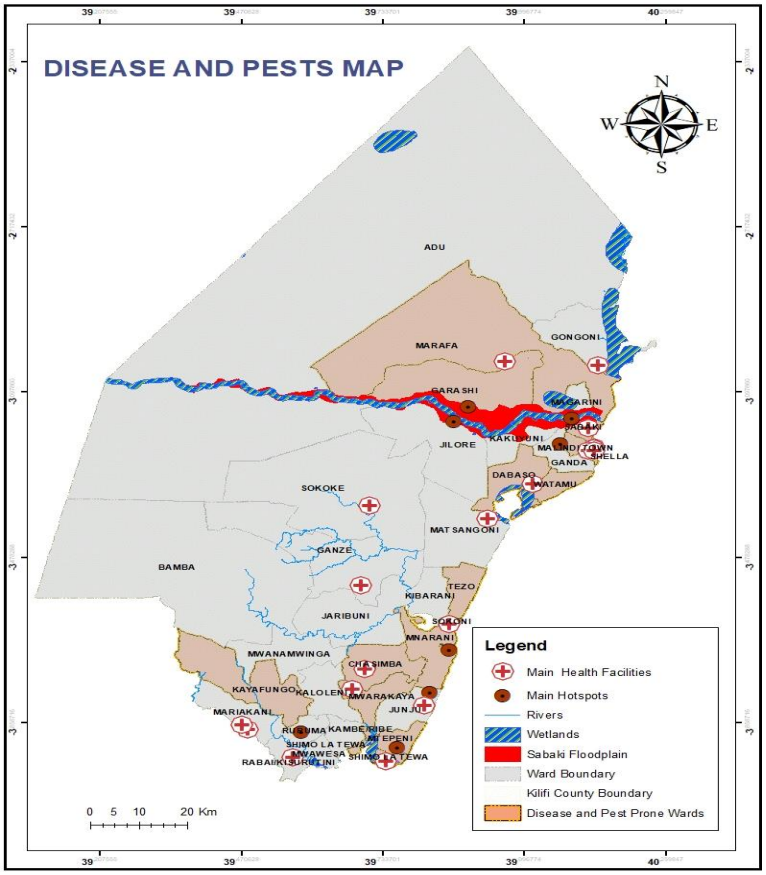
Floods: Floods are mostly experienced along the Galana/Sabaki floodplain symbolized by the Rose polygon towards the mouth of River Galana and mostly affects the lower areas of Magharini Subcounty and Malindi along the river basin. Other areas in the county affected by floods include Kwa Kadzengo, Kikambala, Mbogolo area around Mavueni,

Mtepeni in Kilifi Sub-county, vitengeni, Makobeni, Pendeza, Mbwaka, Pangani, Mitsajeni, Kakuyuni, Chakama, Garashi, Goa and Nyambura areas (in Shimo la Tewa as symbolized by the red stars in the map. Associated impacts of floods on livelihood include destruction of homes/buildings in the low lands, destruction of crop farms, property and infrastructure, loss of life, livestock, contamination of water leading to water borne disease outbreaks like Cholera and typhoid. As a result, vulnerable populations are mostly left homeless, without food supplies, access to clean water and medical services as health facilities are often overburdened by increasing cases of patients and victims of floods.



Diseases (Human, Livestock, and Crops): The level of climate-sensitive degree of risk has increased the prevalence of infectious diseases like diarrhea, typhoid fever, vector-borne diseases like malaria and respiratory diseases resulting from poor air quality or even overreliance on wood fuel for cooking. The related disease hotspots include

Sishakani, Makomboani, Mgamboni, Mikiriani, Chalani, Jibana, Kaloleni, shella, Mtepeni, Ruruma, Jilore, ganda, Magharini, Garashi, Mavueni, Shariani, Takaungu, Ngamani, and Chasimba as symbolized by the red dots in the map above. The common practice of open defecation worsens the risk of contamination of surface water sources and diseases spread by oro-faecal route. Frequent droughts especially in the semi-arid lowlands of the county has led to many rivers drying up and poor water quality. The health effects are seen in the rising number of people suffering from malnutrition and gastroenteritis as well as mental health problems occasioned by loss of livelihoods. However, as seen in the map, some of the disease hotspots are along the flood plains which draws a closer link between disease outbreak and effects of floods contaminating water for the at-risk population and breeding of vectors causing diseases. As a result, the vulnerable groups are affected that they cannot go to school (for children) and those living on a hand-to-mouth basis hugely affected to an extent they can go without food as their daily activities are being affected.



Human-Wildlife Conflict: Frequent droughts also impact tourism as wildlife competes for water and other resources with humans or even livestock. Wild animals from the Tsavo East and Arabuko Sokoke often leave the parks and moved into inhabited areas where they destroy crops and/or come into conflict with humans—thereby increasing food insecurity. Elephants are often seen where they had not been seen in decades, and they destroy crops grown by drought-stricken farmers. Hippos congregating in the remaining

waters along Sabaki River become more aggressive, and there have been several attacks and some deaths reported recently. The conflicts are experienced in areas like Mitangani, Bandari, Mtsara wa Tsatu, Ganda, Jilore, chamari, some parts of Sokoke along the Arabuko Sokoke forest and Dida Forest, some parts of Magharini sub county, and Ganze.

S/No.	HAZARD	RISKS	WARDS	LOCATION
1.	Drought	Prolonged dry spells	Kaloleni, Mwanamwinga, Kayafungo,Rabai-Kisurutini, Mwawesa,Kambe-Ribe,Ruruma,Mtepeni, Junju, Mwarakaya,Chasimba, Ganda,Jilore, Jaribuni, Sokoke, Ganze, Bamba, Sabaki, Adu, Garashi, Tezo, Dabaso, Matsangoni,Watamu, Mnarani, Kibarani, Gongoni, Magarini, Marafa	Kaloleni, Mwanamwinga, Kayafungo, Ganze, Bamba, Jaribuni, Adu, Garashi, Marafa, Sokoke, Gongoni
		Low crop yields		
		Reduced water levels		
		Loss of soil fertility		
		Deficiency diseases		
		Loss of lives		
		Death of livestock		
		Loss of livelihoods		
		Drying up of trees		
		Increased Gender-Based Violence cases		
2.	Floods	Soil erosion	Sabaki, Jilore, Kakuyuni, Ruruma	Mbogolo area, vitengeni, Makobeni, Pendeza, Mbwaka, Pangani, Mitsajeni, Kakuyuni, Chakama, Garashi, Goa
		Loss of lives		
		Loss of livelihoods		
		Loss of crops and animals		
		Destruction of fish breeding grounds		
		Bleaching of coral reefs		

	Local floods	Displacement of people	Mtepeni, Shimo la Tewa, Sokoni, Mariakani, Shella	Kwa Kadzengo, Kikambala, Nyambura area
		Destruction of property		
		Spread of Vector-borne diseases		
		Increased teenage pregnancies		
3.	Emerging Diseases and pests	Infection of human diseases	Tezo, Sokoni, Dabaso,Watamu, Mnarani, Mwarakaya, Chasimba, Mtepeni, Shimo la Tewa, Kayafungo, Shella, Malindi Town, Garashi, Marafa, Sabaki	Sishakani, Makomboani, Mgamboni, Mikiriani, Chalani, Jibana, Kaloleni, shella, Mtepeni, Ruruma, Jilore, ganda, Magharini, Garashi, Mavueni, Shariani, Takaungu, Ngamani, and Chasimba
		Loss of lives		
		Spread of livestock diseases		
		Invasion of crop and animal pests		
4.	Human-Wildlife Conflicts	Loss of lives	Bamba, Ganze, Ganda, Jilore, Kibarani, Sokoke, Mwanamwinga	like Mitangani, Bandari, Mtsara wa Tsatu, Ganda, Jilore, chamari, Sokoke, Bamba
		Destruction of crops		
5.	Rising Sea levels	Submergence of coastal beaches	Shimo la Tewa, Mtepeni, Junju, Mnarani, Watamu, Matsangoni, Tezo, Sokoni Jaribuni, Shella, Magarini, Sabaki	Magarini, Sabaki
		Submergence of buildings		
6.		Destruction of property		Ganze, Bamba

	Strong wind speeds (Cyclones)	Soil erosion	Ganze, Bamba, Mwanamwinga, Kayafungo Garashi, Adu, Marafa	

Table 4: Spatial Distribution of Risks

2.4 Exposure and vulnerability profiles of the county

Agriculture, Livestock, and Fisheries: Rain-fed agriculture is the main source of livelihood in the County. The common crops within the county include maize, cassava, cowpeas and green grams. Inadequate rainfall, as well as the late onset and early cessation of both long and short rains, have made crop failure a recurring hazard in the county. Three (3) out of the seven (7) sub-counties i.e Ganze, Kaloleni and Magarini often experience frequent droughts. As a result of prolonged drought farmer's efforts to produce appropriate crops are undermined. Maize is often planted in lieu of other resilient crops in semi-arid areas such Ganze and Magarini.

Livestock production in the county is currently affected by climate change related impacts. High temperatures and shifting rainfall patterns have reduced livestock feed availability and therefore productivity. Variations in temperature are also responsible for disease outbreaks while warmer seasons increase the spread of diseases.

Climate change also poses a significant threat to fisheries in the county. The high temperatures experienced have made inshore water habitats unsuitable for fish and coral reefs and also alters the growth rate of seagrass. High temperatures also cause ocean upwelling thus reducing productivity of fish. Taken together, these effects have a negative impact on the fishing community in Kilifi County.

Conversely, increases in rainfall trigger contamination of the coral reefs. Worse still, as sea level rise, low lying coastal areas are being inundated with saltwater causing salt stresses on fish. On the other hand rising sea levels also threaten the low-lying areas of the county's coastline. For instance, agricultural land will no longer be usable due to salt water intrusion.

climate change increases the severity and frequency of cyclones through warming of the oceans. In May 2018, an unusually powerful cyclone hit the Arabian Peninsula, and the heavy rainfall enabled desert locusts to breed. Another cyclone in October 2018 kept these locusts alive, and they spread to Yemen then to East Africa, driven by another cyclone in 2019 which contributed to massive crop destruction.

Energy, Environment, and Forestry: Kilifi County has a variety of ecosystems that are important for the provision of environmental goods and services. The county has 18 forests which are gazetted while 7 are non-gazetted. The main forests includes; Arabuko Sokoke, mangrove forests, and Dakatcha woodlands. Over 80% of the population in the

county relies on wood fuel for their energy needs, a fact that has led to destruction of forests in the county. This problem is particularly pronounced in Dakatcha woodlands and Mwangea forests. Other unintended impacts include reduced water quality and quantity through destruction of water catchments. Climate change is making a bad situation worse. Increase in temperature is likely to affect ecologically sensitive coastal rain forests like Arabuko Sokoke. The gradual decline in environmental quality brings with it economic hardships to resource dependent communities and engender conflicts. In Magarini, locals often clash with migrating herders from Tana River County due to crop despoilment.

The county is also endowed with mangrove forests, important nursery grounds for many commercial fisheries. These are also a habitat for migratory birds, offer protection of the shoreline from storms and waves, and act as carbon sinks. Mangroves also offer protection to sea grass beds and coral reefs by filtering sediments. Mida Creek mangrove forest has been affected by changes in inundation duration frequency, illegal logging as well as salinity levels caused by sea level rise thus reducing its productivity. Increased flooding has caused change in species composition while deforestation is increasingly responsible for coastal erosion.

Water and Sanitation: Kilifi County is endowed with both surface and underground water resources. However, the county is a generally water stressed with a general daily water gap of 99,784 m3/d cubic metres per day (2022) which will rise to 118,684 m3/d and 137,584 m3/d by 2026 and 2030, respectively. The County frequently faces droughts exacerbating the already worse water problem, which will have a wide range of implications for food security, health, manufacturing, and associated sectors. Rainfall has equally become irregular, and when it rains, downpour is more intense resulting in flooding. Areas prone to flooding include the Sabaki flood plain, Kwa Kadzengo in Kikambala, Mtondia, Vitengeni, and Mbogolo in Mavueni area of Kilifi south. Flooding also heightens the risk of water-borne diseases. This is especially true since a significant proportion of the population lack access to basic sanitation facilities.

Water scarcity is also making natural resource management more difficult. It is projected that water scarcity will affect energy, manufacturing, agricultural production, and other sectors of the economy. Rivers which were once over one's head are now trickling at ankle level. Irrigation upstream has further reduced the water volumes on River Sabaki which, in turn, has reduced the quantity and quality of water for downstream communities. The adverse impacts of climate change on water resources are already being experienced, by coastal communities owing to salt water intrusion in ground water and farms majorly contributed to by salt mining companies.

Health: Climate change impacts have badly affected human health within Kilifi County. The level of climate-sensitive degree of risk has increased the prevalence of infectious diseases like diarrhoea, typhoid fever, vector-borne diseases like malaria and respiratory diseases resulting from poor air quality or even overreliance on wood fuel for cooking. The common practice of open defaecation worsens the risk of contamination of surface water sources and diseases spread by oro-faecal route. Frequent droughts especially in

the semi-arid lowlands of the county has led to many rivers drying up and poor water quality. The health effects are seen in the rising number of people suffering from malnutrition and gastroenteritis as well as mental health problems occasioned by loss of livelihoods. Worse still, heat stress-related mortality is expected to increase among people aged 65 and above.

When primary health care services are stretched thin and performing poorly as is the case with Kilifi County, it is difficult to respond to the health effects of climate change and this includes access to essential health services by vulnerable communities during climate crisis. For instance, the County Department of Health is understaffed, with a total staffing gap of 5,957 personnel. Further, the average geographical distance to nearest health facility in the county is 5km while the prevalence of stunting among children under five years stands at 39%. Additionally, 4.7% and 18.2% of children under five years are wasted and underweight across the county. There is a network of community health volunteers (CHV), often activated when there is funding for specific projects, including public health initiatives. However, they are unpaid, have competing demands, and this affects their voluntary work. Taken together, underlying health challenges will become more pronounced owing to climate change.

Trade and Industrialization: Counties have a role in trade development and regulation. Kilifi County boast of 78 trading centres with 31,998 licensed retailers and 641 wholesalers. The major trading centres include Kilifi, Malindi, Mtwapa, Mariakani, Kaloleni, and Watamu among others. The County is the leading national source market for cashew nut and coconut. Kilifi County also trades in industrial products. The county currently has 22 manufacturing industries which include soft drink manufacturing industries in Mtwapa, salt manufacturing industries in Gongoni and Marereni (salt belt), cement manufacturing industries in Rabai, Vipingo and Kaloleni, and Steel manufacturing industries in Mazeras and Mariakani among others. In the county, we also have small cottage industries focussing on cashew nuts.

Trade and manufacturing sectors are often indirectly affected by climate change, as they depend on climate sensitive sectors such as agriculture, transportation and energy. Reduced agricultural productivity occasioned by climate change may lead to reduced supply of raw materials for agro-processing or even trade. On the other hand, destruction of transport infrastructure by floods often limits movement of people, goods and services, thus hindering trade and manufacturing. Other threats include reduced manufacturing and trade activities due to power outages occasioned by either low power production or power rationing (for climate-sensitive sources such as hydro, wind and solar) or even damage to power distribution lines by floods.

Cultural Heritage, Tourism and Wildlife: Tourism is one of the county's main economic activity employing tens of thousands of people. The tourism industry has spurred other economic activities. The county is rich in endemic flora and fauna, attractive physiographic features, tropical climate, and sandy beaches that makes it a unique tourist destination. Further, the County has a rich cultural and historical heritage that includes

Swahili/Arab and Mijikenda cultures, world heritage sites like the Kaya forests and archaeological monuments in Gede, Malindi, Takaungu, Mnarani, and Rabai—dating back to the slave trade era.

The connection of tourism to the natural environment makes the sector highly vulnerable to climate change. For instance, sea level rise has destroyed magnificent sandy beaches and hotel establishments through erosion and flooding, storms at sea affect tourism activities such as snorkelling and sport fishing, and high temperatures have caused bleaching of coral reefs important for tourism. Other impacts that are already being experienced include, among others, salt water intrusion into estuaries and freshwater aquifers, decreased light penetration leading to loss of coral reefs, and outmigration of specific fish species that, in turn, affects sport fishing and associated tourist activities.

Frequent droughts also impact tourism as wildlife competes for water and other resources with humans or even livestock. Wild animals from the Tsavo East and Arabuko Sokoke often leave the parks and moved into inhabited areas where they destroy crops and/or come into conflict with humans—thereby increasing food insecurity. Elephants are often seen where they had not been seen in decades, and they destroy crops grown by drought-stricken farmers. Hippos congregating in the remaining waters along Sabaki River become more aggressive, and there have been several attacks and some deaths reported recently. Overall, severe droughts are causing shifts in wildlife distribution patterns and loss of biodiversity including extinction of endemic species. In extreme cases, wild animals will eventually die because of lack of water and food. This will affect tourist arrivals in the county and Kenya as a whole.

Infrastructure: Transport infrastructure such as county roads, street lighting, airstrips, ferries and harbours (excluding the regulation of international and national shipping and associated matters) as well as housing are now devolved. Kilifi County has a road network of 101,000 km, and 40km of rail network which is part of the Mombasa-Kisumu railway stretch that passes through Mazeras and Samburu. The county also boasts of two modern bus termini in Malindi and Kilifi towns. There are other middle level bus parks in Mariakani and Kaloleni. There are a total of five jetties located at Mtwapa, Kilifi, Ngomeni, Malindi and Takaungu. Other infrastructural facilities include Early Childhood Development Education (ECDE) centres, health facilities, markets, water supply systems, and county offices among others.

Climate change associated disasters are known to be destructive and, in the past, have destroyed critical infrastructure in the county. High temperatures may lead to softening and expansion of tarmac roads and, in turn, create rutting and potholes or even weaken bridge joints. Climate change is also projected to increase the intensity of flooding, which could destroy critical infrastructure or even render most roads impassable. In 2015, the county was subjected to the worst floods in more than 20 years, cutting off the road network, destroying homes, and affecting more than 3,000 people especially in the Magarini Sub-County. Sea level rise will also have a negative implication on biodiversity and ecosystem services in Kilifi County. For instance, the 2004 Indian Ocean Tsunami

and 2006/07 flooding destroyed fishing infrastructure and several fishing vessels. Taken together, these impacts will increase the cost of developing and maintaining critical infrastructure in the county.

Human settlement and Migration: Human settlements and patterns in Kilifi County are influenced by proximity to economic and environmental factors such as jobs, markets, agriculture and fishing areas and physical infrastructure such as social roads, housing, water and electricity. The county has a substantial population living in informal settlements. The growth of informal settlements is unprecedented. Some of the reasons for the rapid expansion of informal settlements include, among others, rural-urban migration, urban poverty, and insecure land tenure. These informal settlements are highly vulnerable to climate change including floods and the resultant displacement occasioned by sea level.

In 2015, the County was subjected to the worst floods in more than 20 years. Six seasonal rivers burst their banks, displacing more than 3,000 people especially in Magarini Sub-County. Migration of families has also been reported due to extended drought. For instance, Chakama's land has become extremely dry, hitting subsistence farmers badly. Some residents of Chakama recently relocated to other villages closer to River Sabaki. These families, with several children, often live on open ground without decent housing, toilets, hospitals or even schools nearby. Some of these migrant families have had to leave their older children behind to attend primary school. The separation was very stressful and often triggers mental health problems and gender-based violence.

Education: Kilifi County has 799 public ECDE centres with a total of 1,723 teachers. There are also 810 private ECDE schools. Transition rate from pre-school to the next level is 45%, implying that an estimated 55% of the pupils don't proceed to primary education. The semi-arid regions (Ganze and Magarini) of the county are mostly affected. Overall, the county records low literacy levels and teen pregnancies owing to a combination of factors such as poverty. The impacts of climate change will accentuate existing challenges in the education sector.

Climate change's main impact on the education sector is as a result of the sector's linkages with agriculture, food security, livelihoods and household incomes in agriculturally dependent communities in Kilifi. In such places, food insecure (hungry) children often miss school, as they and their families resort to seeking opportunities to get food. Further, reduced agricultural productivity implies that many rural households cannot afford fees for their secondary school-going children.

2.5 Differentiated impacts of climate hazards and risks

Children: Children are particularly vulnerable to the effects of climate change among them include; malnutrition, lack of education, insecurity, exposure to sexual and gender-based violence and diseases resulting from climate extreme events like floods and droughts that have significant impact on their health.

The elderly: Elderly individuals are also at risk of climate change impacts mainly health related issues often exacerbated by unfavorable climatic conditions.

Youth: Youth represent a crossover between the present and future generations, yet they are seldom involved in climate change response strategies. Climate change increases youth unemployment in sensitive sectors such as agriculture, manufacturing and tourism. This may lead to youth engaging in risk behaviors such as drug abuse, crime and radicalization. The primarily livelihood of youth are charcoal burning, herding, tapping and tour guiding. The resources youth highly utilized are forest produces, water and land resources. Traditionally, elders are in control of land ownership, inheritance and in charge of decision making while in current days youth have been given chances in governance related issues.

Women: Women, who often bear the primary responsibility for household and family care, may face greater challenges accessing quality health services due to shifts in priorities caused by climate change. They may also experience family instability, as men are forced to travel long distances to find grazing land for their livestock. Gender disparities also mean that women often travel long distances in search of water due to drying up of water reservoirs. During hazard such as floods women are left with responsibility of rescuing children and the elderly in the communities. Many are the times women disproportionally suffer the impacts of climate change more because of cultural norms and inequitable distribution of resources, power and less involved in key decision making. Despite the climate change impact, women are involved in selling of fried fish, selling of agricultural produces, small scale of charcoal sellers, fast food business such as' viazi karai'. The current resources women depend on are mostly water resources such as water pan, water taps and boreholes. Also, the forest resource such as firewood are mostly used as a source of energy. Land is also a resource as its mainly utilized for agricultural activities. Women in Kilifi County have no equal aces and control of inheritance, ownership and decision making as compared to men. In this essence, women they don't hold any position in the family and men prefers their children to inherit more than their women since they can get married to another man. However, women have equal say in local decision making and govanance.

Persons With Disability (PWD): Persons with disabilities face additional challenges, including a lack of access to quality health services and education. They are often left out of environmental conservation and how to respond to challenges caused by climate change. This lack of presentation escalate existing barriers to access food and participation in food production which increase risk in poverty and hunger.

Ethnic minorities: Indigenous people in Kilifi County have a close relationship with their natural environment which makes them more sensitive to the effects of climate change. The ethnic minority are mostly discriminated and not well represented in key planning and decision-making platform concerning climate change response. This makes it harder for them to cope with the impacts of climate change.

Small scale farmers: small scale farmers in kilifi are severely affected by drought as a result of climate change. They are forced to go for a long distance looking for pastures and water for their livestock which in the long run lead to loss of livestock. Poor rain distribution in the region lead loss of crop harvest hence increase in food shortage and poverty levels. With the availability of land resource, making water available in the region farmers can practice climate smart agriculture and livestock production system. Farmers can practice bee keeping, rabbit keeping, poultry and butterfly rearing as alternative source of livelihoods. To add on, farmers mostly depends on land and water resources for farming and livestock.

Small scale fishermen: Small scale fishermen are highly impacted by climate change due to water surface temperature rise, sea level rise, and increase in water salinity and water ocean acidification leading to low fish catch. The low fish catch had made fishermen to source alternative livelihood such as aquaculture, selling for marine related ornamental, poultry and dairy farming and fish seed hatchery. Fishermen are highly depends on ocean and land for their daily work.

Petty traders: Petty traders are someone who engages in small quantities of buying and selling. They are majorly characterized by hawking the street with their goods or placed their good on a tray by the road side or in front of their houses and waits for passerby to make purchases. The petty traders mainly depend on farm produce. The traders are indirectly affected by climate change as a result of low food production leading to price fluctuation this in turn reduce the purchasing power. The petty traders have alternative source of livelihood such as value addition of farm produce e.g ground nuts, cashewnut, banana crips, cassava crips and milk product.

3.0 FUTURE CLIMATE SCENARIOS FOR THE COUNTY

3.1 Future climate projections

The county has a bimodal rainfall pattern with average annual precipitation ranging from 300mm in the hinterland to 1,300mm in the coastal belt. The short rain season is experienced in the months of October, November and December (OND) while the Long rains are experienced in the months of March–April and May (MAM). The most important season to the hinterland is the short rains for pasture regeneration and water recharge while the long rain season is the most important season for the coastal area for it supports crop production.

The annual temperatures range between 21^0C and 30^0C in the coastal belt and between 30^0C and 34^0C in the hinterland. The county experiences a very important wind field with relatively moderate wind speeds ranging from 4.8Km/h along the coastal strip to 12km/h in the hinterlands.

Rainfall: Majority of local farmers cited a reduction in rainfall over time. Others also experienced changes in the amount and timing of rainfall. Drought has created a cycle

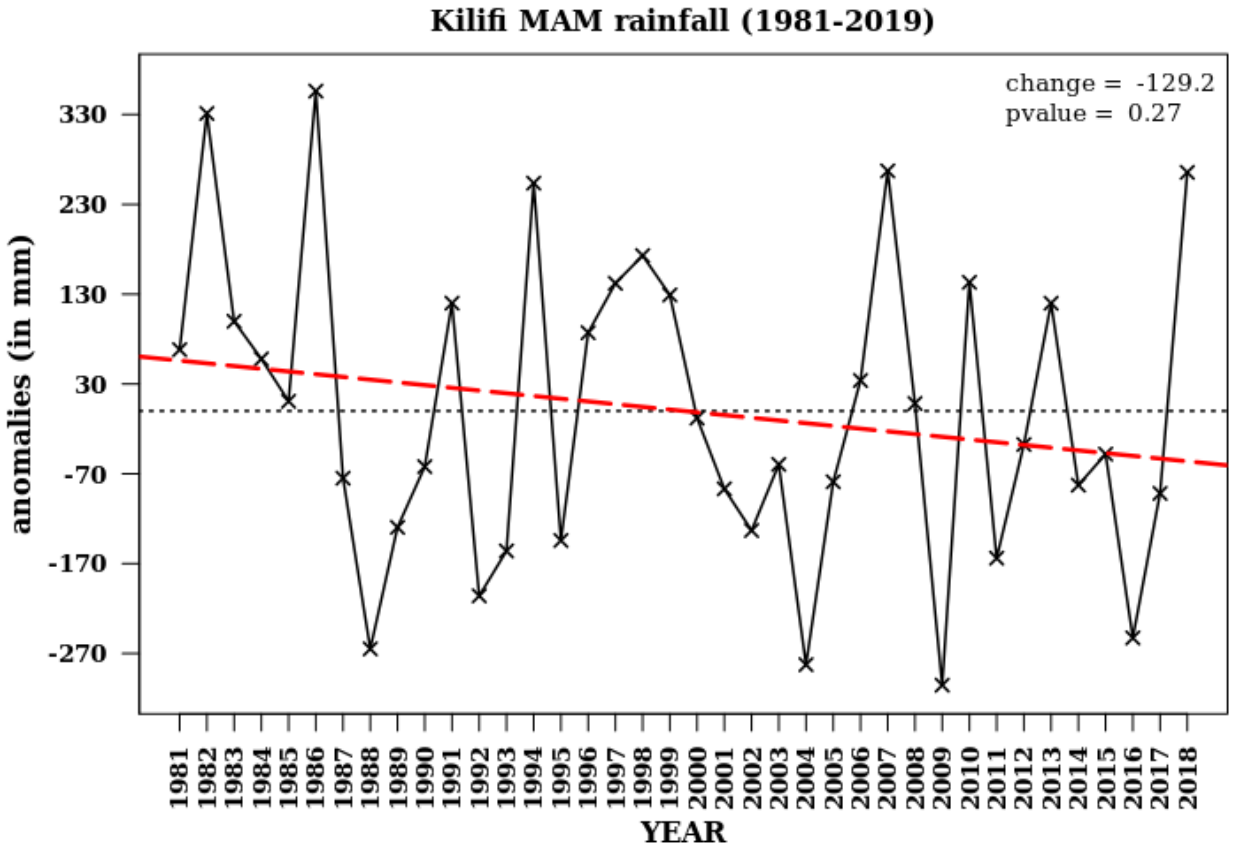
of food insecurity, starvation, and reliance on emergency relief that has been repeated in the County every year since 2013. At the same time, Kilifi County is experiencing increasingly worse and more frequent flooding. In 2015, the County was subjected to the worst floods in more than 20 years. Six seasonal rivers burst their banks and affected more than 3,000 people, especially in the Magarini Sub-County.

Droughts and floods are expected to pose even greater challenges in the coming years, as future projections predict increasing drought risk in First Season (January-June) and increasing flood risk in Second Season (July-December). Rainfall data from the historical period (1977–2005) were compared with those in the future period (2071–2099) to determine the potential changes in the rainfall patterns. Results showed high year-to-year rainfall variability, relatively low mean daily rainfall per season, high variability within seasons and uneven distribution of rainfall within seasons. Besides, rainfall over Kilifi seemed to be unevenly spread. These statistics, coupled with a relatively small mean daily precipitation per season, imply an uneven temporal distribution of rainfall. Such variability is already affecting the area under crop cultivation, production intensity and yields.

Kilifi MAM Rainfall from 1981 to 2019

The line graph provided shows the deviations from the average rainfall experienced between March, April, and May from 1981 to 2019 in Kilifi County. This deviation experienced in these months has been declining over the past 3 decades. The greatest declines were experienced from 1986 to 1987, 1991 to 1992, 1994 to 1995, and 2008 to 2009.

The decrease in rainfall can be associated with the increase in the release of greenhouse gasses into the atmosphere which has resulted in climate change. With the decrease in rainfall experienced in these months, Kilifi County may face an increased risk of droughts, wildfires, and lowered crop yields which in turn may result in food insecurity.

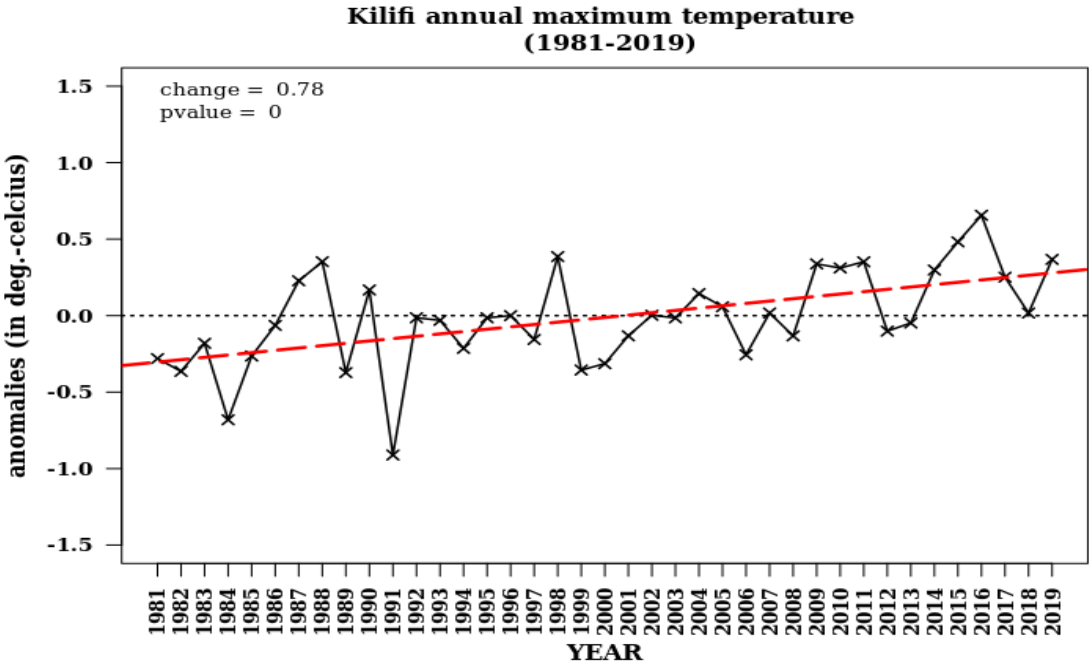


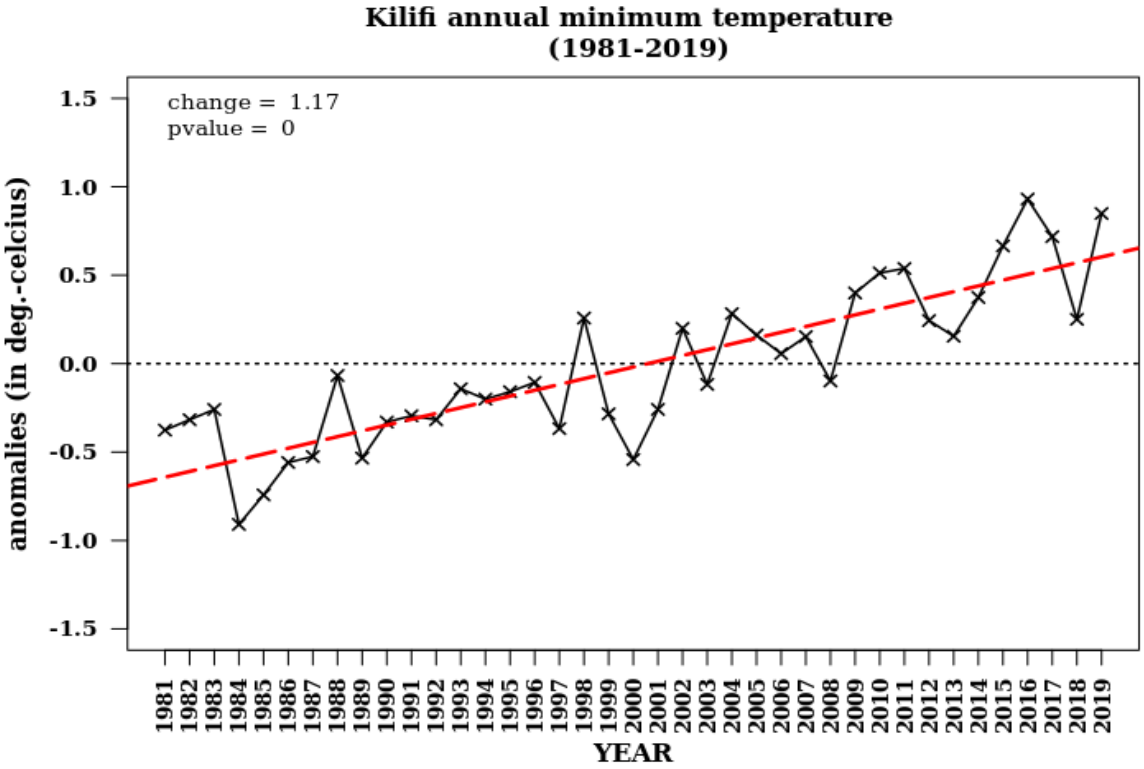
Kilifi OND Rainfall from 1981 to 2020

The line graph provided shows the deviations from the average annual rainfall experienced between October, November and December from 1981 to 2019 in Kilifi County. The deviation experienced in these months has been increasing steadily. However, there are notable declines in the anomalies experienced in 1982 to 1983, 1997 to 1998 and 2019 to 2020.

Temperature: Climate projections for the coastal region suggest that Kilifi County will become warmer than it used to be, posing risks to health, agriculture, water supply and associated sectors. By the 2040s, temperatures may become up to 3°C higher on average than current conditions, with extremely hot days and widespread heat waves becoming much more frequent. Kilifi County is already experiencing abnormal extreme temperatures in the month of March with the highest recorded temperature being 34° C. Since the early 1960s, Kilifi County air temperatures have increased by 2-3°C while no extreme low temperatures have been recorded over the same period.

Kilifi Maximum and Minimum Temperature from 1981 to 2019





According to the graphs provided, there has been a statistically significant steady increase in both maximum and minimum temperature. The maximum temperature has increased by about a mean of 1.3°C across the 38-year period whereas the minimum temperature has decreased by an approximate mean of 1.1°C for the same time period above the

annual average. From 2018 to 2019 both the maximum and minimum temperature increased by about 0.5°C from the annual average.

This increase in temperatures is likely due to the impact of climate change and has further possible impacts such as; frequent and severe heat waves, increased risk of wildfires as well as droughts, negative changes in crop yields, rise in the sea level, and the increased risk of vector-borne diseases such as dengue fever and malaria.

3.2 Likely future Impacts

The projected increase in rainfall intensity especially for the short rains season will most likely lead to more floods in the low-lying areas, increased droughts and food insecurity especially in Ganze and Magarini sub counties and salt water intrusion affecting farms along the Indian Ocean. The predicted increase in temperatures will likely present a more conducive environment for breeding of disease vectors and pests and diseases hence increased pests and diseases. The exposure and vulnerability of the key groups to these climate scenarios vary between various segments of the community as explained below:

Crop Farmers and livestock keepers: Households who rely mostly on subsistence farming are likely to be more affected by the projected climate conditions. For example, if rainfall patterns become highly erratic and extreme rainfall events increases,

it will likely negatively affect crops in the farms and timing of farm operations. A more serious problem however may be increased incidence of new pests and diseases as a result of increase disease vectors such as mosquitoes for malaria and crop pest such as fall army worms and army warms as witness in the recent past. On the other, likely increase in rainfall for short season presents an opportunity for planting in the second season. Increased temperatures will likely cause heat stress in livestock that may lead to reduced reproduction, growth rate and milk production. Livestock farmers may also suffer reduced productivity due to seasonal reduction in fodder and water for livestock during dry seasons.

Fisher folks: Climate change also poses a significant threat to fisheries in the county. High temperatures will likely make inshore water habitats unsuitable for fish, bleaching of coral reefs, thereby disrupting their health and diminishing their protective role of the coastlines. Conversely, increases in rainfall will trigger contamination of the coral reefs. Global warming will also alter the growth rate of seagrass and ocean upwelling thus reducing productivity of fish. Worse still, as sea level rise, low lying coastal areas are will likely be inundated with saltwater causing salt stresses on fish. Taken together, these effects will have a negative impact on the fishing community in Kilifi County.

Small scale traders: Small scale traders who rely on farm produce will be affected by reduced yields. Similarly, because of extreme rainfall events that are likely to increase in frequency, duration and intensity, infrastructure such as roads and bridges may be destroyed which will make it difficult for goods to reach the market.

Women, Elderly and Children: Women will likely be affected more due to the gender roles such as responsibility for fetching water for households. Skewed lands access rights limits women's capacity to invest in land and agricultural enterprises. Similarly, because of the projected weather extremes, expectant mothers may be more exposed to human diseases such as malaria as their immune system is weak. Old age and associated health complications hampers ability to cope with climatic hazards and their impacts. Similarly, children may likely suffer more due to high incidences of vector borne diseases such as malaria and water borne diseases such as amoebiasis, cholera and other diarrheal diseases due to their weak immune system.

4.0 EXISTING ADAPTATION STRATEGIES

4.1 Effectiveness of adaptation strategies against current hazards

Various actors including government, Civil Society organizations (CSOs) and communities have been implementing various actions to deal with the impacts of climate change. Examples of such strategies include establishment and strengthening of climate change governance structures at county and community levels, capacity building and awareness raising, putting in place a legislative framework and implementation of climate change resilience investments in various wards. These strategies are aimed at supporting livelihood pursued by majority of the population such as crop farming, livestock keeping, trade among others.

Prolonged dry spells and erratic rainfall patterns are currently addressed by rainwater harvesting, digging of shallow wells, fetching water from springs, streams and rivers. In Agricultural sector, crop rotation, small holder irrigations, cover cropping, diversification of livelihoods, intercropping, planting of early maturing crop varieties and drought tolerant crops such as cassavas, sweet potatoes are also practiced to evade impacts of dry spells.

Indigenous knowledge and traditional weather forecasting are applied to address challenges associated with unreliable erratic rainfall. Pests for example are handled by application of ash, powder soaps and handpicking while some farmers apply commercial pesticides.

Extreme weather event such as floods and high temperature provide conducive environment for vector borne diseases e.g., mosquitoes that are addressed by use of mosquito nets and environmental sanitation. Flooding and flash floods on the other hand are addressed by digging of trenches, evacuation to higher grounds and improvement of urban drainage systems.

Mainstreaming of climate change strategies in all sector hazards can be more effective in addressing climate related impacts. Adequate extension services promote adoption of climate smart strategies further increase the uptake and effectiveness of these strategies.

4.2 Effectiveness of adaptation strategies against future hazards

Prolonged dry spell leading to depletion of water, pasture and browse conditions for livestock: The likely future hazard scenario is that we will have increased frequency and duration of long dry spells that may lead to severe drought conditions with increased acute water shortages and increased food and nutritional insecurity. The choice of our adaptation strategies involving rain water harvesting and ground water structures have to be improved to cope with the extreme and potential disastrous future emergencies. Our coordination mechanism involving both the National and County Government as well as partners and communities have to be strengthened further to save lives and livelihood. Adaptation strategies that have worked well now could be up-scaled and utilized in the likely future hazard scenarios as more as we invest also into more research on emerging technologies for improved water, food security and other livelihood options.

Erratic rainfall pattern with poor temporal and spatial distribution: Erratic rainfall projection both in space and time increases vulnerability and severity to drought affecting main livelihoods in the county. Adaptation strategies**:** Investment into improved water harvesting and ground water structures, climate smart agriculture, afforestation and re-afforestation strategies along with other new strategies have to be deployed to maximize potential for rain water harvesting and improvement of the ground water potential to maintain a healthy hydrological balance. Accuracy of the seasonal forecast and early warning bulletin information from Kenya Meteorological Department and National Drought Management Authority have to be improved to enhance community's future level of preparedness to the likely future hazard scenarios involving erratic rainfall patterns.

Human-wildlife conflict over scarce water and pasture conditions experienced mostly around protected areas: Human-wildlife conflict prevalence to increase affecting both lives and livelihoods of communities bordering protected areas and this calls for improvement in better adaptation strategies in the likely future hazard scenarios. Adaptation strategies on restoration of forest habitat, capacity building of the communities on conservation education and compensation of communities have to be improved in the likely frequent future hazard scenarios involving human-wildlife conflicts. Increased synergy and collaboration of all stakeholders working in the conservation of our biodiversity for both flora and fauna is extremely important knowing very well that conservation is now moving out of protected areas. As such, conservation easements and community conservancies will most likely take precedence in future.

Increase in average temperature created environment for vector borne livestock and human diseases: Human and livestock diseases expected to increase with increase in temperature as projected by 2050 emission scenarios. Improvement in the current adaptation strategies involving establishment of livestock laboratory and veterinary services, promotion of participatory rangeland management, mass vaccination

of livestock, equipping of health center with drugs have to be done along with new medical researches on human and livestock diseases.

Torrential rainfall with short duration with increased intensity causes floods: Unpredictable and increased torrential rains with high intensity expected to worsen hence affecting lives and livelihoods of communities. In the likely future flush floods hazard scenario, improvement in the timely early warning disseminations, proper land management, capacity building of communities need to be adequately supported and strengthened. Improvement in climate science and hazard predictions needs to be explored. Collaboration with IGAD Centre for Climate Science other regional bodies working on climate related matters needs be strengthened to increase our coping mechanism to rapidly likelihood of future climatic scenarios.

5.0 SECTOR STRATEGIC PRIORITY AREAS

I. DROUGHT

	SECTOR	RISKS	CAUSE	INTERVENTIONS	WARD
1.	Agriculture	Food insecurity	Unreliable and low rainfall	Adopt climate smart agricultural technologies.	Kaloleni, Mariakani, Mwanamwinga, Kayafungo,Rabai-Kisurutini, Mwawesa,Kambe-Ribe,Ruruma, Shimo la Tewa, Mtepeni, Junju, Mwarakaya,Chasimba, Malindi Town,Shella,Ganda,Jilore, Jaribuni, Sokoke, Ganze, Bamba, Sabaki, Adu, Garashi, Tezo, Dabaso, Matsangoni, Sokoni, Watamu, Mnarani, Kibarani, Gongoni, Magarini, Marafa
				Capacity building on agroforestry	
				Adoption of drought resistant livestock	
			Spoilage of harvested food	Provision of proper food storage facilities	
			Low crop yields	Diversification of crop varieties	
				Capacity building on smart and modern farming practices	
				Establishment of Farmer Field Schools (FFS)	
			Poor crop production	Implement Kitchen gardening	
		Loss of livelihoods	Low rainfall	Promotion of Aqua- culture, bee keeping and poultry.	
		Low income earnings		Product value addition of the	

				common value chains	
				Creation of a functional community marketing organization	
				Access to affordable financial services for farmers	
				Creation of agro processing plants	Chasimba, Mwarakaya, Tezo, Matsangoni, Marafa, Sokoke, Kambe-Ribe, Kaloleni,Dabaso, Kakuyuni, Jilore, Magarini, Junju, Mwawesa
				Revival and creation of agricultural cooperatives.	
		Insufficient livestock feeds	Lack of storage for fodder and hay	Promote pasture farming, Construction of pasture and storage facilities	Ganze, Bamba, Sokoke, Adu, Chasimba, Mwarakaya, Garashi, Magarini, Jaribuni, Gongoni
		Overgrazing	Unsustainably large number of livestock	Destocking and heard improvement	
			Influx of headers from neighboring counties	Adoption of pasture farming	
		Reduced income for dairy farmers	Lack of milk storage facilities	Establishment of milk production units	Ganze, Bamba, Sokoke, Adu, Chasimba, Mwarakaya, Garashi, Magarini, Jaribuni, Gongoni
				Purchase of milk value addition machines	
		Death of livestock	Lack of water and feeds	Introduction of off-take programs	
2.	Environment	Environmental degradation	Deforestation	Sensitization and empowerment of community groups on environmental issues	Kaloleni, Mariakani, Mwanamwinga, Kayafungo,Rabai-Kisurutini, Mwawesa,Kambe-

				Establishment of tree nurseries	Ribe,Ruruma, Shimo la Tewa, Mtepeni, Junju, Mwarakaya,Chasimba, Malindi Town,Shella,Ganda,Jilore, Jaribuni, Sokoke, Ganze, Bamba, Sabaki, Adu, Garashi, Tezo, Dabaso, Matsangoni, Sokoni, Watamu, Mnarani, Kibarani, Gongoni, Magarini, Marafa
				Tree growing activities in Schools and other public land	
				Rehabilitation of degraded land such as quarries	
				Training and equipping of forest guards	
				Reforestation of Kayas	Kayafungo, Kaloleni, Kambe-Ribe, Mwarakaya, Chasimba, Jaribuni,
				Protection of water catchment areas through community groups	Ganze, Bamba, Sokoke, Kaloleni, Mwarakaya, Chasimba
				Mangrove restoration	Shimo la Tewa, Mtepeni, Junju, Mnarani, Watamu, Matsangoni, Tezo, Sokoni Jaribuni, Shella, Magarini, Sabaki
				Increased adoption and clean cooking technology	Kaloleni, Mariakani, Mwanamwinga, Kayafungo,Rabai-Kisurutini, Mwawesa,Kambe-Ribe,Ruruma, Shimo la Tewa, Mtepeni, Junju, Mwarakaya,Chasimba, Malindi Town,Shella,Ganda,Jilore, Jaribuni, Sokoke, Ganze, Bamba, Sabaki, Adu, Garashi, Tezo, Dabaso, Matsangoni, Sokoni, Watamu, Mnarani, Kibarani, Gongoni, Magarini, Marafa
				Increased adoption of clean cooking energy	
				Capacity building of technicians on clean cooking technology	
		Increased release of greenhouse	Poor solid waste management	Establishment of waste segregation yards.	Shimo la Tewa, Mtepeni, Sokoni, Watamu, Matsangoni, Malindi

		gases into atmosphere		Research and development of climate smart use of bio-degradable materials	Town, Shella, Sabaki, Bamba, Kaloleni, Mariakani, Mazeras
				Training and sensitization on circular economy	
				Construction and establishment of bio-digesters.	
				Commissioning of waste to energy projects.	
3.	Water	Reduced water for domestic use	Lack of sufficient water storage facilities	Installation of garters and tanks for water harvesting	Kaloleni, Mariakani, Mwanamwinga, Kayafungo, Rabai-Kisurutini, Mwawesa, Kambe-Ribe, Ruruma, Shimo la Tewa, Mtepeni, Junju, Mwarakaya, Chasimba, Malindi Town,Shella,Ganda,Jilore, Jaribuni, Sokoke, Ganze, Bamba, Sabaki, Adu, Garashi, Tezo, Dabaso, Matsangoni, Sokoni, Watamu, Mnarani, Kibarani, Gongoni, Magarini, Marafa
				Drilling of community boreholes	
				Construction and maintenance of water pans	
				Solarization of boreholes	
		Reduced water for irrigation	Drying up of water bodies such as water pans	Construction of dams for irrigation	Chasimba, Jilore, Mwarakaya,
4.	Wildlife	Human-wildlife Conflict	Lack of sufficient pasture and water	Sensitization on dynamics of human and wildlife conflicts	Sokoke, Adu, Ganda, Bamba, Ganze, Ganda, Jilore, Kibarani, Sokoke, Mwanamwinga
				Creation of community	

				governance structures	
5.	Fisheries	Unsustainable fishing	Lack of alternative sources of fish	Capacity building on commercial fish rearing	Chasimba, Mwarakaya, Kaloleni, Mariakani, Rabai-Kisurutini, Mwawesa, Kambe-Ribe, Ganze, Jaribuni, Sokoke, Magarini.
				Use of sustainable fishing methods	Shimo la Tewa, Mtepeni, Junju, Mnarani, Watamu, Matsangoni, Tezo, Sokoni Jaribuni, Shella, Magarini, Sabaki
			Spoilage of fish	Improvement of Marketing infrastructure	
				Creation of functional Fish processing plants	
				Purchase of Value addition equipment	
				Functional marketing organizational	
				Enhancing Fisher folk access to markets	
				Farmers accessing financial services	
				Creation of Effective fisheries community governance structures and cooperatives	

Table 5: Sector Priority Actions on Drought

II. FLOODS

	SECTOR	RISK	CAUSE	INTERVENTION	WARD
1.	Housing	Destruction of lives and property	Settlement of people in flood areas	Mapping and zoning of the floods prone areas to guide human habitation.	Mtepeni, Shimo la Tewa, Sokoni, Mariakani, Shella
				Construction of Soak pits	
				Contruction of terraces	

				Building gabions	
2.	Environment	Bursting of river banks	Clearing of riverine vegetation.	River bank protection by tree planting, building of terraces, gabions and soil cover crop.	Sabaki, Jilore, Kakuyuni, Ruruma
			Sand mining on river banks		
		Soil erosion	Lack of soil cover crop	Riverine protection	Bamba, Ganze, Mwanamwinga, Kaloleni, Ruruma, Jilore, Sabaki, Mwarakaya, Chasimba, Junju, Mtepeni, Sokoni, Mnarani, Kibarani, Tezo, Matsangoni, Watamu, Malindi Town, Shella, Kakuyuni, Sokoke, Marafa, Magarini, Adu, Garashi.
				Construction of terraces	

Table 6: Sector Priority Actions on Floods

III. EMERGING HUMAN DISEASES

	SECTOR	**RISK**	**CAUSE**	**INTERVENTION**	**WARD**
1.	Health	Outbreak of emerging diseases	Declining environmental conditions	Quarry rehabilitation program in the affected wards.	Tezo, Sokoni, Dabaso, Watamu, Mnarani, Shimo la Tewa, Shella, Malindi Town, Sabaki, Mariakani, Kaloleni, Rabai-Kisurutini,
2.	Water		Comprised water standards	Construction of waste water treatment infrastructure.	
				Household water treatment facilities distributed at household level	

			Stagnant water	Construction of drainage systems.	Kibarani, Mtepeni
				Promotion and construction of climate smart community sanitation facilities	

Table 7: Sector Priority Actions on Emerging Human Diseases

IV. CROP/ANIMAL PESTS AND DISEASES

	SECTOR	RISK	CAUSE	INTERVENTION	WARD
1.	Livestock	Death of livestock	Pests and diseases emergence	Floods harvesting by construction of dams in floods prone areas to enhance water for other uses and control vector breeding	Dabaso, Watamu, Mwarakaya, Chasimba, Adu, Garashi, Marafa, Magarini, Sabaki, Kayafungo, Rabai-Kisurutini, Kambe-Ribe, Kaloleni, Mwawesa
2.	Agriculture	Low crop yields	Pests and diseases emergence	Promotion of climate smart agriculture in high pests and diseases prone areas e.g. advocating for conservation agriculture to farmers	

Table 8: Sector Priority Actions on Crop/Animal Pests and Diseases

6.0 CONCLUSION AND RECOMMENDATIONS

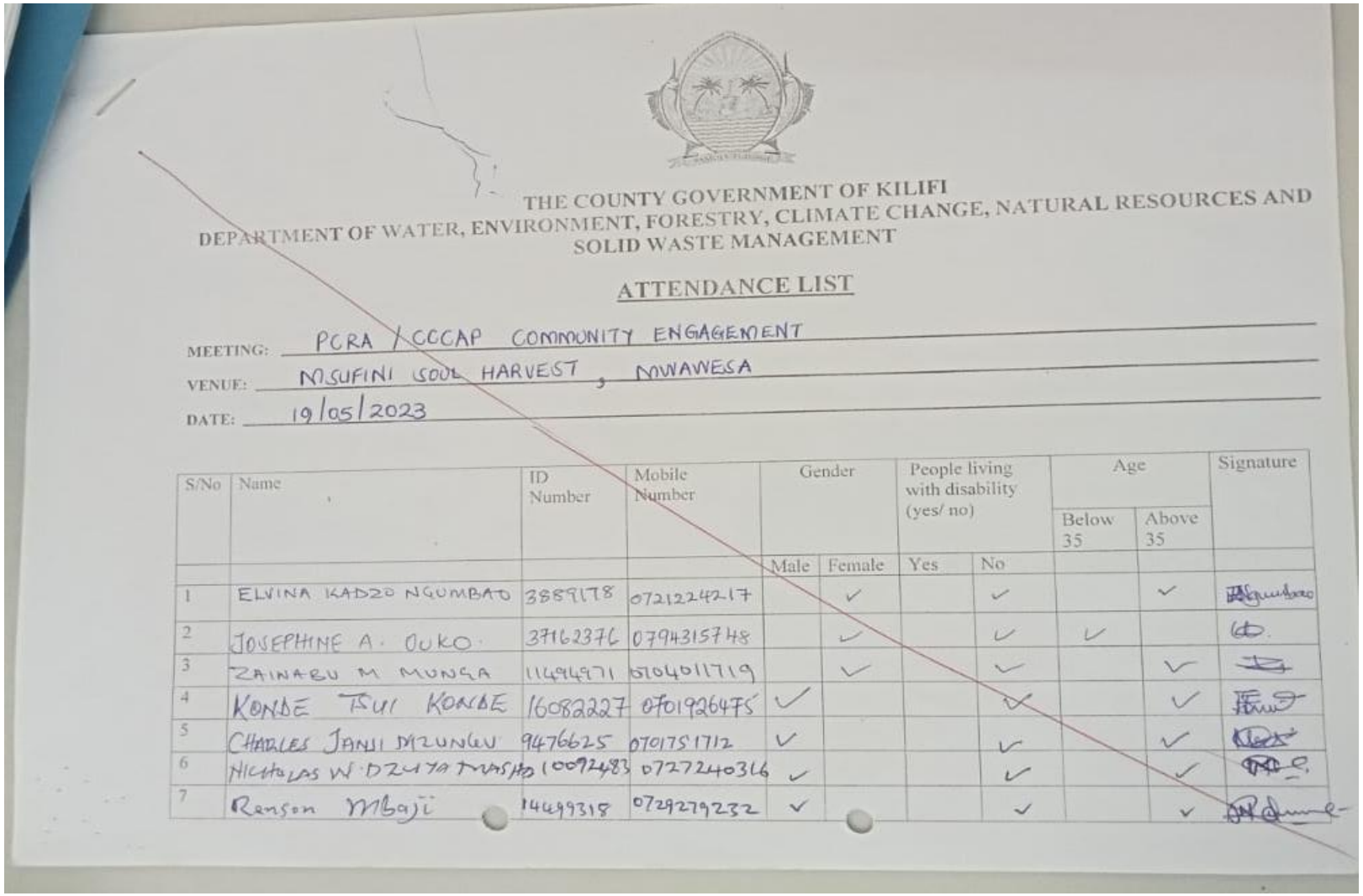
The Participatory Climate Change Risk Assessment is a community engagement process where the community from different ages, gender, affiliations and backgrounds were involved. The engagements were instrumental in building the historical trends, identifying hazards, risks, shocks, impacts and possible interventions related to climate change. The assessment further, identified each ward uniquely and at different risk levels. Though, there were similarities between wards, notably their uniqueness makes the wards interventions different towards climate hazards, risks, shocks and impacts. The outcome of the process presented each ward with a climate hazard map, a historical trend and priority climate adaptation strategies for climate change interventions.

Kilifi County's economy is highly dependent on rain fed agriculture, fisheries, small scale trade and exploitation of our existing natural resources across the county such as sand, coral blocks, forests, ballast and building stones. As a result, the economy is highly exposed to climate risks including prolonged drought, storm surges, floods in low lying areas, emerging pests and diseases, strong winds, high intertidal rise, hydrological droughts in water sources e.g., wells, dams and boreholes drying. These hazards coupled with human activities such as deforestation, unsustainable sand harvesting, encroachment of riparian zones and destruction of catchment areas further compounds the impacts on people and the environment.

In effort to address the climate risks, various actors both state and none state actors are already implementing a number of climate change response actions. The national government through the different state departments are doing different interventions in Kilifi County. Kenya Forest Service is leading a campaign for the 15 billion tree planting, National Drought Management Authority is implementing water projects in Kilifi in the efforts to increase water access to the community, Kenya Highway Authority (KenHA) building Mtwapa -Kilifi Highway are planting trees along the highway as a way greening the road but at the same time adapt to the changing climate. County government of Kilifi is promoting climate smart projects in agriculture, environment, tourism, health and across all other departments. The Civil Society Organizations (CSOs) and local communities are also implementing a number of climate change responsive projects. Notably, there efforts are currently and largely disjointed at the same time achieving much though in silos. Green umbrella community-based organization in Magarini is implementing a carbon trade project supported by the Arsenal English premier league team in England, World vision are implementing a project of carbon through tree/crop value chains. Gro with Us organization is promoting the planting of mangrove in Kidundu village at Kilifi creek for carbon ambitions. Innovations like the Samaki cookies from the local community promote the enhancement of the cassava value chain at the same time promoting fish as a main ingredient. The overall impact from the resilience building efforts will be achieved maximum when each level of government actors and none government actors are coordinated and have a shared vision to address the challenges that come with the climate change impacts.

Lastly, the main and common adaptation and mitigation strategies across sectors include protection of catchment areas, promotion of climate smart agriculture, capacity building, strengthening early warning systems and strengthening disaster management institutional framework. The need to have all efforts coordinated is paramount and treat each climate adaptation and mitigation project as an investment towards climate change. This definitely necessitate the need to have Kilifi County climate change investment strategy to guide, control and check on any investment that address the impacts of climate change. This will quantify the milestones each investment will have in addressing climate change and their impacts in the short and long time.

Annex 1: Sample PCRA/CCAP Ward Attendance Lists

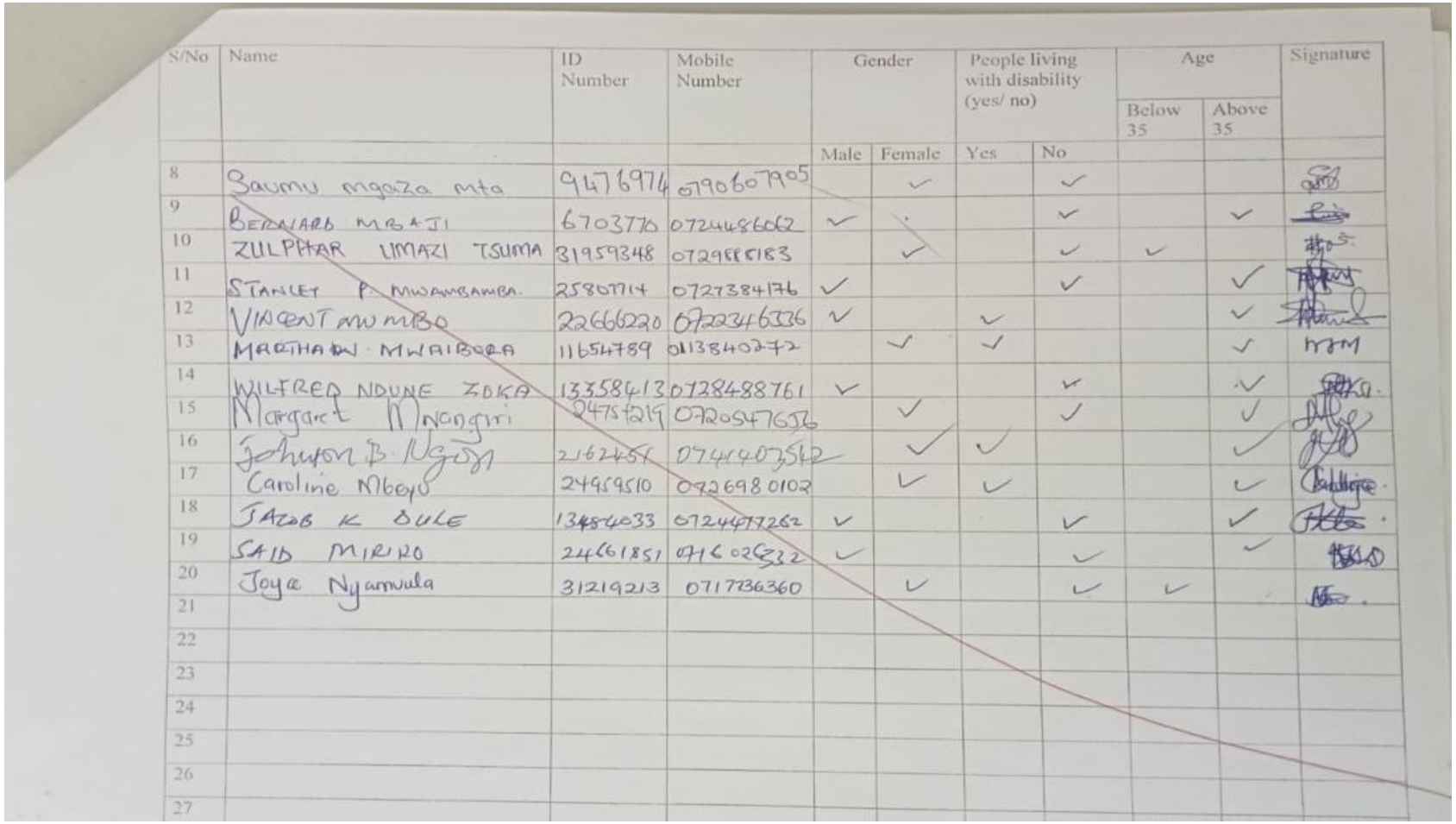


THE COUNTY GOVERNMENT OF KILIFI
DEPARTMENT OF WATER, ENVIRONMENT, FORESTRY, CLIMATE CHANGE, NATURAL RESOURCES AND SOLID WASTE MANAGEMENT

ATTENDANCE LIST

MEETING: PCRA / CCCAP COMMUNITY ENGAGEMENT
VENUE: MSUFINI SOUL HARVEST, MWAWESA
DATE: 19/05/2023

S/No	Name	ID Number	Mobile Number	Gender		People living with disability (yes/ no)		Age		Signature
				Male	Female	Yes	No	Below 35	Above 35	
1	ELVINA KADZO NGUMBAO	3889178	0721224217		✓		✓		✓	
2	JOSEPHINE A. OUKO	37162376	0794315748		✓		✓	✓		
3	ZAINABU M MUNGA	11494971	0104011719		✓		✓		✓	
4	KONDE TSUI KONDE	16082227	0701926475	✓			✓		✓	
5	CHARLES JANI MZUNGU	9476625	0701751712	✓			✓		✓	
6	NICHOLAS W. DZUYA MASHA	10092483	0727240316	✓			✓		✓	
7	Renson Mbaji	14499318	0729279232	✓			✓		✓	



S/No	Name	ID Number	Mobile Number	Gender		People living with disability (yes/ no)		Age		Signature
								Below 35	Above 35	
				Male	Female	Yes	No			
8	Saumu mgaza mta	9476974	0790607905		✓		✓			
9	BERNARD MBAJI	6703770	0724486062	✓			✓		✓	
10	ZULPHAR LIMAZI TSUMA	31959348	0729885183		✓		✓	✓		
11	STANLEY P. MWAMBAMBA.	25807714	0727384176	✓			✓		✓	
12	VINCENT MWMBO	22666220	0722346336	✓		✓			✓	
13	MARTHA W. MWAIBORA	11654789	0113840272		✓	✓			✓	
14	WILFRED NDUNE ZOKA	13358413	0728488761	✓			✓		✓	
15	Margaret Mnongiri	24754219	0720547616		✓		✓		✓	
16	Johnson B. Ngoji	21624561	0744407542		✓	✓			✓	
17	Caroline Mboyo	24959510	0726980102		✓	✓			✓	
18	JACOB K DULE	13454033	0724477262	✓			✓		✓	
19	SAID MIRRO	24661851	0716026322	✓			✓		✓	
20	Joyce Nyamwula	31219213	0717736360		✓		✓	✓		
21										
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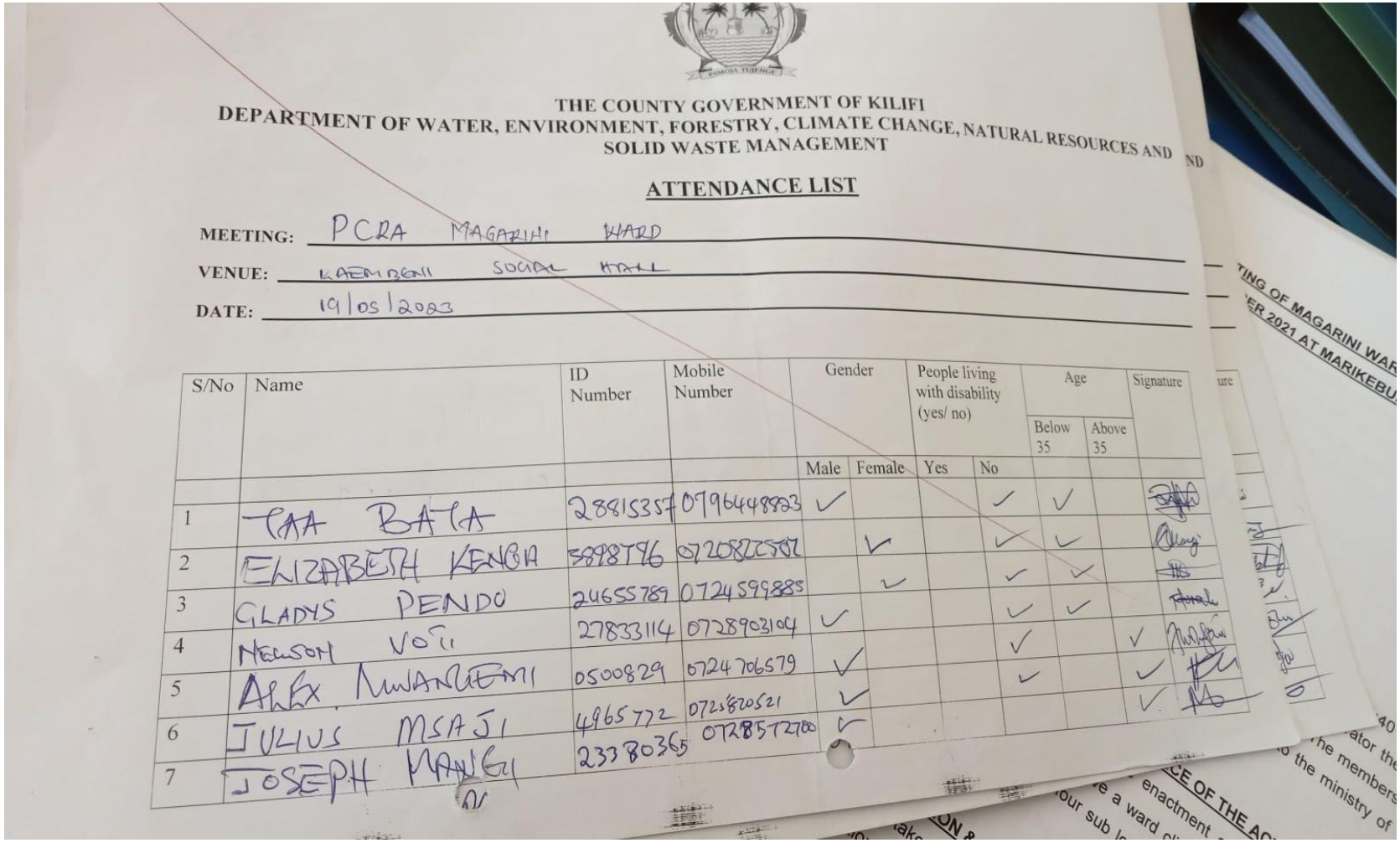
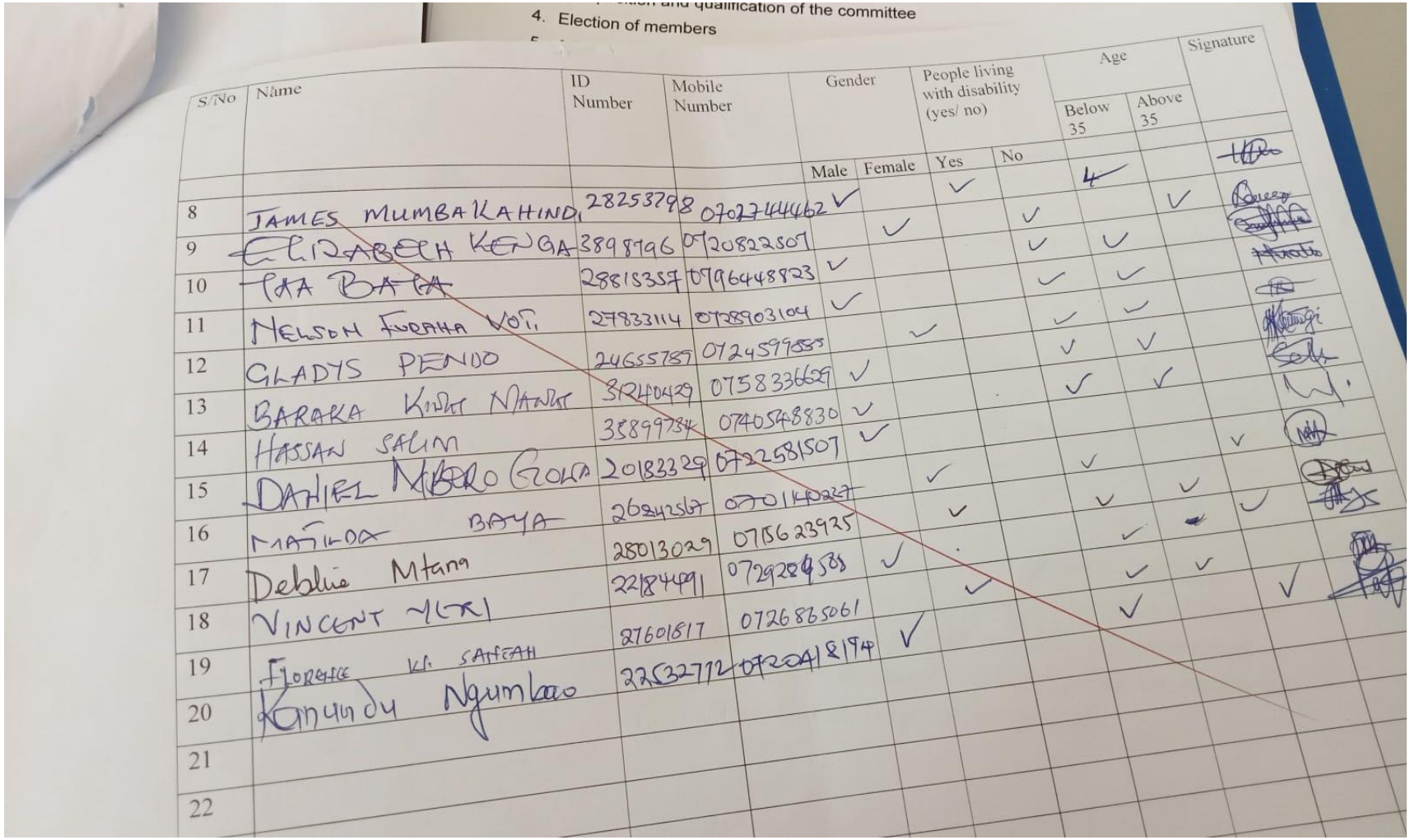


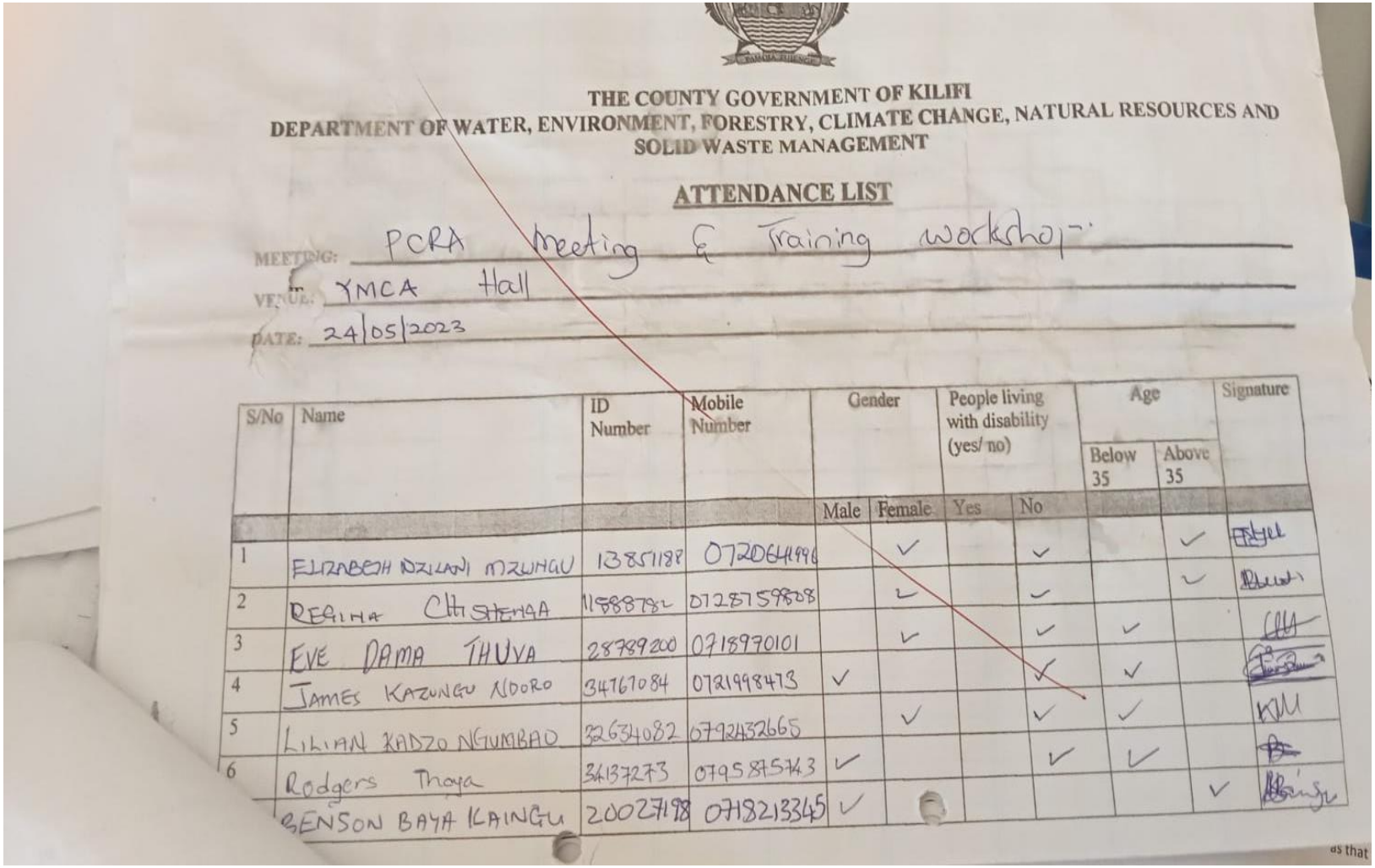
THE COUNTY GOVERNMENT OF KILIFI
DEPARTMENT OF WATER, ENVIRONMENT, FORESTRY, CLIMATE CHANGE, NATURAL RESOURCES AND ND
SOLID WASTE MANAGEMENT

ATTENDANCE LIST

MEETING: PCRA MAGARINI WARD
VENUE: KAEMBENI SOCIAL HALL
DATE: 19/05/2023

S/No	Name	ID Number	Mobile Number	Gender		People living with disability (yes/ no)		Age		Signature
				Male	Female	Yes	No	Below 35	Above 35	
1	CAA BAYA	28815357	0796448823	✓			✓	✓		
2	ELIZABETH KENGA	5898796	0720822582		✓		✓	✓		
3	GLADYS PENDO	24655789	0724599885		✓		✓	✓		
4	NELSON VOI	27833114	0728903104	✓			✓		✓	
5	ALEX MWANGEMI	0500829	0724706579	✓			✓		✓	
6	JULIUS MSAJI	4965772	0725820521	✓					✓	
7	JOSEPH MANGA	23380365	0728572700	✓						


4. Election of members
S/No
Name
ID Number
Mobile Number
Gender
Male
Female
People living with disability (yes/ no)
Yes
No
Age
Below 35
Above 35
Signature
8 JAMES MUMBA KAHINDI 28253798 0702744462
9 ELIZABETH KENGA 3898796 0720822507
10 PAA BAYA 28818357 0796448823
11 NELSON FUDAHA KOTI 27833114 0728903104
12 GLADYS PENDO 24655787 0724599885
13 BARAKA KINDI MANJI 31240429 0758336629
14 HASSAN SALIM 35899734 0740548830
15 DANIEL MBERO GOLA 20183329 0722581507
16 MATILDA BAYA 26242567 0701140247
17 Debbie Mtana 28013029 0715623925
18 VINCENT YERI 22184491 0729284585
19 FLORENCE KI. SAFEAH 27601817 0726865061
20 Kahindy Ngumbao 22532772 0720418194
21
22



THE COUNTY GOVERNMENT OF KILIFI
DEPARTMENT OF WATER, ENVIRONMENT, FORESTRY, CLIMATE CHANGE, NATURAL RESOURCES AND SOLID WASTE MANAGEMENT

ATTENDANCE LIST

MEETING: PCRA Meeting & Training workshop
VENUE: YMCA Hall
DATE: 24/05/2023

S/No	Name	ID Number	Mobile Number	Gender		People living with disability (yes/ no)		Age		Signature
				Male	Female	Yes	No	Below 35	Above 35	
1	ELIZABETH DZILANI MZUNGU	13857188	0720644996		✓		✓		✓	
2	REGINA CHISTEMBA	11888782	0728759808		✓		✓		✓	
3	EVE DAMA THUVA	28789200	0718970101		✓		✓	✓		
4	JAMES KAZUNGU NDORO	34767084	0721998473	✓			✓	✓		
5	LILIAN KADZO NGUMBAO	32634082	0792432665		✓		✓	✓		
6	Rodgers Thoya	34137273	0795875743	✓			✓	✓		
	BENSON BAYA KAINGU	20027198	0718213345	✓					✓	

as that

S/No	Name	ID Number	Mobile Number	Gender		People living with disability (yes/ no)				
				Male	Female	Yes	No	Below 35	Above 35	
8	EVE DAMA THUVA	28789200	0718970101		✓		✓	✓		[signature]
9	LILIAN KADZO NGUMBAO	326321082	0792432665		✓		✓	✓		[signature]
10	RODGERS THOYA	3437273	0795875743	✓			✓	✓		[signature]
11	BENSON BAYA KAINGU	20027198	0718213345	✓					✓	[signature]
12	George Kikami	14200893	0733465996	✓					✓	[signature]
13	JAMES KAZUNGU NDORO	34767084	0721998478	✓			✓	✓		[signature]
14	Sifa Hamson Kombe	23021438	0791160466	✓					✓	[signature]
15	PATRICK KABAH MUNGOMA	30535496	0717740198	✓			✓	✓		[signature]
16	Jael Colleen	36960446	0723049611		✓		✓	✓		[signature]
17	Lennox Mwangolo Douglas	23988384	0729711599	✓			✓			[signature]
18	Henry Kingi Karisa	2041236	0728[illegible]	✓			✓		✓	[signature]
19	Cosmas Kasina	13183997	0772699451	✓			✓		✓	[signature]
20	Hilldah Kahindi	34[illegible]2	0791392466		✓				✓	
21										
22										
23										