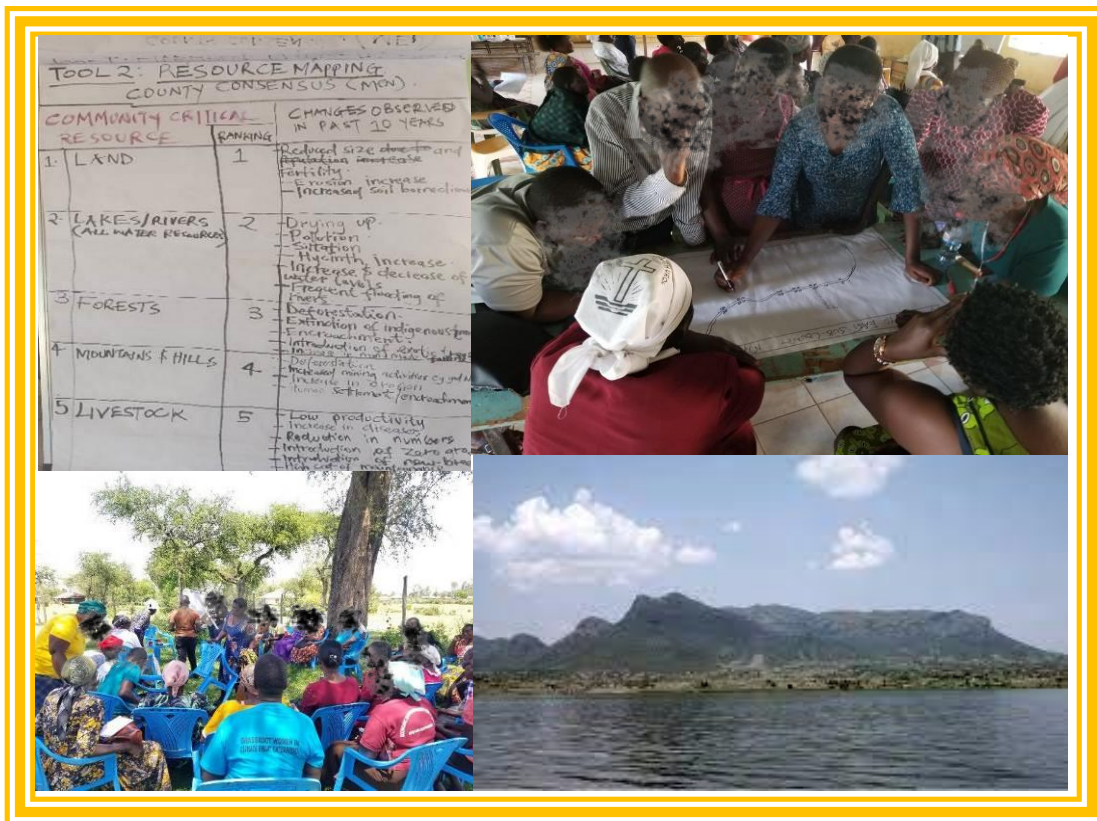

PARTICIPATORY ASSESSMENT OF CLIMATE AND DISASTER RISKS (PACDR) FOR JUSTICE AND MERCY (JAM) COMMUNITY INTEGRATED PROJECT IN HOMA BAY COUNTY

TRAINING AND ANALYSIS REPORT



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Acknowledgement

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The community on the one hand was truly resilient, enduring long hours of the whole 13-tools framework, we sincerely acknowledge their passion, dedication, and commitment. We also thank the community for freely sharing information with us, their rich knowledge of local issues and historical events have enabled us to build a rich report. We also acknowledge the support of key stakeholders that joined the PACDR process including representatives of county and national government and partner organizations who sent representatives to learn with the community on the process of PACDR, they altogether spiced the entire experience. The commendable work of the consultant would not be overstated. The team under the leadership of Dr. Calvince Ouko exhibited unique synergy and professionalism. This PACDR document is a testament of their commitment to help communities raise awareness, assess their climate change and disaster risks and to develop adaptation strategies in Homabay County and shall be a constant reminder of JAM community project to champion resilient communities from the vulnerabilities of climate change in Homabay County.

Executive Summary

Justice and Mercy (JAM) Community Integrated Project is a community Based organization founded in 1995 which promotes people-driven sustainable rural development through Food security and livelihoods, Integrated health, education and psycho-social support. The organization facilitates implementation, learning, networking and advocacy on sustainable agriculture and organic farming for improved livelihoods. Beneficiaries of JAM are drawn from rural poor farmers, women/widows and widowers, people living with HIV and AIDS, Various Key Populations, Youths and orphans drawn from currently 4 sub-counties of Homa Bay County. In this regard, JAM organised education sessions on Participatory Assessment of Climate and Disaster Risk (PACDR) with the community drawn from different villages within the four sub counties of their intervention with the help of the consultant. This report presented the outcomes of the PACDR orientation activities in four selected sub counties in Homa Bay county. Participants were chosen representatives of the communities that JAM has been working with through their interventions. A total of 297 were involved in the community PACDR orientation exercise and this included 94 men, 108 women, and 95 female and male youths. To build consensus on the overall outcomes for the four sub-counties, 15 persons from each of the four sub-counties were invited for a consensus building session on the last day of the orientation exercise. The communities actively engaged in the processes of identifying their resources, livelihoods, hazards and working to build their own adaptation roadmaps.

Some key outcomes of the PACDR orientation exercise are listed:

- i. Farming, livestock keeping, and business were the key community livelihoods, while droughts, floods and diseases were the key hazards/disasters facing the community. Moreover, land, water resources (rivers and lakes), forest and hills, were the highest ranked community resources.
- ii. Women, vulnerable groups, and children were the most impacted by all hazards in the community, however decision-making during disasters was not all inclusive as it should.
- iii. The community prioritised construction of water storage facilities/sinking of boreholes/building water storage facilities, irrigation, planting drought tolerant crops and agroforestry as the key adaption option for overcoming droughts and floods.
- iv. The modified PACDR framework with additional tools served to ease the process of adaptation roadmap building and also aided the community in exposing unique impacts that effect different segments of the community.

The exercise observed the following challenges and lessons learned.

- i. PACDR tools are often time-consuming and may keep participants seated long hours leading to the risks of reduced concentration and energy towards the end. However, the more interactive the process becomes (involving the community in facilitation, sketching, drawing, writing etc.) the more the interest, ownership, and richness in the quality of discussions and information received.

The following key recommendations are made by the consultant to JAM.

- i. Specific climate resilient interventions should focus on farmers and their farming practices/agricultural activities as the priority livelihoods identified by the community.
- ii. There is need to build capacity of the community to cope and mitigate droughts by investing in drought tolerant crops, water storage and conservation such as water pans, dam linings and tanks for enhancing irrigation and water storage which were identified by the community themselves.
- iii. While the community prioritise agroforestry and afforestation of degraded hills as methods of fighting drought and floods, the community might not be aware of sources of quality seed and adaptable species of trees and crops, there is need to have a coordinated sensitization program on good agroforestry practices, and possible empowerment to the community to have their own tree nurseries.
- iv. Youths and children were minimally included in decision making during climate hazards/disasters, there is need to empower and sensitize the community on the need to build an inclusive decision-making approach.
- v. The modified PACDR framework with additional tools (tool 6, 8, 9, and 10) is highly recommended for future PACDR exercises. The tools were not only useful in shaping the focus towards building the communities adaptation roadmap, but also helped reveal specific areas of hazards impacts to the community groups and how this has shaped their resilience building to climate change disasters.

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Definitions of Terms

Adaptation	An adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.
Climate change	A change in the climate system which is caused by significant changes in the concentration of greenhouse gases as a consequence of human activities and which is in addition to natural climate change that has been observed during a considerable period.
Global warming	The gradual increase observed or projected, in global surface temperature, as one of the consequences of climate change. The primary greenhouse gases that are measured in a GHG inventory are carbon dioxide (CO ₂), Methane (CH ₄), nitrous oxide (N ₂ O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), Sulphur hexafluoride (SF ₆) and nitrogen trifluoride (NF ₃).
Mitigation	The human interventions that seek to prevent or slow down the increase of atmospheric greenhouse gas concentrations by limiting current or future emissions and enhancing potential sinks for greenhouse gases.
Resilience	The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation (IPCC, 2014, AR5 Glossary).
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
Sustainable Development	The development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.
Green Economy	An economy that aims at reducing environmental risks and ecological scarcities as well as enhancing sustainable development without degrading the environment.
Indicators	A sign of progress /change that result from a project's intervention. It measures a change in a situation or condition and confirms progress towards achievement of a desired specific result. It is used to measure a project's impact, outcomes, outputs and inputs that are monitored during project implementation to assess progress.

List of Acronyms

UNFCCC	United Nations Framework Convention on Climate Change
IPCC	Intergovernmental Panel on Climate Change
AU	African Union
PACDR	Participatory Assessment of Climate and Disaster Risk
NAP	National Adaptation Plans
NAPA	National Adaptation Program Action
NCCAP	National climate Change Action Plan
NCCRS	National Climate Change Response Strategy
NDC	Nationally Determine Contributions
EAC	East African Community
JAM	Justice and Mercy (JAM) Community Integrated Project
KMD	Kenya Meteorological Department
MoAFL	Ministry of Agriculture, Fisheries and Livestock

Introduction

Climate change is the biggest environmental threat that humanity has ever faced (IPCC¹). Although the earth has undergone natural transformations over many years, humans, and their activities such as deforestation, industrialization and urbanization have caused the greatest transformation over the past few years². The risks associated with climate change are increasingly finding expression in rural poor households whose only level of livelihoods is subsistence farming and this has had disproportionate impacts on the most vulnerable of the communities including women, children, old persons and people living with disability. Kenya's vulnerability to climate change cannot be overstated with current projections suggesting that its temperature will rise up to 2.5°C by 2050³, while rainfall is likely to become more intense and less predictable. Notably, declining rainfall amount and reduced predictability will present significant challenge for food security and water availability, especially in Kenya's rural communities where rainfed agriculture persists. In practice, climate risk is assessed based on three variable factors of exposure and vulnerability to hazards. Vulnerability is a measure of the degree to which communities and their systems are susceptible to, and unable to cope with adverse impacts of climate change⁴. Figure 1 highlights the general framework of climate risk assessment and intervening factors. Essentially, assessing risk relies on assessing what hazards the communities are exposed to, based on their vulnerability. Thus, communities with poor economic empowerment and resource endowment or weaker institutions will potentially have weaker coping strategies and thus increased vulnerability to climate change risks. Building communities resilience to climate change must first address factor that build the communities ability to withstanding the impacts of climate i.e., increasing their adaptive capacity through capacity building, boosting levels of income and resource availability as well as enhancing institutional systems and networking. The Justice and Mercy (JAM) Community Integrated Project in Homa Bay undertook a Participatory Assessment of Climate and Disaster Risk assessment for the communities within their project intervention areas in Homa Bay and this report highlights the key findings.

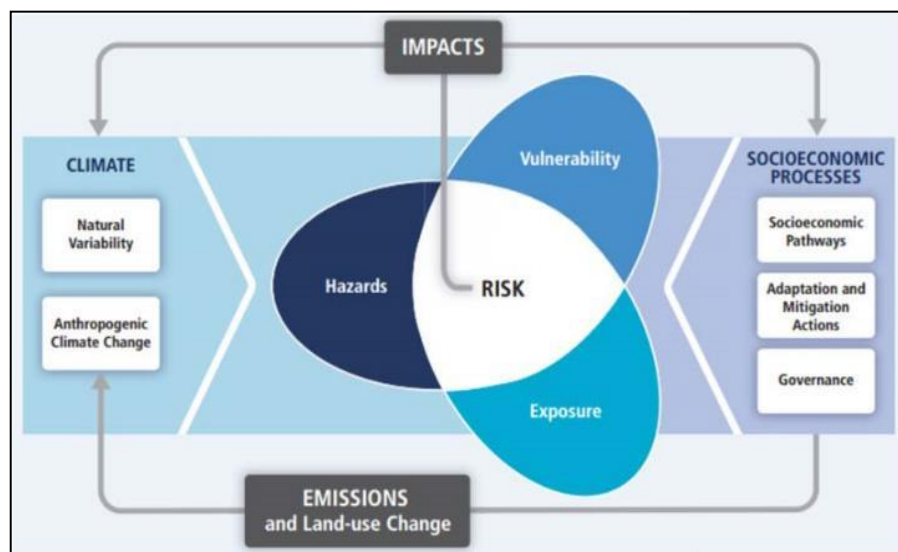


Figure 1: Climate risk assessment framework (Source ⁵CoastAdapt Intl.)

¹IPCC Sixth Assessment Report Fact Sheet 2021. https://www.ipcc.ch/site/assets/uploads/2022/02/AR6_Factsheet_2022_February.pdf.

² Lyon B. & Vigaud N. (2017). Unravelling East Africa's climate paradox. Climate extremes: Patterns and mechanisms. 15:265:281. DOI: <https://doi.org/10.1002/9781119068020.ch16>.

³ OCHA Relief Web (2022) Climate Change Profile: Kenya. https://reliefweb.int/sites/reliefweb.int/files/resources/Kenya_2.pdf

⁴ IPCC Sixth Assessment Report: <https://www.ipcc.ch/assessment-report/ar6/>

⁵ Coast Adapt: The adaptation Process. https://www.google.com/url?sa=i&url=https%3A%2F%2Fcoastadapt.com.au%2F2FC-CADS%2Fstep-2-assessing-risks-and-vulnerabilities&psig=AOvVaw3FbDdXxDBuH32g7dC20RSr&ust=1697658548056000&source=images&cd=vfe&opi=89978449&ved=0CBMQjhxqFwoTCPDhpYrt_YEDFQAAAAAdAAAAABAE

Geographical Context of Homa Bay County

The County of Homa Bay is located on the southwestern end of Kenya along the Lake Victoria basin and neighbours Migori, Kisii, Nyamira, Kisumu, and Siaya Counties while sharing the lake boundaries with the Kenyan neighbours of Tanzania and Uganda. The county covers an area of 4,267.1 Km² extending into Lake Victoria, Africa's largest freshwater lake, with a surface area of 1,227 Km² (about 30% the size of Kenya's lake Victoria)⁶. The County has a population density of 359.1/km². Ninety percent of the population lives in the rural areas while only 10 per cent of the population is found in urban areas. The county spans diverse agroecological zones ranging from the hot and dry lake belt regions to the relatively wet and humid midlands bordering highlands areas such as Kisii highlands. This rich agroecological characteristic provide an array of opportunities for diverse agricultural potential and practices with various crop grown ranging from dryland crops like millet and sorghum to highland crops like coffee. Despite these diverse agricultural opportunities, the county continues to experience complex and diverse climatic challenges owing to climate change that has increasingly threatened the agricultural base of the county which remains one of the backbone economic activities together with fishing – courtesy of the county's proximity to Lake Victoria. Administratively, the County is divided into 8 Sub-Counties namely, Rachuonyo North (Karachuonyo), Rachuonyo East (Kabondo Kasipul), Rachuonyo South (Kasipul), Rangwe, Ndhiwa, Homabay Town, Suba North and Suba South. The County is further divided into twenty-three divisions, forty wards, 140 locations and 265 sub locations.

Justice and Mercy (JAM) Community Integrated Project in Homa Bay County

Justice and Mercy (JAM) Community Integrated Project is a community Based organization founded in 1995 which promotes people-driven sustainable rural development through Food security and livelihoods, Integrated health, education and psycho-social support. The organization facilitates implementation, learning, networking and advocacy on sustainable agriculture and organic farming for improved livelihoods. Beneficiaries of JAM are drawn from rural poor farmers, women/widows and widowers, people living with HIV and AIDS, Various Key Populations, Youths and orphans drawn from currently 4 sub-counties of Homa Bay County namely Rachuonyo North, Rachuonyo East, Rachuonyo South and Rangwe (see Figure 2). JAM envision a just society where the rural poor have a voice through sustainable livelihood that takes into account emerging issues such as climate change.

To improve on agricultural production which is the main source of food, nutrition, and income among the rural communities of Homa Bay and its environs, consistent efforts must be put to address climate and climate change as a major factor in sustainable agriculture and

⁶ Britannica, The Editors of Encyclopaedia. "Lake Victoria". *Encyclopedia Britannica*, 1 Nov. 2023, <https://www.britannica.com/place/Lake-Victoria>. Accessed 19 November 2023

livelihoods. In Homa Bay County where 60% of economic activities are agriculture based and account for about 74% of total Gross Domestic Product (GDP), climate threats come at huge costs. Therefore, building communities' reliance to climate change and their capacity to assess, evaluate and build appropriate adaptation programs is the priority of JAM in its intervention area of Homa Bay. The capacity of households and communities to adapt to the changing climatic conditions depends on the strength of the natural, human, financial, social, and governance systems they rely on for their livelihoods. In some situations, these systems are too weak to deal with the consequences of climate change and other natural or human-made hazards.

In this regard, JAM organised education sessions on Participatory Assessment of Climate and Disaster Risk (PACDR) with the community drawn from different villages within the four sub counties of their intervention with the help of the consultant. With the ravages of climate change being a reality across the entire Homa Bay County, the four sub counties where JAM's interventions are targeted may be considered just as a pilot.

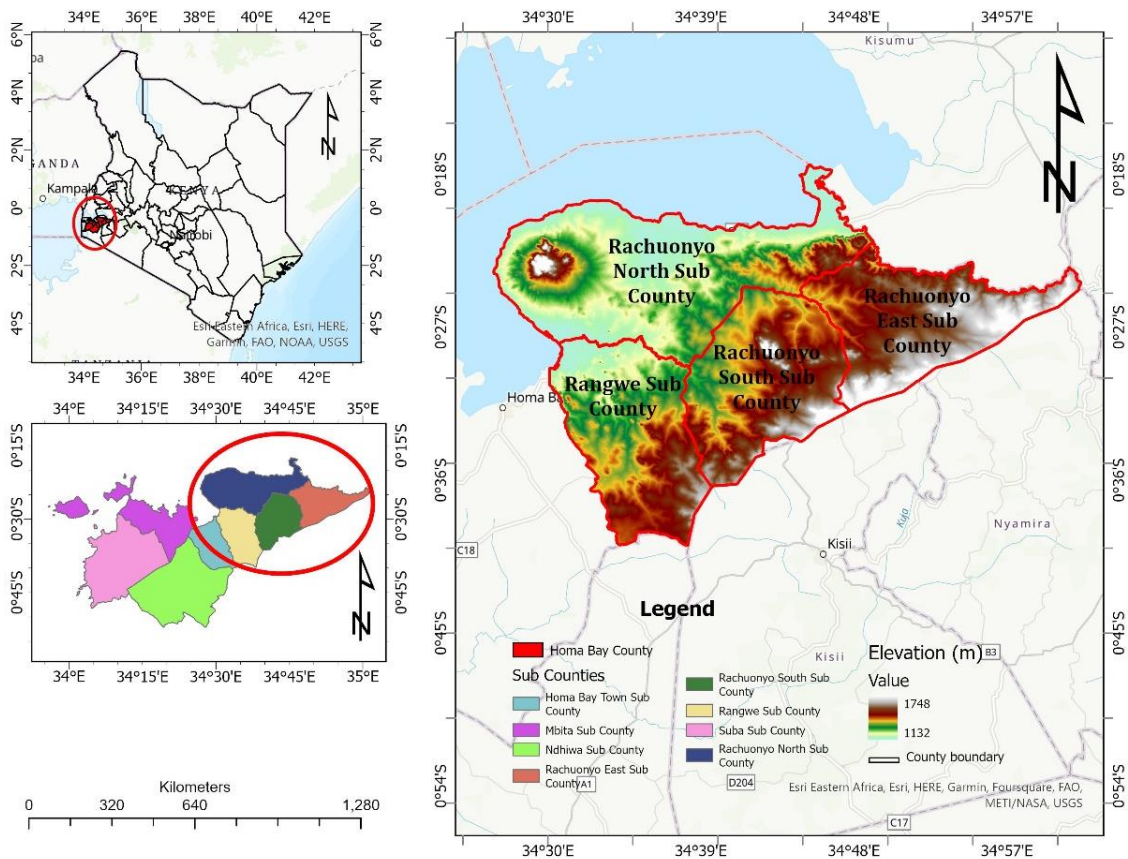


Figure 2: Map of Homa Bay County showing the 4 Sub counties (image developed in GIS)

Climate context and Policy framework for Homa Bay County

1.1 Homa Bay County Climate Outlook

The adverse effects of climate change have the capacity to disproportionately affect marginalized and rural communities. According to existing reports, the future climate for Homa Bay County is likely to be more intense and variable⁷. Temperatures will continue to rise and precipitation in many parts may increase while other areas it may decrease while severity of storms may increase, and predictability reduce. It is predicted that temperature might increase by 0.4°C in the years of 2021-2065 (MoALF, 2016)⁸. Figure 3 shows a timeseries of historical rainfall and temperatures trends for Homa Bay County modelled from observed meteorological data from the Kenya Meteorological Department (KMD) between 1990 and 2018. Clearly, both temperature and rainfall means are on the rise going by the linear trends.

These projections are in line with the reported trends by the World Bank and Kenyan government reports for Homa Bay county which indicate that by the years of 2021-2065, temperature is projected to increase by 0.4°C, while precipitation would increase by 0.7% in the first wet season, and 3% in the second wet season, and consecutive days of moisture stress is projected to double in the first wet season from about 25 days to around 45-50. Figures 4 & 5 provides highlight of the past and projected climate outlook for Homa Bay (MoAFL, 2016).

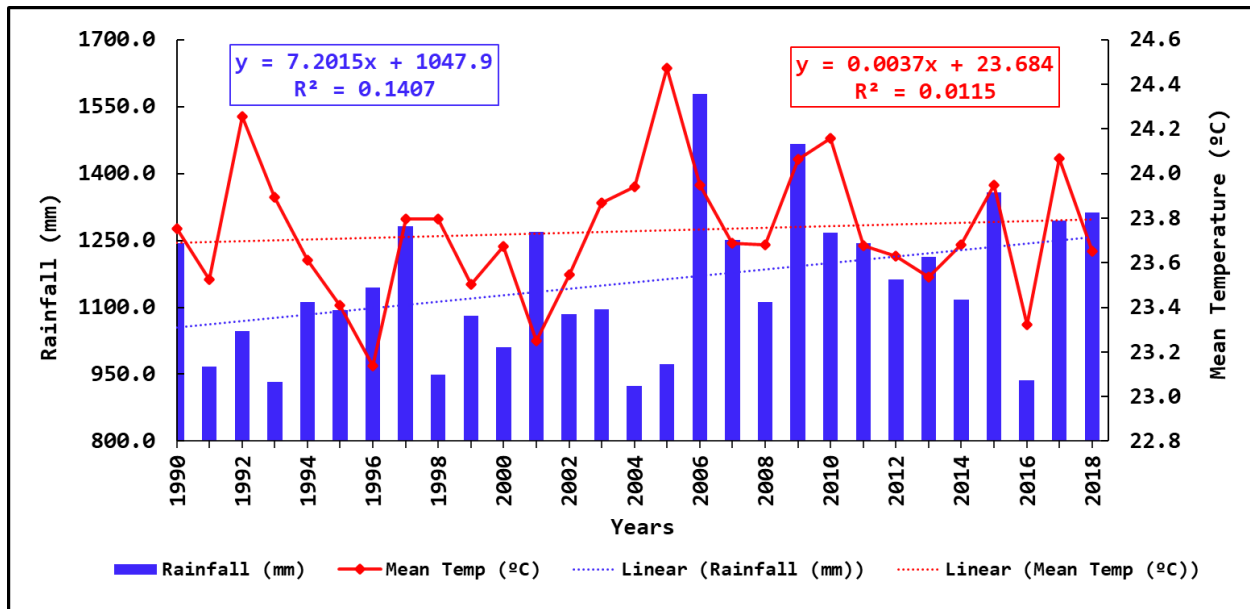


Figure 3: Observed Rainfall and Temperature patterns for Homa Bay county (Data source KMD)

⁷ Ongeko, K., Mugalavai, E., & Obiri, J. (2017). Evaluation of community adaptation to climate change in Homa Bay County, Kenya. International Journal of Scientific and Research Publications, 7(8), 680-688.

⁸ MoALF. 2016. Climate Risk Profile for Homa Bay County. Kenya County Climate Risk Profile Series. The Ministry of Agriculture, Livestock and Fisheries (MoALF), Nairobi, Kenya. https://cgspage.cgiar.org/bitstream/handle/10568/80450/Homa%20Bay_Climate%20Risk%20Profile.pdf

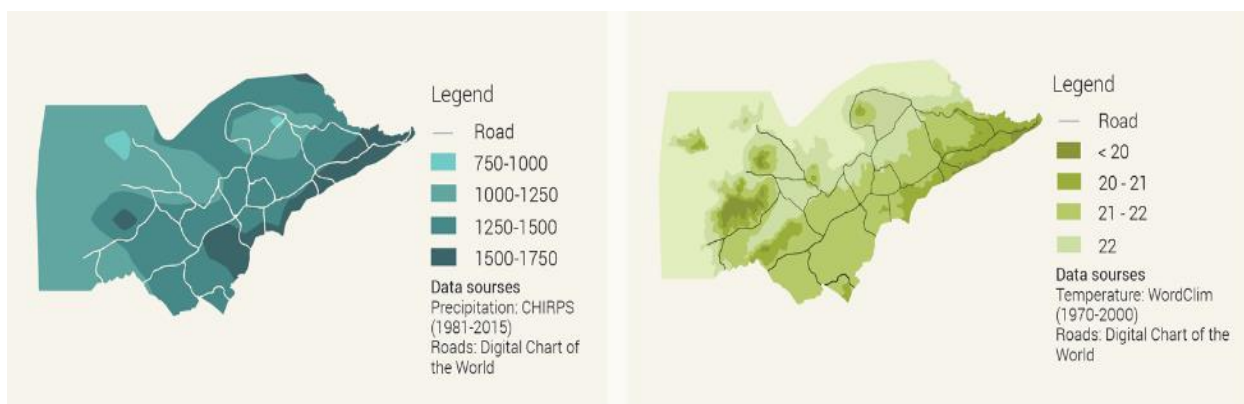


Figure 4: Historical Rainfall (Right) and Temperature Trends of Homa Bay County (Left) (MoAFL, 2016⁹)

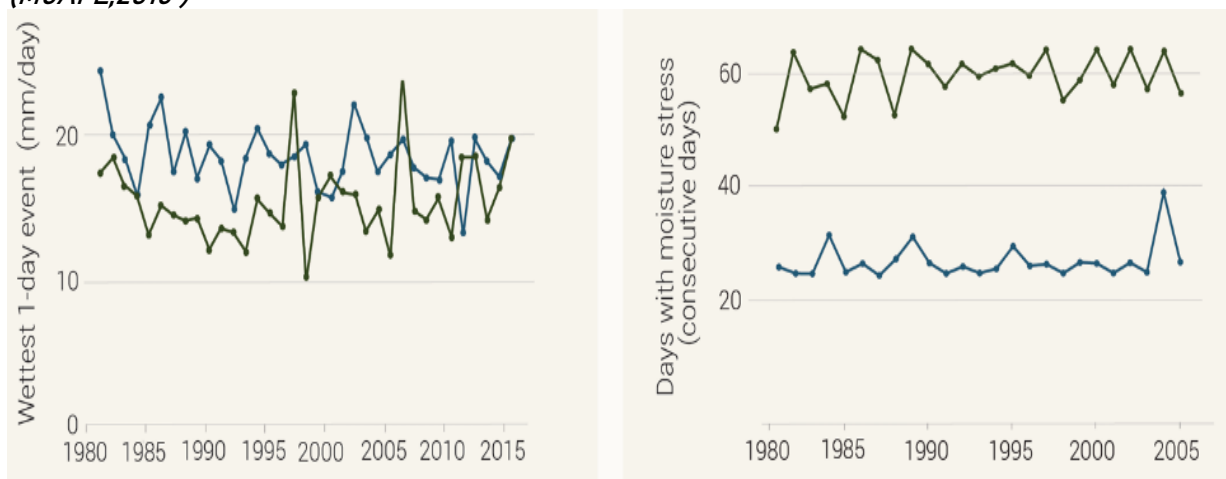


Figure 5: Historical Floods (Right) and Drought Events (Left) In Homa Bay County (MoAFL, 2016)

1.2 County Climate Change Policy Framework

Climate Adaptation and mitigation actions are key to any institution that intends to achieve their climate action commitments under the national and international climate change framework and obligations. In Kenya climate change action are geared towards contributing to the Nationally Determined Contributions (NDCs) and Kenya’s commitments to the Paris Climate Agreement of 2015. Such alignment is meant to deliver co-benefits including sustainable development, green growth and resource use efficiencies. Homa Bay county, being one of the 47 counties of Kenya that aims to collaborate with the national government in achieving the countries green growth vision and climate resilience agenda has in the recent past formulated important climate change legislative frameworks and policies meant to steer the county in realising its climate change mitigation and adaptation agenda. On November

⁹ MoALF. 2016. Climate Risk Profile for Homa Bay County. Kenya County Climate Risk Profile Series. The Ministry of Agriculture, Livestock and Fisheries (MoALF), Nairobi, Kenya. https://cgspace.cgiar.org/bitstream/handle/10568/80450/Homa%20Bay_Climate%20Risk%20Profile.pdf

2022, the Governor of Homa Bay County launched a policy framework to help mitigate adverse climate change impact. The framework contains the County Climate Change Policy 2021, the County Climate Change Act 2022, and the County's Climate Change Risk and Vulnerability Assessment Report (2022). Together with the National and international policy frameworks, Homa Bay county is set to prominently play a role in helping Kenya achieve its climate action agenda. Some of the policy frameworks existing in the county include:

Table 1: Climate Change Policy Framework at different levels

Level	Policy
International	<ul style="list-style-type: none"> • United Nations Framework Convention on Climate Change (UNFCCC) 1992 • Sustainable Development Goals (SDGs) 2015 • Convention on Biological Diversity (CBD) 1992 • UN Convention to Combat Desertification (UNCCD) 1992 • Paris Agreement 2015 • Sendai Framework on Disaster Risk Reduction 2015
Regional	<ul style="list-style-type: none"> • Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods • Agenda 2063: Africa We Want • African Climate Resilient Agricultural Development Programme • EAC Climate Change Policy
National	<ul style="list-style-type: none"> • Kenya Constitution 2010 • National Climate Change Action Plan (NCCAP) (2013-2017, 2018-2022) • Nationally Determined Contribution (NDC) 2020 • Climate Change Act 2016 • National Adaptation Plan (NAP) 2015-2030 • Kenya Vision 2030 • National Climate Change Response Strategy 2010 • Kenya Climate Smart Agriculture Strategy (KCSAS) • National Environment Management and Coordination Act (EMCA) 1999 • The Agricultural Sector Development Strategy (2010-2020)
Local	<ul style="list-style-type: none"> • County Climate Change Policy 2021 • County Climate Change Act 2022 • County's Climate Change Risk and Vulnerability Assessment Report 2022 • Homa Bay County Climate Change Action Plan (CCCAP) 2021-2026. • Homa Bay County Climate Change Policy

Homa Bay: Climate Outlook

- *Temperature will continue to increase by 0.4°C*
- *Rainfall intensity and amounts likely to increase by 0.7-3%.*
- *Moisture stress likely to double.*

Approach Used by JAM

2.1 Concept of Participatory Assessment of Climate and Disaster Risk (PACDR)

Participatory assessment of climate and disaster risk is a framework used to assess the climate risk at community or local level. Participatory processes envision the involvement of the community members in an interactive session where information and data flow from the focus group participants as the primary source of information as opposed to the conventional approach where the facilitator drives the process. In PACDR session the community identifies their own climate risk based on what they have experienced and seen. They narrate their own experiences with climate change and outline the coping strategies that have been used in the past and that which can work in the future. PACDR aimed to identify risks; assess the magnitude of impacts on people, assets, value chains, (critical) infrastructure, settlements, and ecosystems; and ascertain the possible options for action.

PACDR is followed by identifying future risks and the opportunities that they present before evaluation and building an adaptation pathway against the impending risks. Before the application of the modified PACDR, the tool was presented to the client with a justification for the modifications for their concurrence and feedback – read section 2.3.1 for more highlight on the modified PACDR. Figure 6 shows the agreed working approach to the PACDR implementation. The PACDR was undertaken at the sub-county level and involved three community groups organised as men, women and youth.

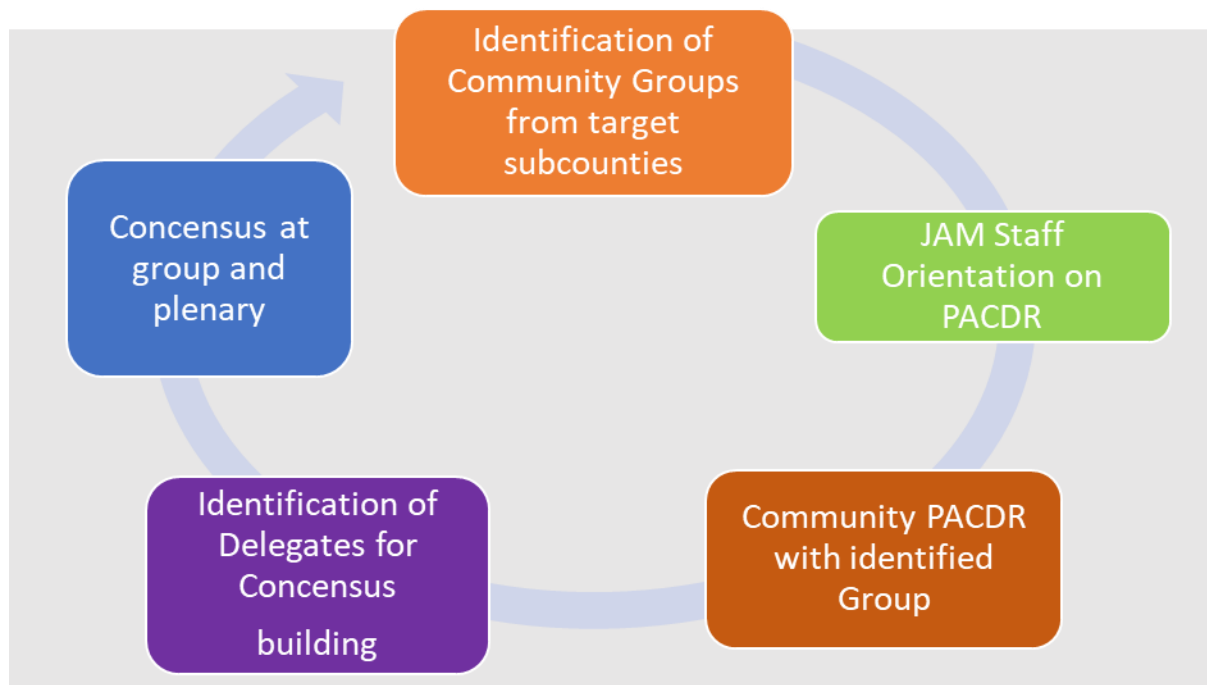


Figure 6: JAM PACDR working approach

2.2 Community Meeting meetings

The process of Participatory Assessment of Climate and Disaster Risk (PCVA) Tool dissemination commenced by orientation of JAM staff on the PACDR framework and tools. The JAM staff would later act as facilitators of the proceeding community PACDR with the assistance of the consultant. The Community PACDR involved selected participants from different villages within 4 sub counties under JAMs project interventions. The meetings ensured representations of women, men, youths aged between 18 – 35 years, County and National government agricultural officers, administrative leaders and JAM affiliate partners, and other vulnerable groups like the persons living with disability. Table 2 provides a breakdown of the participant sampling.

2.3 Consensus Building

Consensus building meeting was used to achieve agreeable outcomes that would be representative of the four sub counties. This was achieved through the delegates selected to represent the four sub counties in a plenary meeting on the last days of the PACDR exercise. A total of 70 delegates participated in the consensus building meeting and they all came to represent the communities that had been subjected to the PACDR process. This meeting was used to build consensus on the issues discussed and take a position on the key livelihoods, key hazards and most important resources in the four sub counties. Also important was the adoption of key adaptation pathways and adaptation roadmap for the four sub counties for possible scaleup to the whole county. The results presented in this report represent the issues discussed at the delegates plenary. The Table 2 below shows the three key aspects of livelihood, resources and hazards that the community agreed on.

Table 2: Community meetings, location, gender ratio and number of participants

Date	Location	No. of Participants Represented/target groups				Gender Ratio M:W:Y
		Target Pop.	Men	Women	Youth	
23/10/2023	Training at JAM HQts	20	8	6	6	40%:30%:30%
24/10/2023	Rangwe	60	27	32	13	38%:44%:18%
25/10/2023	Rachuonyo North	60	17	23	24	27%:36%:38%
26/10/2023	Rachuonyo East	60	24	23	34	30%:28%:42%
27/10/2023	Rachuonyo South	60	18	24	18	30%:40%:30%
30/10/2023	JAM HQts(Consensus)	60	18	32	20	26%:46%:28%

The participatory assessment of climate and disaster risk was modified to suit the present study based on literature review and additional insights from the consultant based on recent lessons learned from its application in other parts of the county. The modified PACDR tool and its exercises and modules are highlighted in Table 3.

Table 3: Modified Participatory Assessment of Climate and Disaster Risk (PACDR) Tool

Module	Exercise	Tool	Tools administered	
			Community	Consensus
Module 1	Review	N/A		
Module 2: Climate Change and Hazard analysis	Exercise 1: Livelihood Mapping and Ranking Exercise 2: Resource mapping Exercise 3: Hazard Identification and Ranking Exercise 4: Seasonal Calendar Exercise 5: Historical Timeline	Tool 1 Tool 2 Tool 3 Tool 4 Tool 5	All	All
Module 3: Vulnerability Assessment	Exercise 6.1: Hazard -Impact Analysis Exercise 6.2: Hazard – Livelihood Impact Analysis Exercise 6.3: Hazard – Gender Impact Analysis	Tool 6 Tool 7 Tool 8	All	
Module 4: Responses to the impacts of hazards	Exercise 7.1: Exercise Decision Making Change Pathway Exercise 7.2: Community Role Play Change	Tool 9 Tool 10	All	
Module 5: Adaptation pathways	Exercise 8: Illustrative presentation on Climate change scenarios for community Exercise 9: Community adaptation goals Exercise 7: Adaptation strategies, obstacles and opportunities	Tool 11	All	All
Module 6: Co-benefits adaptation strategies	Exercise 8: Identification of co-benefits Creation of a matrix of adaptation strategies and co-benefits	Tool 12	All	All
Module 7: Community adaptation planning	Exercise 9: Development of an Action plan Community presentation	Tool 13		All

2.3.1 Justification for approach used.

The selection of at least 60 participants per subcounty participants was informed by JAMS project intervention areas which cover the 4 sub counties of Rachuonyo North, Rachuonyo South, Rachuonyo East and Rangwe. The total participants were about 297 and this was deemed representative of the populations from each of the sub counties and within the time and resource constraints available. The number was also chosen as convenient focus group to work for effective group interaction and participation of everyone.

The PACDR tools as provided in the pacdr.net are highly effective tools and have been widely used across the world, however the tools were slightly modified to enrich its robustness in collecting quality data and to make it effective in capturing detailed community experiences and realities. The modification allowed the introduction of gender vulnerability matrix which was missing in the 7-module framework. This gender matrix was instrumental in capturing gender perspectives of climate hazard vulnerability from the community. The modifications were partly informed by the experiences of the consultant and some lessons learned from recent applications of similar tools by the consultant in other areas across the county.

The following specific modifications were made to the PACDR.

- I. The total PACDR Tools used increased from 8 exercises (read tools) in the original 7-module framework to 13 tools in the modified PACDR tool (see Table 3).
- II. Livelihoods assessment was introduced in Tool 1

- III. The resources were identified based on their types (physical, human, social, economic etc) and the changes that have been observed over time noted.
- IV. Vulnerability assessment was undertaken at 4 levels (Impact analysis, livelihoods vulnerability, assets and resource vulnerability, gender vulnerability).
- V. Adaptation pathway and roadmap was modified to include expected timelines, actors, approximate budgets, community contributions which provided insight into suitability of the proposed adaptation actions.
- VI. The community was allowed to use the language of their choice, and this provided a favourable atmosphere for free interaction.
- VII. Consensus was built at group level (men, women, and youths) and at consolidated level (plenary)



Figure 7: PACDR orientation sessions during community meetings (Plenary, Youth, Men, women in clockwise order)

Key Outcomes

2.1 Community Livelihoods, Resources and Hazards

Livelihoods in the study area are strongly natural resource-dependent, with the exact nature of livelihoods reflecting the geographical context and climate of the study region. Farming (primarily crops, but also livestock) was identified across the four sub counties of Rachunoyo North, Rachuonyo East, Rachuonyo South and Rangwe, as a key livelihood activity. While others like fishing, businesses and mining featured more prominently based on the locality of the resources where such livelihoods depend, for instance fishing is predominant based on proximity to the Lake Victoria while business was mentioned to be more common among majority who reside in the urban or local trading centres. Farming was reported to be the key activity of the rural community because it's "part of their culture" and "way of life", it is also supported based on prevailing good climate and good soils in the region. Some of the specific crops grown in the study area included millet, maize, beans, cassava, groundnuts, sweet potatoes ("Rabun"), coffee, sorghum, fruits and vegetables. The communities also reported livestock keeping such as cattle, poultry, chicken, sheep, goats, rabbits, pigs, mice as part of livestock farming livelihoods. Besides farming in general, the community cited business/trade, fishing, employment (self and civil servants), sand harvesting and mining/quarrying, brick making, casual labors, masonry, pottery, basketry, tailoring and charcoal burning as other key livelihoods. Some women groups such as those from Rachuonyo North and South reported that most women trade fish, Omena (dagaa), and vegetables in major open-air markets, while majority including men and women are also engaged in other forms of businesses like general sale of consumable goods and cereals and even sale of animals.

Employment was highlighted as a key livelihood but in some participant groups like Rachuonyo North, it was reported that it's hard to find formal employment in the rural areas, although in urban centres such as Oyugis, it's somehow possible to get employed. Some livelihoods are known to be environmentally damaging to the ecosystem like charcoal burning, but some participants reported that people engage in them because they lack alternative activities or options to do. Most of these livelihood activities are a source of income to majority of the population in the community. Majority of women reported that engaging in alternative livelihoods such as business and table-banking have given them some economic stability and financial independence, and even reduced "too much dependence on their husbands" for money. In general, all sub counties have slightly similar livelihoods implying that they are within the same or near similar ecological zone, which can support most of these activities.

Diversity in livelihoods is one major indicator of a resilient community. In Table 4, the community groups identified their key livelihood options based on their level of importance to the community such as household food security an income generation, and the number of households engaged in that livelihood option. The community groups also identified their key resources and hazards, and which were ranked based on their level of importance to the community livelihoods and magnitude of impact through a democratic process that involved consensus and voting process to settle a choice. However, considering the volumes of data gathered and numerous outputs from groups, only summaries of the consensus outcomes of the most ranked issues from the 4th Tool to the 13th shall be presented.

2.1.1 Tool 1: Livelihoods

Table 4: Types of community livelihood activities for the four sub-Counties

Sub counties			
Rachuonyo North	Rachuonyo East	Rachuonyo South	Rangwe
Farming	Farming	Farming	Farming
Livestock	Business/ agro business	Business	Livestock keeping
Business/Trade	Livestock keeping	Livestock keeping	Business
Fishing	Sand harvesting	Employment	Bodaboda
Employment	Brick making	Mining	Casual labors
Sand harvesting	Employment	Brick making	Building and construction
Brick making	Agro forestry	Building and construction	Brick making
Mining/Quarrying/Ballast	Mining/quarrying	Charcoal burning	Tailoring
Arts and hand work	Basketry	Splitting firewood,	Charcoal burning
	Ballasting	Boda boda riding,	
	Pottery	Quarrying	
	Hunting		

Community Livelihoods	Ranking by no. of Community members
1. PUR/FARMING	1
2. PITH/LIVESTOCK	2
3. LUPO/FISHING	5
4. OHALA/BUSINESS	3
5. FOYO KWARE (Gold Mining)	7
6. WANGO MAKAA (Charcoal)	6
7. BARO BAD (Timber)	8
8. PEDHO LEE DRAIDWAR (Pottery)	9
9. WANGO NATAFARE (Brick Making)	4

Livelihoods	Ranking
1. Pur (Farming)	1
2. Pith (Livestock Keeping)	2
3. Ohala (Business)	3
4. Bodaboda	4
5. Fishing	5

Figure 8: Sample field images of community livelihoods and ranking

2.1.2 Tool 2: Resource and Asset Mapping

In this module, the mapping exercise was valuable to gather knowledge on the community's assets, resources and risks. Different groups were asked to draw their community maps to help them identify and locate resources important to them such as forests, farmlands, rivers/water resources and infrastructure such as buildings and roads. The mapping exercise allows analysis of hazards and the probability of changes or intensification over time. Mapping

also helps to identify the most vulnerable areas to hazards (hotspots) or the likely affected areas. With these, it would be crucial to design effective strategies and build resilience in the community, incorporating local knowledge and perspectives in the assessment process. Mapping resources helps to develop more context-specific strategies for risk reduction and adaptation.

The different groups (men, women and youths) mentioned nearly similar natural and physical resources in the four sub-counties (Rachuonyo East, North, South and Rangwe). Resources were differently mentioned by the different groups in relation to the daily work/duties (gender related). Women and men mentioned different financial, human, and social resources. Both men and women mentioned chamas, business (markets) as financial resources. Knowledge and skills were mentioned more by the youth and men, while the women emphasised on security and health. Some participants argued that, socially, women tend to concentrate much on church (faith) while men chose to engage in community projects, and this could have a bearing in their knowledge of resources mentioned.

Main resources mentioned included natural resources like farming land, springs and rivers, Lake (all groups), forests, minerals/quarries (men and youths), hills (youths), physical assets such as schools, roads, buildings, hospitals, bridges, economic and financial resources such as markets and businesses (mentioned largely by women and men), social resources such as chamas (saving groups and table banking) (all groups mentioned) and churches and finally, human resources like health, knowledge and skills, community projects, literacy. Details of key resources are listed in Table 5.

The community reported the following changes to resources observed in the past 10 years.

Natural resources

- Land: Many groups reported reduced soil fertility and striga weed infestation, changes in crop patterns, change in rainfall patterns, soil erosion as key changes observed on land, more farms were not tilled before than are now under cultivation, soil borne diseases, land has reduced in size (demarcated into smaller subdivisions), reduced water tables.
- Rivers: Most rivers were reported to have reduced water levels and some dried up completely, change of course, water pollution, destruction and encroachment into river reserves, siltation, widening of banks. Some people have planted trees along river courses to prevent flooding, siltation leading to shallowness of rivers.
- Forests: deforestation has occurred, afforestation in some parts through law enforcement, disappearance of indigenous species, and introduction of exotic species, human encroachment for settlement, farming and charcoal burning
- Lake: reduced fish species (they die during certain times of the year), spills over community land (caused by siltation hence backflow), water pollution, water hyacinth, receding water level during dry periods
- Sand: sand capacity reduced, encroaching households/communal land by sand harvesters

- Minerals: Sinking of soil, holes left that led to death of people, more minerals discovered especially in Rachuonyo North and South that have contributed to improved living standard of people
- Quarry: increase of quarrying activities

Physical resources:

- Dams/water pans: there are more dams now than before (mostly for controlling floods and for water storage), some dams have dried up e.g., Ragogo, siltation remains a problem to many dams, pollution in water pans, increased number of water pans which may also pose risk of injury to villagers.
- Hospitals: increased number of health facilities (some are set up by charity organizations and some by the county government e.g., JAM community hospital, Matata Nursing home), sprouting of hospitals, increase in the number of doctors, increase in medicine supply
- Roads: some roads have been swept away by floods and in a bad state (Impassable) especially the muram roads serving villages, improvement of road networks has been observed and this has improved quality of life and accessibility, reduced accidents

Financial/economical

- Markets: many markets have come up, Increase in prices of the commodities, scarcity of farm produce, high taxation.
- Social: people are uniting to form saving groups (chamas), table banking and merry-go-rounds, more churches coming up
- Human resources: people are forced to learn new skills to diversify livelihoods, increased number of people attending school than before (free education program by the government)

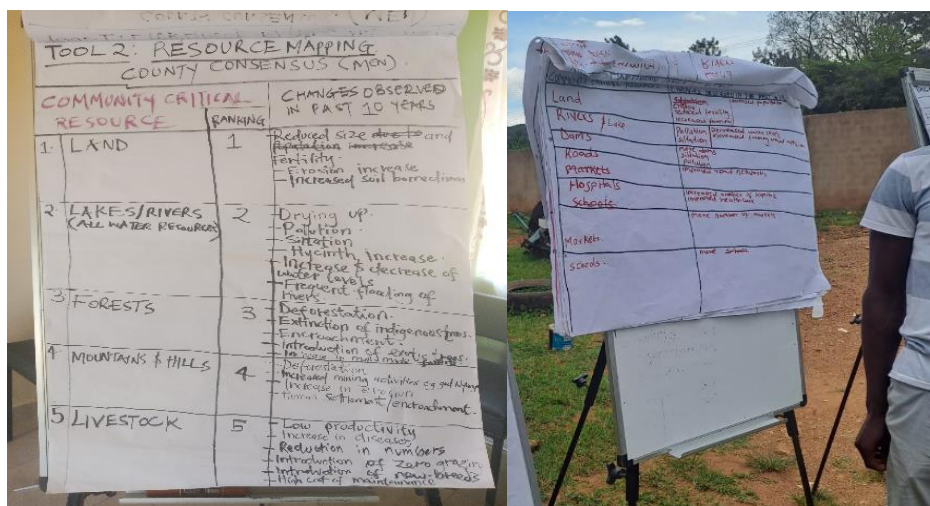


Figure 9: Sample image for resources and assets mapping

Table 5: Resource and Asset Mapping for each Sub County

	Sub County			
Ranking	Rachuonyo North	Rachuonyo East	Rachuonyo South	Rangwe
Natural assets	Land	Land	Arable land, soil	Forests
	Lake	Rivers	Grass(land)	Land
	Rivers	Forests/trees	Water (lake)	Rivers
	Livestock (animals)	Sand and stones	Biodiversity	Sand/rocks
	Forest	Hills	Forests	Minerals
	Hills	Minerals	Quarries/stones	
		Sand	Hills	
		Quarry	Springs and Rivers	
			Minerals	
Physical assets	Dams / Water Pan	Roads	Sand	Minerals
	Hot springs	Hospitals	buildings	Bridges
	Schools	Schools	Roads	Sanctuary
		dams	Fishponds	
		Boreholes	Dams	
Economic and financial	Markets	Fishponds	Schools and hospitals	
	Hospitals	Markets		
	Roads	Sisal		
Social resources	Chama	Chama (savings)	Kungo (savings group)	Churches
	Churches			
Human Resource	Educated population	Skills and Knowledge		Skills and knowledge

2.1.2.1 Community Resources and hazard mapping

During the resources and mapping exercise in Tools 2 and 3, the communities were tasked to map their key resources and hazard hotspots. This was achieved by having the community to sketch their locality and show major features, assets and resources and key areas considered disaster hotspots for some of the disasters identified above. This exercise besides being very interactive also provided an opportunity for the community to reflect on the resources they have and build their geographical knowledge of their surrounding. Typical samples drawn by ladies' groups from two sub counties of Rachuonyo South and North are presented below.

Rachuonyo South was reported to have a tarmac road, 4 major rivers (Rivers Awach, Ayoro, Osiane and Agido), 2 forests reserves (Wire and Koder) and several quarries where people go to mine sand/ stones/ ballast. The subcounty also has a gold and people have created a gold mine (southwest)

There are several schools, both primary and secondary where children attend learning. It was noted that most arable land (s) and grazing fields are close to homesteads.

The hazards mapped in the areas included Landslides prone areas in the southern part around Ranyanya cave, Disease outbreak (malaria) in the whole subcounty, Drought affects the whole subcounty, Crop pests and diseases affecting different crops in different seasons and birds that attach crops (Quill birds specifically). See Figure 10 for more details of the resource mapping.

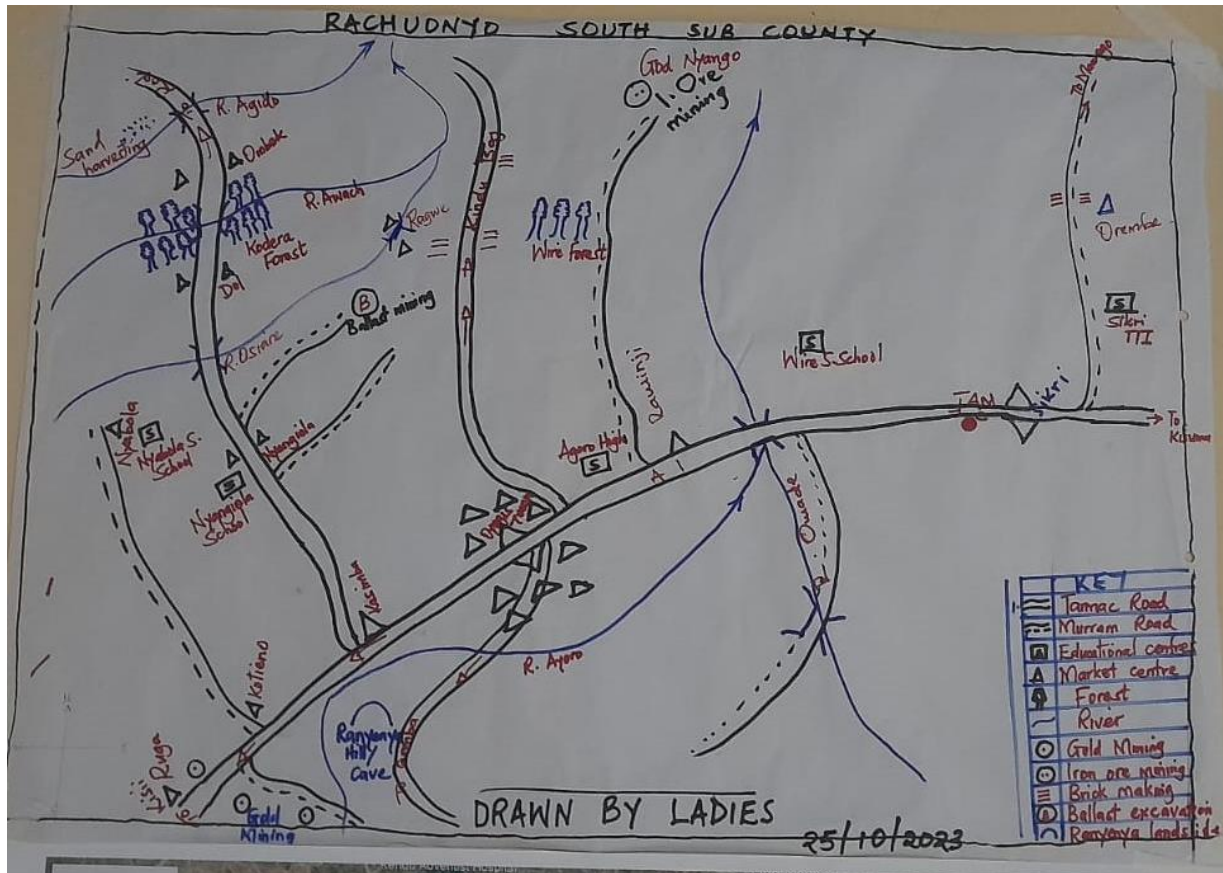


Figure 10: Map of Rachuonyo South Sub-County women group

In Rachuonyo East Sub-County, the following issues and resources were noted and mapped (see Figure 11):

- ❖ There are several rivers in the Sub-County (Awach Kibuon and Sondu (biggest)). Most regions around the lower part of Sondu River are usually affected by floods.
- ❖ There is a coffee factory (Nyamwaga) which provides services to the community including jobs.
- ❖ Most roads were reported to be tarmacked.
- ❖ There were schools and colleges where children can access basic education.
- ❖ On hazards, landslides were identified as a key issue since there are several mining and quarry centers, for mining sand, ballast and stones. The quarries and mines are also a source of income to the community.

- ❖ Mining and quarrying causes soil erosion and destruction of farming land

Some important reflections on the mapping exercise:

- ❖ The map helped them to realize the effects of the hazards in the whole community especially drought, landslides, and soil erosion than they knew before
- ❖ They can use the calendar in planning their own activities and mark important community events.

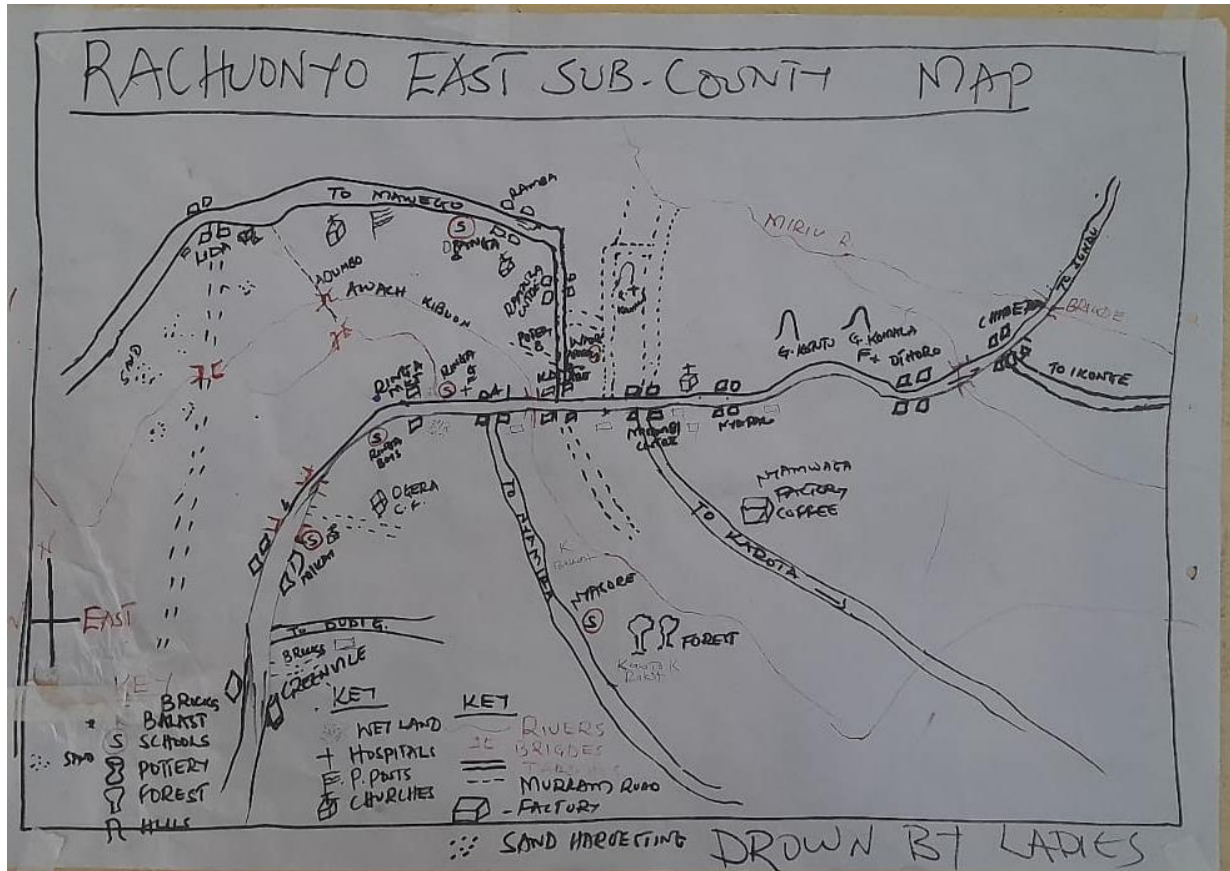


Figure 11: Rachuonyo East Sub-County Hazard map for the women group

2.1.3 Tool 3: Hazard identification and Ranking

The region is vulnerable to the impacts of climate change and the risks associated with these impacts are significant. Some of the vulnerabilities and risks of climate change are highlighted in table 6. However, drought and famine are the most prevalent hazards in the region. The following were the natural hazards reported by the communities.

- ❖ Drought: all groups across the four sub counties reported prolonged drought/ dry spells caused by low amounts of rainfall. Drought affects the whole of Homabay County and affects agricultural productivity, livestock (pasture) and general vegetation condition.
- ❖ Famine was reported to occur due to prolonged drought/dry conditions and high temperatures.
- ❖ Floods from the lower parts of Rachuonyo North and near the lake side following heavy rainfall. Flooding affects businesses, farms, and livelihoods, causes human migration which come with several negative consequences such as lack of food and insecurity.
- ❖ Crop pests and diseases; it was recorded that in the recent past there has been eruption of frequent infestations of crop pests which destroys crops leading to low yields and produce. This eventually causes famine which leads to starvation.
- ❖ Landslides: this was reported more in Rachuonyo East and South as caused by heavy rainfall especially in places where people do mining/quarrying. It leads to death of people and destroys people's farms. It is also a major contributor of soil erosion
- ❖ Hailstones, which frequently occurs and destroys crops and buildings
- ❖ Diseases breakout; Human diseases such as cholera and Bilharzia due to uncleanliness especially near the lake during rainy seasons. Malaria is the major threat in the region caused by mosquitoes. Animal diseases such as anthrax, foot and mouth, worms and ticks attack cattle
- ❖ Human-wildlife conflicts; wild animals and birds scramble for food from peoples farms due to famine and drought. Quella birds attack crop fields

There's generally low capacity of people of the local community to withstand such occurrences as floods and drought. Majority of the community are poor. They are not prepared for future disasters such as floods. Drought, famine was more mentioned as the leading hazards in all the sub-Counties.

Generally, the observed climate changes by the locals are consistent with the scientific assessments on the impacts of climate change in the Nyanza region of Kenya i.e., increasing trends of temperature and variable rainfall patterns. Drought is specifically associated with high temperature rates, which causes high evaporation rates from surfaces. The future climate projection over Homa Bay County indicates rise in temperature and unpredictable rainfall patterns. Increase in temperature seems to be under evaluated by people in this region. This is because, it is gradually increasing and not easily linked with the hazards. Even though some of the hazards are major caused by human influence (environmental degradation), climate change poses a bigger threat. It is

therefore worth it to strengthen the adaptive capacities of the population in the most affected areas and reduce vulnerabilities to such risks.

Table 6: Hazard identification and Ranking for the Sub Counties

Subcounty			
Rachuonyo North	Rachuonyo East	Rachuonyo South	Rangwe
Drought	Drought	Drought	Drought
Famine	Famine	Famine	Crop pests & Diseases
Floods	Diseases and Pests	Pests and diseases	Diseases
Crop diseases	Floods	Floods	Famine
Disease breakout	Hailstone	Landslide	Flooding
Human Wildlife conflict	Landslide	Hailstones	Wild animals/ birds
Hailstone	Birds	Human diseases	Landslides
	Death of livestock	Wild animals	
	Post-election violence		



Figure 12: Figure 13: Youth participants preparing their tools for PACDR



Figure 14: Community engaging in resource mapping and sketching, youth (top left), women (top right), and consensus group

2.1.3.1 Consensus Building and outcomes for Toll 1-3

As already mentioned in section 1.3, consensus building meeting was used to agree on outcomes that would be representative of the four sub counties and the participation was by representatives for the wider community that participated in the PACDR process. The results presented in this report represent the issues discussed and agreed on at the delegates plenary. The table below shows summary of top three livelihoods, resources and hazards that the community agreed on during the consensus.

TOOL 1 Livelihoods Ranking		TOOL 1 Livelihoods Mapping & Ranking		TOOL 1 Livelihoods Mapping and Ranking	
Ranking	Community Livelihoods	Ranking by no. of community members	Ranking by no. of members of community	Community Livelihoods	Ranking by no. of community members
1	PUR/FARMING	1	1	1	1
2	PITH/LIVESTOCK	2	2	2	2
3	LUPU/FISHING	5	3	3	5
4	OHALA/BUSINESS	3	4	4	3
5	GO TO KUARE (SOLD)	7	5	5	7
6	WANLO NIARA	6	6	6	6
7	BAKO BAD (Timber)	8	7	7	8
8	REMO LEE (BEEKEEPING)	9	8	8	9
9	WANLO NIARA (BEEKEEPING)	4	9	9	4
10			10		
11			11		
12			12		
13			13		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		

TOOL 3 HAZARD IDENTIFICATION AND RANKING
COUNTY CONSENSUS (MEN)

IDENTIFIED HAZARD	RANKING
DROUGHT	1
FAMINE	2
CROP DISEASES/ANIMAL	3
FLOODS	6
BIRDS AND PESTS	5
HAIL STONES (PE)	8
SIENYUOK MAR LONO (LINDSUDS)	9
HUMAN DISEASES	4
WILD ANIMALS	7



Figure 14: Presentations of sub-county outcomes during the Consensus building meeting and the outcome of hazard ranking

Key Livelihoods	Key Resources	Key Hazards
✚ Farming	✚ Land	✚ Drought
✚ Livestock	✚ Water resources	✚ Floods
✚ Business	✚ Hills	✚ Disease outbreak

2.1.3.2 Significance of the findings to the community – Tool 1-3

The following could be deduced from the consensus meetings findings:

- Majority of the communities in the four sub counties practice farming as a key livelihood activity (both crops and livestock).
- The greatest resource the community has is land which happens to be the largest resources supporting the farming activities which is the key livelihood activity. Water sources happened to be the second most important resource followed by Hills.
- It could be potentially perceived why drought and floods are highlighted as the key disasters of importance to the four sub counties. Considering the livelihood base of the communities which is farming, mostly rainfed, may affect the key livelihoods activity which is farming.
- In the event of excessive rainfall, flooding occurs this is likewise detrimental to the agricultural activities and farms.
- The above finding provides evidence to the fact that climate change which is the causative factor to the drought and floods has direct bearing on people's livelihoods in the four sub counties.
- Therefore, addressing the climate change root cause and building communities resilience through appropriate adaptation mechanisms may be the most immediate need of the farmers and agricultural communities of Homa Bay county.
- The communities are well aware of their resource base and assets and their locations, this knowledge is useful in directing attention and intervention to the areas that the communities already identified to experience any hazards or challenges.

2.1.4 Tool 4: Seasonal calendar

The seasonal calendar shows the different activities carried out by the community in different seasons. It also shows the climatic seasons of the community and any other social and cultural activities taking place in the community across the year. The seasonal calendar provides useful information on the community's seasonal patterns and vulnerabilities and helps identify periods of stress and hazard related to climate change. It also provides an opportunity to discuss changes in seasonal activities and events and their links to climate change which can inform the development of adaptation strategies. For instance, the seasonal calendar will identify the shifts in the rainfall patterns and how this has affected their farming systems (e.g., crop yields). This helps the community to identify alternative methods of farming or how they can better adopt to these changes. In cases of flooding, the community is able to identify better strategies to reduce the impact such as early warning systems and in case of drought better water conservation methods. The calendar produced was for the current situation (Table 7 and 8). The discussions on the seasonal calendar were as follows:

- ❖ The main hot seasons were identified as usually from December through to March the following year, while cold seasons are July (peak/coldest) and April. In Rachuonyo North and East, the hot season begins as early as October to January.
- ❖ February, September and October are the short rainy months while Longs rains are usually in April through to June.
- ❖ The planting cycle usually begins in January/ February with land preparation, planting and weeding in March, April, May, July/August and September/ October, while harvesting it done in December-January and August
- ❖ They get casual labour when it is not favourable to go to the farm or when there are increased farm activities demanding more labour
- ❖ Famine is experienced in April all the way to September in some subcounties such as Rangwe and Rachuonyo South
- ❖ Years ago, the month of January used to have light shower rainfall, this has shifted to the month of February.
- ❖ Nowadays, planting depends on the start of the rainy season for conventional conservative and farming, this is why planting has been marked for three months between February to April.
- ❖ Both men and women across the four sub-counties reported that, after harvesting, the produce is either used as school fees for their children and only keep a small portion for food consumption. This was a reflection of the overdependence on agriculture to meet critical livelihood needs like education, and a lack of diversified income sources.
- ❖ Rainfall has become unpredictable now than before, in which some parts of the sub counties may have rainfall, while others have no rain completely.
- ❖ Farmers are embracing planting drought resistant crops such as sweet potatoes to cater for the famine/ dry months
- ❖ Drought occurrence is frequent and is becoming more intense, with the recent severe drought reported in late 2022 to early 2023.

- ❖ Incidences of eruption of diseases especially during rainy seasons such as cholera, bilharzia (places near the lake/waterlogged areas)
- ❖ Food produce has drastically decreased. Farmers are not getting good yields since crops are infested with “Kungu” (pests/false army worms) and this happens during growing seasons.
- ❖ During long rains, some regions especially the low land areas are greatly affected by floods which sweep homes away and force them to migrate to safer grounds. This also disrupts their livelihood activities.

Hazards identified within seasons:

- ❖ Drought and famine which causes scarcity of resources e.g., water and food,
- ❖ Storms and hailstones,
- ❖ Landslides, especially during heavy rainfall events

Some noticeable changes observed by the community on the seasonal calendars compared to earlier years:

- ❖ Variable rainfall patterns (decreased rainfall period, resulting into drought conditions)
- ❖ Livelihood diversification where communities are now “trying many things to make ends meet”.
- ❖ Extended periods of drought
- ❖ Water scarcity (decreased water tables)
- ❖ Shift in seasonal patterns e.g., onset and cessation of rainfall
- ❖ Frequent crop pest infestation compared to the previous years.

Figure 15 below presents some outcomes of the historical calendar exercises from four groups across the four counties in the study.

Since the seasonal calendars had some little variabilities based on different groups and sub counties, we have managed to present a harmonious calendar that reflects the whole four sub counties, this was done by matching the activities from each group and the correct months and comparing with what other groups said.

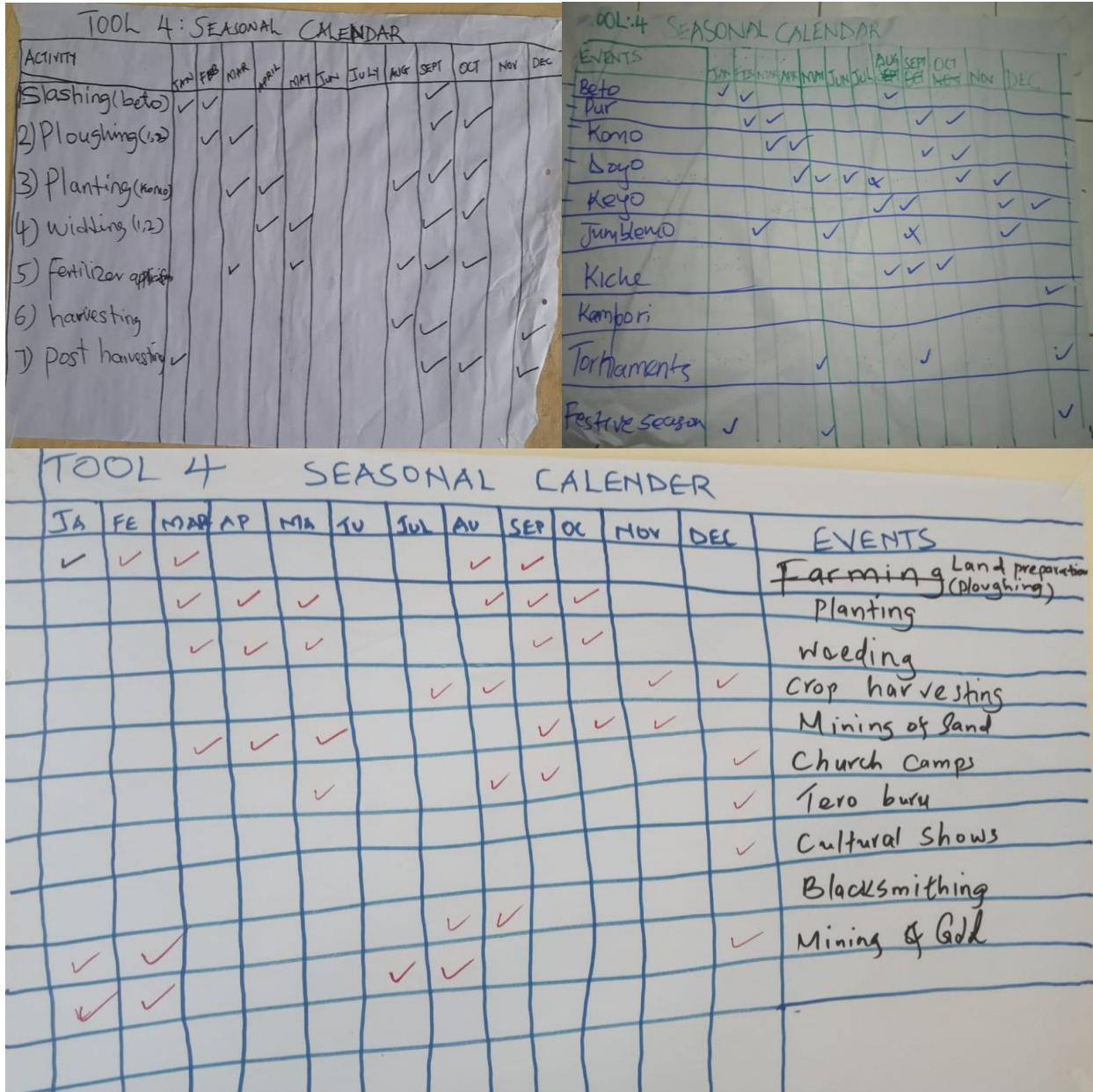


Figure 15: Seasonal Calendars for (a) women group in Rachuonyo East Sub County, (b) youth group in Rachuonyo North Subcounty (Kendu Bay) and (c) the youth group, Rachuonyo South Sub County

Table 7: Seasonal Calendar for Lower Midlands (Rachuonyo South and Rangwe)

Upper Midlands - Rachuonyo North and East													
		Season/Months											
No	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Au	Sep	Oct	Nov	Dec
1	Slashing	Dark Blue	Dark Blue							Dark Blue			
2	Land preparation	Purple											Purple
3	Ploughing		Dark Blue	Dark Blue						Dark Blue	Dark Blue		
4	Planting			Purple	Purple					Purple	Purple		
5	Weeding			Orange	Dark Blue	Dark Blue				Dark Blue	Dark Blue		
6	Fertilizer application			Dark Blue		Dark Blue			Dark Blue	Dark Blue	Dark Blue		
7	Harvesting	Purple						Purple	Purple				Purple
8	Sports and culture				Yellow				Yellow				Yellow
9	Post harvesting	Dark Blue								Dark Blue	Dark Blue		Dark Blue
10	Manure application	Purple							Purple				Purple
11	Week of prayers					Yellow						Yellow	
12	Religious activities				Purple				Purple				Purple
13	Short rains		Purple							Purple	Purple		
14	Circumcision				Yellow				Yellow				Yellow
15	Long rains				Purple	Purple			Purple				Purple
16	Cold seasons				Purple			Purple					
17	Hot seasons	Purple	Purple										Purple

Table 8: Seasonal Calendar for the Upper Midlands (Rachuonyo North and East)

Upper Midlands- Rachuonyo North and East													
		Season/Months											
No	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Au	Sep	Oct	Nov	De
1	Land preparation	Light Green	Light Green						Light Green			Light Green	Light Green
2	Clearing							Pink					Pink
3	Ploughing	Purple	Purple						Purple	Purple			
4	Harrowing		Purple	Purple					Purple	Purple	Purple		
5	Planting			Light Green	Light Green					Light Green	Light Green		
6	Weeding				Pink	Pink	Pink				Pink	Pink	
7	Harvesting							Pink	Pink			Pink	Pink
8	Camp meetings							Pink	Pink	Pink			
9	Week of prayer		Light Green			Light Green						Light Green	
10	Post harvesting									Purple		Purple	Purple
11	Camporee												Light Green
12	Religious activities			Purple	Purple			Purple	Purple			Purple	Purple
13	Tournaments/sports				Light Green				Light Green				Light Green
14	Festive season	Light Green			Light Green								Light Green
15	Long rains			Purple	Purple						Purple		
16	Short rains							Pink					
17	Cold seasons							Purple					
18	Hot seasons	Purple									Purple	Purple	Purple

2.1.5 Tool 5: Historical mapping for Hazards

Just like any other region in the world, Homa Bay County is Vulnerable to a range of climate related impacts including droughts, floods and famine. During rainy seasons, the low land areas (mostly Rachuonyo North) near the lake region experiences heavy rainfall that leads to flooding. This causes significant damage to crops, infrastructure and livelihoods. The Historical timeline tool helped in mapping the history of hazards and key disasters in the past. The community provided information based on what was witnessed and how they remembered them including their local names. The summary historical timeline which includes specific examples of hazards that have occurred in region is shown in Table 9.

The vulnerability of the region to climate related impacts highlights the importance of climate adaptation measures such as the early warning systems, disaster risk preparedness and proper planning and management including allocation of resources. However, some of these initiatives are long-term and requires a multi stakeholder engagement.

Here are some specific examples of hazards that have occurred in the region in the past and recent years:

- i. Drought: In 1939 there was massive infestation of crop pests and diseases (“nyangweso”) which led to famine occurrence. The pests ate up all crops and farmers harvested low yields. Another episode of drought (“Ooro”) occurred in 1984 and 2014. Many livestock died. People referred to it as “guok ka guok gi dhere” meaning “every dog with their cattle”.
- ii. The year 1963 was remembered for floods. This was also the year which Kenya got independence from the British colony. People therefore believed the rain was brought about by independence “uhuru”. There was also some fish species called “Nguba” and people named this “koth uhuru”, meaning fish brought by independence. Since the rains were too much, there were landslides in different parts of Homa Bay County. The landslide damaged farms, bridges, farms and caused significant economic losses.
- iii. 1997/98, 2007 and 2017 were also years to be remembered for floods in these regions. There was too much flooding that caused people to flee their home to upland areas. The impact was particularly felt within the regions bordering the lake and in the plains such as Rachuonyo North. Houses were swept away. The year 1997/98 was later declared by scientists as El Nino. In 2007, many people and animals died from the increased water levels “Oula Mapek” meaning “heavy flooding”. However, in 2017, the rainfall caused increase in lake levels especially within the Nyanza region (Lake Victoria).
- iv. Famine has always ravished homes, especially those living below poverty line. in 1980, there was famine allover the country (Kenya). People received aid from the government in form of yellow maize (“odumb nyamula”). In the local language, people referred to that year as “goro goro/kech mar kube”, meaning, the famine of “2kg tin of maize”.
 - a. In 1994 and 1995, the Kalenjin attacked the neighboring tribes in search of food. There was famine in the whole region
- v. 1982 was best remember for “ayaki” the HIV/AIDs infection that erupted around this time worldwide, many people were affected. It was declared a pandemic. Almost 40 years later, the world was under a lockdown following an outbreak of Covid 19 Virus

(Corona). Many people died, there were curfews and quarantine which was all under a worldwide lockdown. This led to loss of livelihoods. People lost jobs.

- vi. In 2007, post-election violence led to death and displacement of people.
- vii. 2019, 2021 and 2022 were years where many farmers complained of low and poor yields following infestation of crop pests (“kungu”). The false army worms are the major threat in this region. many farms were pests infested and crops performed very poorly.
- viii. In the year 2023, hailstones (“pee”) negatively affected crops in many farms. Plants and crops died.

Figure 17 and 18 outline the outcome of historical timelines provided by the participants

Table 9: Historical timeline of hazards

Hazard	Year	Local name given	What is it Remembered for
Drought	1939	<i>nyangweso</i>	Pests destroyed crops
Floods	1963	<i>Uhuru</i>	A lot of rain
		<i>koth uhuru</i>	Brought fish called Nguba, landslide
Famine	1980	<i>Kech Mar Kube/ goro goro</i>	Introduction of yellow maize (Onding)
Pandemic	1982	<i>ayaki</i>	Caused death: People died
Drought	1984	<i>Ooro</i>	Many Livestock died
Famine	1992	<i>jalango lawa</i>	Kalenjins attacked Sondu
	1994	<i>kibrit olwar e pii</i>	
Flooding	1997/98	<i>El Nino/ Kodh</i>	Too much flooding that caused displacement and migration of people; Houses were swept with water
	2007	<i>Oula Mapek</i>	Many people and animals died
Post election violence	2007	<i>Ocampo 6</i>	Deaths to people, grand coalition, displacement of people
Drought	2014	<i>guok ka guok gi dhere</i>	Deaths of livestock
Floods	2017	<i>Oula</i>	The lakes were swollen
Pest outbreak	2019	<i>kungu</i>	Poor performance of the crops
Disease (Flu): Pandemic	2020/2021	<i>Corona</i>	Many people died, Quarantine/ curfew, lockdown, loss of livelihood
Crop pests infestation	2021/22	<i>Kungu</i>	Many farms were infested by crop pests
Hailstones	2023	<i>pee</i>	Plants and crops died

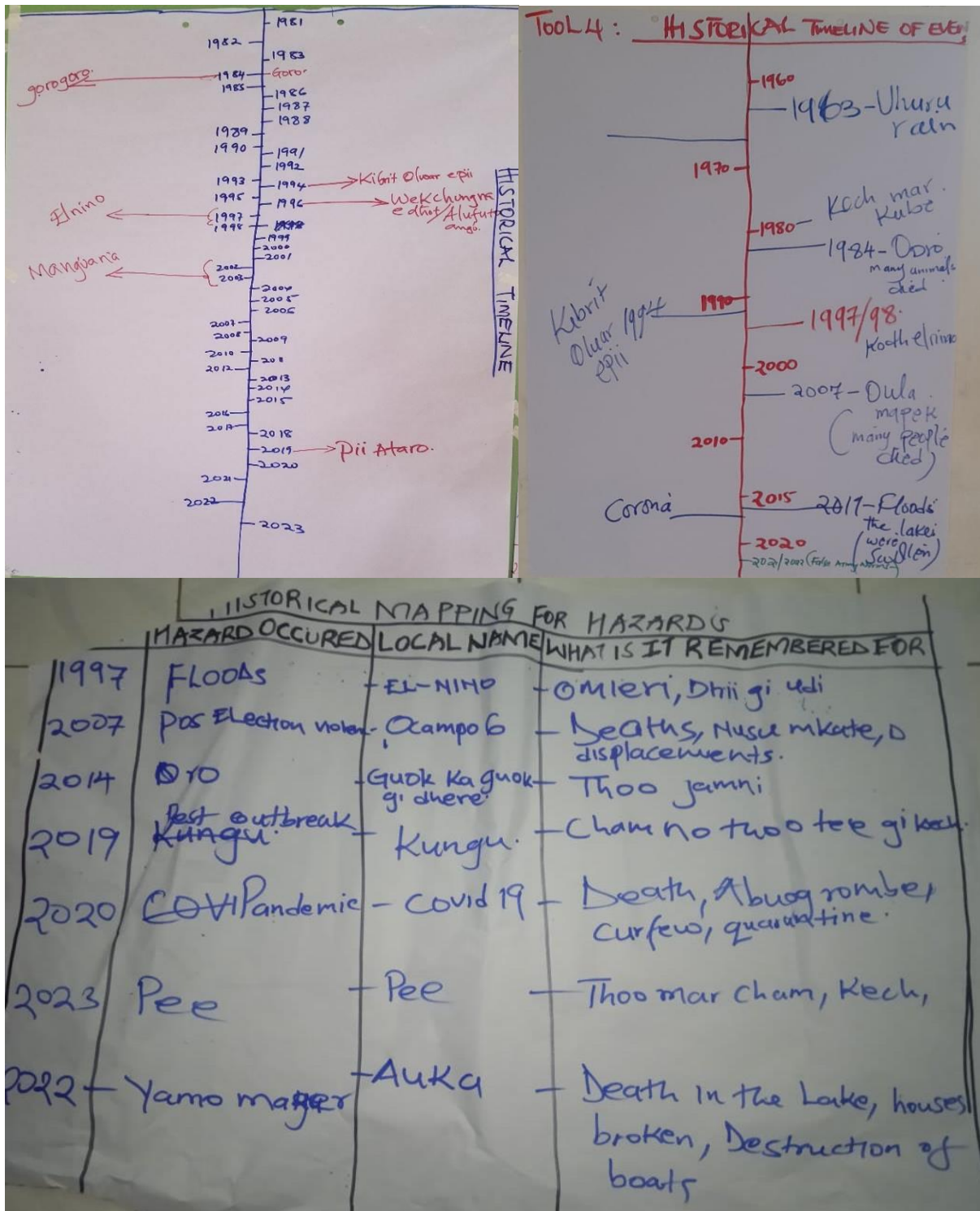


Figure 16: Sample historical timeline in Rachuonyo East

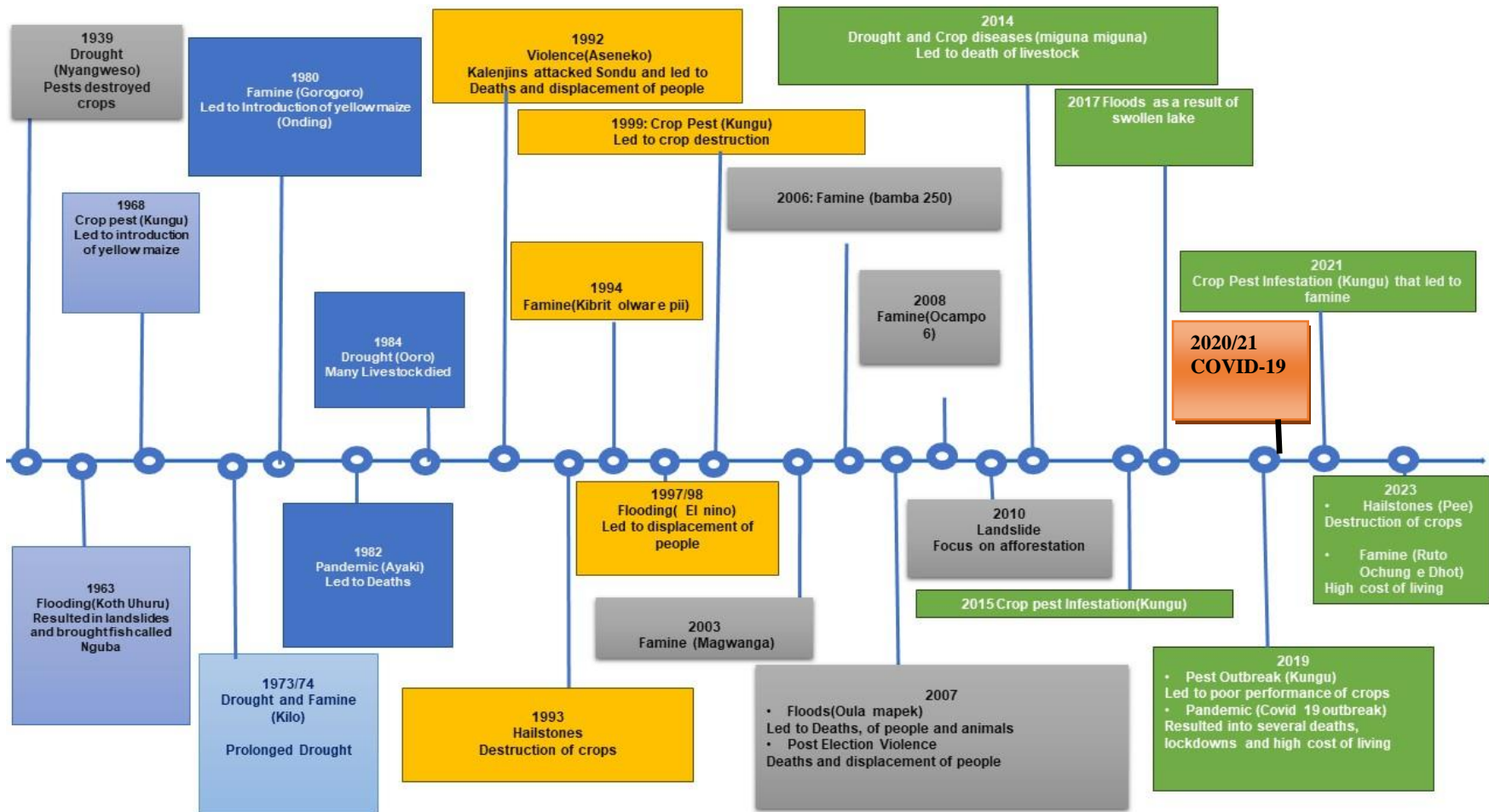


Figure 17: Historical Timelines Flow chart

Module 3: Vulnerability Assessment

2.1.6 Tool 6: Hazards Impacts Vulnerability Matrix

Vulnerability assessment involved identifying hazards and their related impacts on livelihoods. The participants were asked to identify the most prevalent hazards and list the related impacts including the local responses that people in the community currently use to mitigate the negative impacts of these impacts. They also evaluated the effectiveness, sustainability, and the potential for adaption of the responses. The exercise was built on the previous exercise (Tool 3: hazard identification and ranking) and provides an insight into the community's capacity to adapt to the hazards, including the potential to strengthen their resilience. The consolidated community hazard impacts are summarised in the table 10 below, see also Figure 20. In the exercise, the women, men and youth groups identified key impacts realised from the key hazards already identified under tool 3 above. Some of the issues mentioned from key hazards are highlighted bellow.

Drought

- This was the most prevalent hazard across the four sub counties and has in the past led to death of animals. It was reported that during droughts, community would rather sell their animals than loose them in drought. This however only works for a short time and is not a very a sustainable solution because it leaves the community poorer. They also won't have enough money to buy feed or look for pasture and water for long distances every drought season.
- During droughts, some community members dig boreholes while others walk long distances especially in Rachuonyo North to fetch water from the lake, this is usually a slightly better option than buying. But this is not sustainable since the lake water must be treated and boiled for it to be clean and safe for drinking.
- When water levels in rivers reduces, construction of boreholes for sources of water is highly effective and also sustainable since individual families can dig their own wells and get access to water. labour is also readily available and cheap.
- Drought causes famine which leads to lack of food in most cases. Food rationing and diversification of livelihood are slightly effective options and can also be sustained since food is preserved and can be taken for a longer scale. Diversification of livelihood though efficient needs capital and skills hence a bit sustainable.

Floods

- In the past floods has resulted in migration to safer grounds and displacement of communities from their homes. However, this is not usually sustainable due to inability of authorities to provide all the necessary needs such as food, and other basic need, hence not sustainable.
- Some groups reported that floods can wash away topsoil and cause increased soil erosion that rid the soil of its quality. While applying organic/local manure to leached soils caused by flooding, making terraces is certainly effective in flood management. However, the constant washing every flooding season makes the work meaningless.

- Flooding has in the past caused water borne diseases, participants from Rachuonyo North, East and South both reported to have witnessed outbreaks of cholera before due to effects of floods. Water borne diseases caused by flooded water can be effectively solved by seeking medical intervention from health centres. However, this requires money and also acquiring one of such a facility requires stakeholder intervention, funding and expertise, which are long term goals. It there is not sustainable.

TOOL 6: HAZARDS IMPACT MATRIX

HAZARD	IMPACT	LOCAL RESPONSE	EFFECTIVENESS	SUSTAINABILITY
Kech	Family dispute Tho mar Jamni -Kuo -Outbreak of disease -Mitra Dar marji	-Mkum uso -mar cham -Goto ame -Pith mar bel -Kod mjamula	-Nokonto ebugo -doro	Chiefs noketo arim e for uso
Oro	-Tho -Outbreak of disease -Riembo dhokj (Jamni) -Nyul ne odok opiny	-Gero dams -Keto leama -aluora -Kano kuanj -Pidho Ogada -Keto chiemo -moremo	-chokopi mitija -go saa oro. -Noduokhuche -chien -chiemb chhou -rey udore chiere -oro. -Nyul nadok -Ewange -Nlecho mar -mon modok chien	2 3 1 1 2.
Flood	-Mukmok mar ud -Sienyumok mar lo -Thoo -Tuoche -Dar	-Dar mar -Jomanidhoo -Gero Pams -puro bo arua -Gero olalo -Kumo chop -chwako pii -Kwato komj	-Tuoche mikelo -Kod pii nodok -chien -Thoo mardhano -nadok chien -tot mar unoth -gen'othuoche -mitelo Kod lil -mar aluora	3 2 3 3 1

Figure 18: Hazard impact vulnerability assessment

Table 10: Review and evaluation of local responses of hazard impacts

Hazards	Impacts	Local Response for community	Rate 1-3	
			Effectiveness	Sustainability
Drought	Caused death of animals due to lack of food (some became emaciated)	Long distance for water, pasture & destocking	2	2
	Poor germination of crops and Reduced crop yields (Crop failure)	Planting of drought tolerant crops	2	2
	Water Scarcity	Fetching water from the lake, Digging boreholes	2	2
		Preserve water points e.g., springs and wells	1	2
		Use water sparingly	2	2
		Use of water for the prioritized activities only	2	1
	Drought brought famine (Plants dried up); causes poverty	Food rationing; Livelihood diversification	2	2
	Malnutrition especially in small children	Seeking for help from govt and other well wishers	2	1
	Rivers dried up	Construction of boreholes	3	3
	Emergence of crop pests and diseases	Planting of trees, crop rotation	2	2
	Diseases outbreak/human diseases (Ulcers)	Going to hospital, Government support sought, closure of public gatherings	2	1
Prices of commodities escalated	Barter trade	2	1	
Famine	High food prices; Lack of food; Low income	Food rationing; Farm hard work & perseverance	2	2
		Casual labors/ jobs to get food	2	1
	Malnutrition; Causes children to drop out of school (Reduced learning)	Government intervention e.g., school feeding programs; Relief food and help from well wishers	2	1
	Other diseases (depression, ulcers etc.)	Counselling, seeking for help	3	3
	Domestic violence (causes family misunderstandings)	Seeking consent of one another before making of some decisions on meals; Looking for casual jobs	2	3
	Insecurity: Leads to increased theft cases (Stealing)	Planting crops that mature faster; encourage diversification of livelihoods; kazi mtaani	3	1
	Causes poverty	Diversifying in livelihood activities e.g., agro business;	3	2

	Depreciation of livestock value	Preservation of meat (Alia)	2	1
	Death of Livestock	Destocking	2	1
Floods	Causes soil erosion and landslide	Building of gabions,	3	2
	Leads to bursting of rivers	Avoid activities in river reserves (riparian lands)	1	0
	Displacement of people (Leads to migration of people)	Migration to safer grounds	1	2
	Leads to water borne diseases e.g., cholera and other diseases	Building of hospitals through government interventions	3	1
	Destruction of farms; Destruction of property	Construction of ridges	2	1
		Plantation of Napier grass and trees along the edges of farms; Planting crops which do best in flood and swamps	3	3
	disruption of livelihood activities e.g., business			
	Caused water pollution	Boiling water for drinking	2	1
	Disrupted learning in institutions			
	infertility due to flooding	Applying local/organic manure and making terraces	3	2

The vulnerability matrices are presented in table 11 and 12 below.

Rating scale:

1- Least effective or least sustainable

3- Most effective or most sustainable

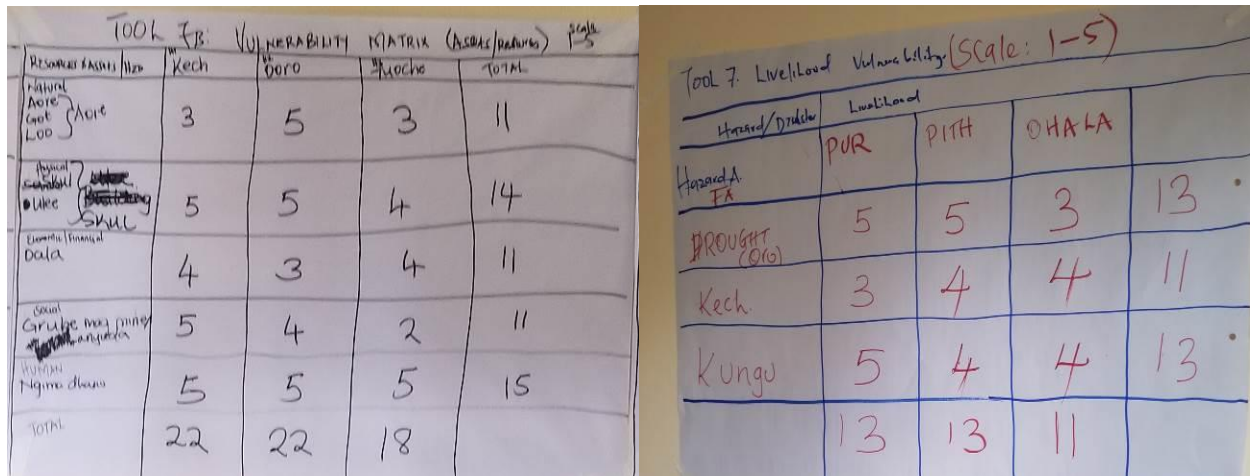


Figure 19: Sample vulnerability matrices encompassing Tool 7A and 7B

2.1.7 Tool 7: Livelihood vulnerability

This tool was introduced to assess the vulnerability of livelihoods to climate hazards which are believed to not only affect resources and assets but also livelihoods. Besides communities understand impact more specifically based on impacts on livelihoods. Each livelihood was analysed based on their vulnerabilities to the identified climate hazards. Each hazard was assessed based on how they impact the top three livelihoods in the community. The summary reflects the average scores from the four sub counties and is also focussed on the key livelihoods and hazards ranked among top three. The Likert scale measured the degree to which the hazards impact the livelihood in question i.e to what extent does drought affect farming, or to what extent does drought affect livestock keeping etc.

Drought is the most important hazard (Table 11) identified by all groups, since it threatens their very key livelihood which is farming and livestock activities in same manner. It also threatens businesses since most businesses depend on produce from the farm. A disruption in the chain disrupts the whole cycle. Floods affect farming by sweeping farm crops, causing soil erosion and causing soil infertility. It affects livestock and business in a slightly lower magnitude, the same as disease outbreaks. Farming is the most distinct livelihood in the community with many community members practicing it as a means to pay school fees and for food security and hence becomes the most sensitive. Similarly, livestock keeping is affected in a similar way. Business gets affected by climate change the least.

While drought still remain the topmost impactful disaster hazard of all, resource vulnerability indicates that Land and rivers, schools and casual labour are most impacted community resources, respectively (Table 12). Effects of droughts for instance was reported to lead to high temperature which often “burn grass” leading to reduced crop pastures, the hot sun also “burns crops” in the eyes of some respondents. Most economic/financial resources are dependent on natural resources, majority engage in sale and trade of agricultural commodities,

so during drought when resources are affected, natural resources are affected and render nothing to sell to get financial resources.

Table 11: Livelihood vulnerability matrix

Tool 7: Livelihood vulnerability					
No	Hazards/ Livelihood	Affected Livelihoods (Rate 1 - Least affected, 5 - most affected)			
		Drought	Floods	Disease outbreaks	TOTAL
1	Farming (Pur)	5	5	4	14
2	Livestock Keeping (Pith)	5	3	4	12
3	Business (Ohala)	4	3	3	10
	TOTAL	14	11	11	

Table 12: Livelihood Resources and Assets Vulnerability matrix

Affected Livelihoods (Rate 1 - Least affected, 5 - most affected)					
Category	Livelihood Resources and Assets	Hazards			TOTAL
		Drought	Famine	Floods	
Natural resources	Rivers	5	4	3	12
	Lake	3	3	3	9
	Forests	4	2	1	7
	land	5	4	5	14
Physical resources	Buildings	1	1	1	3
	Dams	3	2	0	5
	Roads	2	1	1	4
	Churches	2	1	2	5
	Schools	5	4	5	14
	Hospital	4	3	5	12
Economic and financial resources	Markets/ business	4	5	4	13
	Farming	5	4	4	13
	Livestock	5	5	4	14
	Business	3	4	5	12
	Casual labor	5	5	5	15
Social Resources	Women groups	5	4	3	12
Human resources	Skills and Knowledge	5	4	4	13
	TOTAL	71	59	59	

2.1.8 Tool 8: Community group (Gender) vulnerability

This was an additional tool incorporated to enrich the PACDR framework like the Tool 7 above. This tool assessed how the key climate risks affect different gender groups in the community differently. Similarly, the summary reflected the average scores from the four sub counties and is also focussed on the top three climate hazards in the four sub-counties. The Likert scale of 1- 5 measured the degree to which the identified hazards affected women, men, youths, children and other groups in the community. The tool provides an indication of the segment of the community most vulnerable (Table 13).

Interestingly, women overwhelmingly agreed that they are the most affected by hazards (15) more than any other groups, they agreed with the opinions of youths as well. Men although thought they are the most affected by the hazards (15), but this was not in agreement with women and the youths said. On the overall women were the most vulnerable going by all the groups.

In all the four sub-counties, women were considered the most at risk to all climate hazards mentioned. Other groups referred to here are people living with disabilities (e.g., blind, lame), children and the elderly (senior citizens). Women's high vulnerability was reported to be caused by the fact that they are mostly at home, and in most cases dependent on their husbands yet they carry the emotional and physical burden of the family. This therefore increases their susceptibility. Again, it was some groups in Rangwe and Ranchuonyo North reported that women are expected by cultural to play certain roles in the community such being the homemakers, this means they must take care of all the households before they consider themselves. This they must do despite their weak coping strategies, and lack of resources as compared to their male counterparts. Again, women shoulder most of the family responsibilities, as such, extreme climate hazards that affect family livelihoods will most significantly impact women disproportionately.

All groups indicated that, youth men and children were the least affected vulnerable citing reasons such as the fact that youth men are rarely at home, that they are rarely absorbed into what is happening at the home, and they also always have somewhere to go and eat when their homes have no food. For children, it was explained in many groups that they are still under parental care and must depend on everything from their parents, who will go out to strive for them.

Table 13: Gender vulnerability analysis report summary

Group	Hazards/Disaster	Gender groups (Who was most affected (Rate 1 - Least affected, 5 - most affected))						
		Results averaged for county (rounded off to nearest whole number)						
		Women	Men	Youth Men	Youth Women	Children	Others	Totals
Women	Drought	5	3	2	4	5	5	21
	Floods	5	2	2	5	5	5	24
	Diseases	5	4	3	4	5	5	26
	SUB TOTAL	15	9	9	14	15	15	
Men	Drought	3	5	2	4	1	4	19
	Floods	4	5	3	4	1	4	21
	Diseases	5	5	5	4	2	4	25
	SUB TOTAL	12	15	10	12	4	12	
Youths	Drought	5	4	5	4	5	5	28
	Floods	5	3	2	4	5	5	24
	Diseases	3	3	2	1	1	1	11
	SUB TOTAL	13	10	9	9	11	11	
GRAND TOTAL		40	34	28	35	27	38	

Tool 8: Key Outcomes

- Women are the most devastated gender group in the whole county.
- The group represented by “others” i.e., elderly, people with disability and socially vulnerable are the second most affected gender groups by disasters.
- Women and men groups responded that diseases are the most devastating hazard across all gender groups in the county.

Tool 8: COMMUNITY GROUP VULNERABILITY (2008-09)

Hazard/Disaster	Gender groups						Total
	Women	Men	Youth men	Youth women	Children	Others	
1. Kech	5	3	3	4	1	5	21
2. Oro	5	2	3	4	1	5	20
3. Tuoche	5	4	2	2	5	5	23
Total	15	9	8	10	7	15	

Figure 20; Sample tool 8 developed by men in Rachuonyo South Sub county

2.1.9 Synthesis of the vulnerability findings for the four sub-counties

Climate and environmental change have widespread and significant implications for community livelihoods, infrastructure, and natural resources. The nature of effects varies with exposure to each hazard/incremental change (floods, droughts, disease outbreak e.t.c), together with the vulnerability of the village, which depends on the livelihood activities and the extent to which they are influenced by climate.

Noting that Homa Bay relies on rainfed agriculture which was also highlighted as the leading livelihood, changes in rainfall or moisture stress affect the farming seasons, and the overall decline in harvest, particularly in cereal crops which is the mainstay of the farming livelihoods. Again, the County faces increased drought incidences owing to changes in climate change and fueled by the natural drier conditions characteristic of the lake basin owing to its climatological and geographic conditions. Flooding within the four sub-counties, especially within the areas of Rachuonyo North is historically documented problem which is attributed to the relatively topography of the lake basin zones characterised by black cotton soils. Flooding therefore becomes more prevalent during periods of intense rainfalls. In the sub county of Rachuonyo North, especially Osodo community, flooding is almost a recurrent annual problem which often leaves trails of destruction, losses, loss of livelihood and displacement. Flooding was also linked to landslides in some parts of Rachuonyo South and East. Where minor mining

and extractions activities are rampant. In Rachuonyo South in 2008 due to El Nino rains there was landslide at Ranyenya that caused displacement of community members from their homes and disrupting learning in schools. Moreover, human health is increasingly being compromised by climate change and climate variability with increased disease prevalence such as malaria parasite believed to be catalysed by climate change.

Gender differentiated vulnerability was significantly reported based on the Tool 8 above. Women, the vulnerable groups come top in the vulnerability list, and this is in agreement across the men, women and youth groups. Tool 8 served to clarify the reasons behind the vulnerability and to allow each group objectively to look at the impacts based on specific effects. It is the reality that extreme events like drought and famine affects the listed groups differently owing to their fragility, low resource capacity and general susceptibility to extreme harm. During drought, women for instance travel long distances in search of water, children on the one hand may suffer malnutrition and growth defects due to poor feeding. More importantly, cultural expectations on women even during disasters also significantly contribute to this vulnerability. This therefore puts them on frontline to vulnerability.

Module 4: Responses to the impacts of hazards

This module assesses how communities responded to the impacts of hazards through decision making.

2.1.10 Tool 9: Decision Making Change pathway.

With the occurrence of climate related risks and hazards, critical decisions are often made by the community both at the wider community level and even at the household level. The participants listed some typical decisions usually taken during disaster hazards in Table 14. Some decisions included efforts to dig wells and drill boreholes during droughts or selling of household animals or other items of the family.

Both men, women, and youth groups across the four counties agreed that most decisions during hazards are done jointly between men and women in the household. In Table 13, we can see the highest score of 16 on the column of joint/both implying decisions between men and women in a household setting. This means that both men and women usually have equal rights to make decisions during hazards. Nevertheless, some women groups reported that men generally have an upper hand and are usually the lead in most cases, which shows they have full control over most things in their homes.

In as much as youths have a place in the present society, majority have very little impact (4) when it comes to making decisions during disaster. This may be since; many youths still don't have full ownership of resources and most of them are still under parental care. Children have the least authority to make decisions here. Perhaps children who are old enough to make decisions on their own can take part under the guidance of their parents.

TOOL 9: DECISION MAKING CHANGE PATHWAY		Who made the decisions		
Hazard/disaster	types of decision made during disasters	women	men	children
oro	Destocking	✓	✓	
	Livestock migration		✓	
	Reduced number of meals	✓		
	Type of crop to be planted	✓	✓	
	Food preferences	✓		✓
kech	Reduced number of meals	✓		✓
	Food preferences	✓		
	change of preference in meal taking	✓		
	Destocking/selling of properties	✓	✓	
	Migration	✓		
kungu	Type of medicine-control	✓	✓	

Figure 21: Decision making matrix from Rachuonyo South Meeting

Table 14: Decision change pathway

Hazards	Typical decision made during disaster/hazard	Who makes the Decision?				
		Men	Women	Both	youths	Children
Drought	Digging shallow wells and boreholes and dams	✓				
	Water conservation and preservation	✓				
	Religious intervention			✓		
	Additional Water storage devices in readiness for rainfall		✓			
	Storing silage for livestock			✓		
	When to start preparation of farms			✓		
	Irrigation (crops)			✓		
	Planting trees	✓				
	Planting of Napier grass	✓				
	Buy water tanks and donkey carts for fetching water from rivers		✓			
	Selling livestock (de-stocking)			✓		
	Food preference		✓			✓
	Using water sparingly and searching for sources of water		✓		✓	
	Floods	Digging trenches	✓			
Planting of nappier grass		✓				
Construction of ridges/ canals		✓				
Deciding if to apply mulching				✓		
Planting nappier grass along the farm		✓				
Planting trees such as gravellier along plantations				✓		
Digging pans and directing runoff				✓		
Migration to higher grounds/ seeking help				✓	✓	
Diseases	Keeping the environment clean (good and proper sanitation)			✓	✓	
	Spraying crops			✓		
	Water treatment to use			✓		
	Good nutrition and fruits	✓				
	Deciding on good farming methods			✓		
	Seeking medical attention from hospitals			✓		
	Praying for divine intervention			✓	✓	
	Inviting Herbalists to help			✓		
Total		9	4	16	4	1

Based on the hazard vulnerability and impacts analysis and decision-making during hazards in Module 3 above, Participants determined the need for action in light of the strength of the impacts and responses in Table 15.

Table 15: Hazard Impact and action

Hazard	Severity of Impact	Strength of existing response	Need for action
Drought	3	1	3
Floods	3	1	3
Disease Outbreak	3	2	3

Tool 9: Key Outcomes

- *Majority of decisions in the community are made jointly by both men and women.*
- *Youths and children are involved in least decisions made during disasters.*
- *The Key hazards identified are severe, however weaknesses in the local response mechanisms exist, thus the need for external interventions.*

2.1.11 Tool 10: Role Changes – Access, control, and ownership of Resources

Tool 10 was part of the added tool to the PACDR framework to assess the extent to which disasters disrupt the access, ownership and control of community resources. Communities' access to resources and assets may be affected by the occurrence of disaster events. For instance, an occurrence of landslide may displace community thereby affecting their access and ownership of resources that were previously in their possession. Again, flooding may hinder access to resources like rivers and lake. On the one hand, disaster impact on households may lead to changes in access, control or ownership of family assets and resources like livestock of land, for instance, an item in the house may solely belong to a woman, man, or child, but when disaster strikes, another household members may have a say on how it is used to help the family cope with the disaster.

Some specific issues that emerged from the community include:

- ❖ There's totally no access, control nor ownership during flood hazards over land especially in areas near riparian areas and flood prone areas. The most appeared to come from Rachuonyo North due to their proximity to the lake.
- ❖ During drought, roles really don't matter, the participants said that their greatest concern during drought and famine is simply how to put food on the table. Anyone with access to or ownership of anything that can help the family has the responsibility if using it for the general good of everyone affected. For example, if a child has chicken in the family and the family is down on hunger, the chicken can be sold or taken at will to provide support to family.
- ❖ Some disasters like landslides can completely block people from accessing their land or assets on the ground. This happens a lot when the governments or authorities walk in to exert some control. Like recently witnessed in Rachuonyo East and South when some mines collapsed because of landslides. The government imposed a no access rule.
- ❖ Access to resources like rivers and forest have been affected before in all the four counties. In Rachuonyo North, when river Kibuon bursts its banks, it can no longer be accessed.
- ❖ Men are the most affected through changes in ownership, access and control, they have to lose some aspects of both owing to the fact that they are traditionally the beneficiary of greater access, control and ownership. During disasters therefore, they lose access in almost all resources since the other family members may have to be fully involved in decisions on their usage.

The following Table 16 highlights the scores given to show the change in access, control, and ownership of resources during extreme events.

Table 16: Role changes

Hazard	Resources	Observed change (0- none defined role, 1- greatest change, 3- least)					
		Access		Control		Ownership	
		Men	Women	Men	Women	Men	Women
Drought	Land	3	2	3	2	3	2
	Rivers	3	2	2	2	0	0
	Forests	3	3	3	2	3	3
Disease Outbreak	Land	3	2	3	2	3	3
	Rivers	3	3	3	3	3	3
	Forests	2	3	3	2	3	3
Flood	Land	0	0	0	0	0	0
	Forests	3	3	3	3	3	3
	Rivers	3	3	1	1	3	3
Grand Total		23	21	21	17	21	20
Prorated		2.2	2	2.3	1.9	2.5	2.3

Tool 10: Key Outcomes

- ✓ Ownership, control and access are all affected to some degree during disasters/hazards events.
- ✓ Access of resources is the most affected during disasters for both men and women.
- ✓ Women's control is the most affected as compared to control and ownership status.

Module 5: Adaptation Pathways

2.1.12 Tool 11: Adaptation options and Rank

Based on the identified climate hazards and disasters, the community discussed and identified possible adaptation strategies which may help enhance the communities' coping strategies. These strategies also speak to what the community may do in the future should similar climate hazards extreme events recur. In module 1, the community identified their main hazards which included drought, floods and diseases outbreak. To overcome these hazards discussed key adaptation issues presented below.

- ❖ The most prioritised measure included irrigation, which is challenged by inadequate resources. nonetheless, it improves food production and ensure food security.
- ❖ Practising agro forestry including planting water friendly trees such as grevia was argued to create a microclimate and attracts rainfall thereby presenting multiple benefits to the farmers. The key challenge with this was the lack of adequate funds to purchase the seeds, and the seeds are not readily available.
- ❖ Participants reported that evacuation is the fastest and most convenient fast respond to most hazards especially floods. Evacuation leads to safety of lives, but this is challenged by the fact that it may also fuel conflict. Some community member reported that conflict may arise in the places of temporary shelters or relocation as people often scramble for food and other necessities. Constructing ridges, and planting Napier grass along erosion-prone landscapes are other measure to combat floods. They lead to improved soil fertility and improves soil structure. But these are compounded by several issues such as soil erosion.
- ❖ During disease outbreaks, most participants reported that using herbal and natural drugs worked well for the community. Some participants from Rachuonyo East reported that during Covid-19 outbreak, many individuals relied on herbal concoctions to boost their immunity. Besides, the community indicated that sensitisation on better hygiene such as use of toilets built at household level may also promote adaptation towards diseases. The only challenge is that such constructions may require capital which poor members of community may not afford.

Tool 11 and Table 17 gives a breakdown of the adaptation options suggested for each hazard identified and gives ranking based on the order in the list

TOOL II: ADAPTATION STRATEGIES AND RANK

Hazard	Adaptation Options and Rank	Challenges	Opportunities
ORO	Destocking.	- Lack of market.	- Investing from the money.
	Irrigation.	- Investing - Expensive.	- Spreading the risk / transfer.
	② Establish water reservoirs / kungo yao	- Expensive. - Water borne diseases. - Danger zones.	- Increase production - Promote creativity.
	② Planting drought resilient crops.	- Inadequate technical know-how on soil composition.	- Fish ponds. - Water can be used for irrigation.
	④ Introduction of dry matter to livestock.	- Storage. - Post harvest handling. - Coping.	- Capacity building - Increased production.
	③ Crop diversification.	- Lack of resources - Limitation of land - Lack of knowledge.	- Balanced nutrient. - Increased milk production. - Reduced infection in animals. - Lowered production cost.
① Introduction of organic farming	- Inadequate organic matter - Labour intensive.	- Food security. - Improved soil fertility / nutrients - Household nutrition.	
			- Healthy food & healthy eating / nutrition.

Figure 22: Tool 11 showing the community adaptation options and their challenges and opportunities.

Table 17: Tool 11 Communities' adaptation strategies, challenges faced and the opportunities

Hazard	Adaptation Option	Challenges	Opportunities
Drought	Irrigation	Inadequate resources	Improved production
	Planting of agro forestry trees e.g., grevillea on farms	Lack of enough land/ seedlings	Regular rainfall (creates a micro climate)
	Sinking boreholes/ wells/water points	Lack of expertise/ resources	Stakeholder involvement, source of income to youths
	Introduction drought resistant crop e.g., cassava	Long term maturity, loss indigenous species of crops	Bumper harvest and food security
	Destocking: selling of livestock	Low prices of cattle	sustainability of remaining animals
	Community rotational grazing: Free range grazing	Total loss of the animals, spread of cattle diseases, poor care of livestock	Open infrastructure
	Planting drought resistant crops	Human animal conflict	
Flood	Migration to higher grounds	Conflicts, cost of movement went high, deaths,	
	Construct Ridges	Sinking soils, soil erosion, resources for labour	Intact soil, increased food production
	Planting of trees and nappier grass, change in farming patterns	Lack of seedlings/cuttings	Retain land fertility
	Digging water pans and directing runoff: Opening of canals	Resources strain (expertise, labour)	small scale irrigation, involvement of partners
		Increase in mosquito infestation, diseases	Source of income, relief food, medical camp, draining of water, jobs Increased fishing, sand harvesting
Disease outbreak	Use of herbal drugs	No proper dosage, can lead to death, some were ineffective	Building of toilets at household levels
	Quarantine	Separation of families and loneliness	construction of hospitals
	Prohibited sharing of items	Leads to selfishness and stigmatization	enhance hygiene among the people
	use of holes in disposal of human wastes	Spread of diseases, embracing	sensitization at community level

Module 6: Co-benefits of adaptation strategies

This subsection (Tool 12) presents the co-benefits of each of the adaptation strategies identified (Table 18). The co-benefits represent added advantages of given interventions to both intended and unintended beneficiaries. They are commonly referred as the fringe benefits of adaptation programs. For each adaptation strategy, the participants across the four sub counties identified key co benefits. For instance, while actions like sinking boreholes and constructing dams were deemed effective in overcoming drought by supplying water during drought, the participants reported that they can also be opportunities for supporting irrigated farming and aquaculture by rearing fish in the ponds. It was also interestingly reported that boreholes encourage community togetherness as people will always converge near watering points and this helps them to catch-up and network thus fostering stronger relationships. Other co-benefits reported during the meetings are highlighted below:

- Planting drought resistant crops besides promoting food reliability (food security) was reported to result in improves nutrition, serves as a source of income and introduces local seeds bank which the community can keep replanting. It's the opinion of the consultant however, that, for effectiveness, there should be readily available and affordable seeds to the community owing to the changes in climate and soil conditions that might not require doing things the same old traditional way, so capacity building and innovation centres and opportunities for training for value addition.
- Construction of ridges was mentioned in Rachuonyo South as a way of increasing land fertility. The ridges in the communities' perspectives are heaped soils on the edges of terraces at the margins of a farm. the ridges, besides being helpful in promoting soil and water conservation, may also be useful in planting short-term maturity crops and vegetables.
- Irrigation was mentioned as the most appropriate way to tackle drought. It creates employment opportunities and improves food security especially in dry areas ensuring continuous production. Participants from said that they have seen increased food production in places where irrigation was applied, especially in Rangwe and Rachuonyo North.
- Changing farming practice controls soil erosion and improves soil fertility. Practices such as agroforestry and intercropping were reported to have tangible benefits to the soil and the environment at large. But they noted that the practices require creating awareness on climate change and having a nursery bed to provide seedlings for agroforestry work. The tree nurseries may also promote livelihoods through sales.

2.1.13 Tool 12: Co-Benefits

Table 18: identification of the Co-Benefits of the prioritised adaptation measures

Hazard	Prioritized Adaptation	Co-Benefits	Further improvements of Co-Benefits
Drought	Access to clean safe water. Sinking boreholes/wells, protecting springs, installation of household water storage facilities	Stakeholders' involvement	Provision of enough land/ space, enough and good labour, local materials
	Planting drought resistant crops	Introduction of local seeds	Provide organic manure, seed preservation
		Improved production and nutrition, and food security	Access to quality seeds
		Farming reliability	capacity building and Innovation centres
		Income generation	Training on value addition
	Construction of ridges	Increased food production, and Increase land fertility	Introduction of mixed farming, increase acreage
	Irrigation	Employment	Training skills on advance irrigation, Provision of modern irrigation solutions
		Improved food security and continuous production	Extension of irrigation lands
	Conservation agriculture through sustainable farming practices and agroforestry	Controlled soil erosion	Introduction of more tree nursery
		Improved soil structure/fertility	Awareness to climate change
	Searching for water	Digging of wells and boreholes	Piping of water from boreholes

Module 7: Community Adaptation Planning

2.1.14 Tool 13: Community Adaptation Roadmap

The adaptation planning process involved development of community adaptation program of action that provided a road map towards the realization of the prioritised adaptation strategies in the most timely, cost-effective, and sustainable manner. Tool 13 and Table 19 provides a summary the outcomes of this exercise. The action map required having defined prioritized measure, timelines, actors, resources needed and costs, and actions in the long and short term. The major timelines of this study ranged from 1-2 years depending on how the activities need to be accomplished and availability of funds.

Some actors mentioned by the community as potential partners included charity organizations such as JAM, county governments, and non-governmental organizations (NGOs). The main responsibility lies within the community itself, individual families, Community Based Organizations (CBOs) and to some extend county and National governments. Labor, land and availability of funds were the most important resources needed. The groups mentioned costs required and the support needed.



Figure 23; Community adaptation planning session during consensus meeting

Table 19: Community climate adaptation roadmap

Prioritized Adaptation	Timelines	Actors		Resources needed	Cost	What will be done at community level	What external support/action is needed
		Responsibility	Partners				
Sinking boreholes/wells	6 months	Families/farmers, Youth groups, Community groups	JAM, County and National Government, World Vision	Funds (money), Land (1/4 acre), Experts	1 million	Provide labour and Management, Provide local available materials, Security	Expertise/ training Enough funds (finance) Purchase of land
Plant drought resistant crops	3 months -1 year	Families MoA through the County Government	JAM, National Government, NGOs, NDMA, cooperatives (KIMIWO)	Land, manure, farm tools seeds/cuttings/seedlings Finances, Labour	(1/2 acre) 50 M 10 people	Labour, local management, Security land, manure, market, farm tools	Provide proper expertise Inputs (such as seeds/ cuttings) Finance, Labour Seeds, markets, training, value addition Irrigation
Construct Ridges	1 month	WRUAs, Youth groups, Area chiefs	National Government, Water Resources Authority (WRA), Red cross, JAM and other NGOs	Labour, Finances, expertise	100K	Local labour	Provide proper expertise Enough Finance Materials
Irrigation	2years	JAM, Practical action	MoA, water irrigation board	lakes/rivers, land, solar water pumps, technicians, trainings, security	10m	land, labor, security.	solar water pumps, trainings, technicians
Agroforestry	2years	JAM, tree for future,	MoA, Kenya forest	land, seedlings, labor, trainings, security	3million	land, labor, security	seedlings, trainings, shades/nets, porting bags
Destocking	3-4 months	Community	National govt, County govt and JAM	Transport and animals, funding	50,000 KES		
Preservation of food stuffs	3-6 months	Farmers, Social groups, County Government	NGOs, NDMA, County & National Government, JAM and other Charity organizations	Pics bags, Fridge/ cold room, Money, Land, Storage space	10 million	Create awareness and unity (unite together) -Labour and skills -Provide temporary storage e.g., granaries	Good infrastructure especially in the interior regions, Funding (money), Good storage facilities (e.g., silos, and tools), More land, to be provided with good security and transportation means
Selling of Livestock	Days- Months (Depending on the urgency of the need)	Individual families (farmers), Group members, County Government	Chiefs, National Government, NDMA, KMC	Potential buyers, Transport means, Markets	5 million	Identify good market places and compare market prices Sell healthy animals at good prices for good profits	Improved security (especially for their businesses), Market linkage with ideal buyers, linking with vets to know the status of disease spread e.g., before selling or buying meat
Using local (organic) manure	3 months	Farmers, Group members	MOA, NGOs, Input suppliers	Livestock, Farm tools, Land, Money	3 million	Provision of labour, Provision of locally available materials	Training and skills, Feedback such as monitoring and evaluation

Economic use of food reserves	4 months	Community	National govt, County govt and JAM	Funding, cereals, building materials	no cost	Done at household level	None
Food rationing	4 months	Community			No cost	Done at household	Sensitization on food storage to avoid losses
Quarantine	4 months	Community	National govt, County govt and JAM	Funding.	none	This is achieved at individual level	National or county Governments
Prohibited sharing of items	4 months	Community	National govt, County govt and JAM	funding	none	Done at individual or household level	

Conclusion

This report presented the outcomes of the participatory assessment of climate and disaster risk (PACDR) community orientation activities in four selected sub counties in Homa Bay county. Participants were chosen representatives of the communities that JAM has been working with through their interventions. A total of 263 were involved in the community exercise. To build consensus on the overall community outcomes for the four sub-counties, 15 persons from each of the four sub-counties were invited for a consensus building meeting sessions on the last day of the orientation exercise. The communities actively engaged in the processes of identifying their resources, livelihoods, hazards and working to build their own adaptation roadmaps. The following list highlight some of the key outcomes of the PACDR:

- The key livelihoods were farming, livestock farming and business
- Droughts, floods and diseases were identified as the key hazards/disasters facing the community and top ranked for immediate action.
- The top ranked resources included land, water resources (rivers and lakes), forest and hills, and schools in the order of priority and importance.
- Farming was identified as the most vulnerable livelihood activity, while drought remains the most devastating environmental hazards.
- Women, the vulnerable groups (disability) and children are the most vulnerable groups in the community.
- While significant decisions during disasters are made by both men and women, there was poor representation and involvement of children and youth.
- The community prioritised construction of water storage facilities/sinking of boreholes/building water storage facilities, irrigation, planting drought tolerant crops and agroforestry as the key option for overcoming droughts and floods.
- The adaptation road map should act as a tool for redirecting intervention by JAM and other interested partners in meeting the communities' own identified needs
- Majority of the community identified JAM, County government, and other agro-based NGOs as the closest partners they would wish to partner with in realizing adaptation goals identified.
- The modified PACDR framework with additional tools served to ease the process of adaptation roadmap development from the community perspective.

Challenges and Lessons learned

2.2 Challenges

- The tools are time consuming and may keep participants seated for long hours to complete.
- Some community members fail to talk throughout the whole session despite being encouraged to do so freely.
- Bigger groups may create problems in consensus building as debates and arguments take longer to settle and agree.

2.3 Lessons learned

- The community is conscious and aware of climate change and its effects, and have always attempted within their capacity to cope, it's the limitations based on resource availability, exposure and lack of adequate information that hamper realization of sufficient adaptation programs.
- The additional tools (Tool 6 to Tool 10) proved effective in helping the community effectively understand the adaptation road map well. The road map emanated from the detailed outcomes of the impacts, vulnerability and role play analysis in the tools 6 to 10. Which then made it easier to develop a future plan of action.
- The more interactive the process the more the interest from participant and quality of discussions and richness of information received.
- Motivation in form of tea breaks and lunch significantly improves communities' participation and interest.
- Enthusiasm of the community is enhanced through prioritization; the community is passionate when discussion the issues they feel have most pressing impact.
- Full involvement of community in the PACDR activities including sketching, drawing, writing and facilitation creates a sense of ownership and a feeling of originality.

Recommendations

Based on the adaptation goals identified against the hazards affecting the community's livelihoods and resources and assets. The following recommendations are proposed by the consultant:

- 1) There is need to build the capacity of the communities on appropriate drought resistant crops considering that the community identified drought tolerant crops investment as a way of overcoming effects of drought.
- 2) Water storage and conservation was identified as a key challenge, JAM and other development partners may offer direct and indirect farm-based water conservation solutions such as water pans, dam linings and tanks for enhancing irrigation and water storage.
- 3) Agroforestry and afforestation of degraded hills was singled as areas of intervention by community; however, the community might not be aware of sources of quality seed and adaptable species of trees and crops, there is need to have a coordinated sensitization program on good agroforestry practices for community's use. The community can be empowered to have tree nurseries for their own use
- 4) Youths and children were found to be minimally included in decision making during climate hazards/disasters, there is need to empower and sensitize the community on the need to build an inclusive decision-making approach that involves all household members including children and youths.
- 5) The outcomes of the gender-vulnerability analysis reveal the need to target interventions based on extent of vulnerability for specific social groups considered highly vulnerable such as women and people living with disability.
- 6) The modified PACDR framework with additional tools (tool 6, 7, 8, 9, and 10) is highly recommended for future PACDR exercises. The tools were not only useful in shaping the focus towards building the communities adaptation roadmap, but also helped reveal specific areas of hazards impacts to the community groups and how this has shaped their resilience building to climate change disasters.

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APPENDICES

Training Program

Table 20: Jam Staff Training

Time	Activity	Responsible
8:30am – 9:00am	Welcoming and Introduction	JAM
9:00am – 9:20am	Introduction to PACDR concept	Consultant
	Breakout Groups (3 Groups)	
9:30am – 10:30 am	Practice Exercise (Tool 1 &2)	Consultant
TEA BREAK		
11:00am – 12:30 pm	Practice Exercise (Tool 3, 4, &5)	Consultant
12:30pm -1:30pm	Practice Exercise (Tool 6 &7)	Consultant
LUNCH BREAK		
2:00pm– 4:00pm	Practice Exercise (Tool 8, 9 & 10)	Consultant
4:00pm – 5:00pm	Practical Exercise (Tool 11, 12 and 13)	Consultant
5:00pm - 5:30pm	Presentations by Groups	Consultant
	HEALTH BREAK	
	END OF DAY ONE	

Table 21: Community Training

Time	Activity	Responsible
8:30am - 9:00am	Welcoming and Brief Introduction to PACDR	JAM /Consultant
9:00am - 9:20am	Breakout Groups (3 Groups)	JAM /Consultant
9:20am - 10:20 am	Practice Exercise (Tool 1 &2)	JAM /Consultant
HEALTH BREAK		
10:30am - 12:30pm	Practice Exercise (Tool 3, 4, &5)	JAM /Consultant
12:30am - 1:30pm	Practice Exercise (Tool 6 &7)	JAM /Consultant
LUNCH BREAK		
2:00pm - 4:00pm	Practice Exercise (Tool 8, 9 & 10)	JAM /Consultant
	HEALTH BREAK	
	END OF DAY 1	
Time	Activity	Responsible
8:30am - 9:00am	Welcoming and Brief Introduction to PACDR	JAM /Consultant
9:00am - 9:20am	Breakout Groups (3 Groups)	JAM /Consultant
9:20am - 10:20 am	Practical Exercise (Tool 11, 12 and 13)	JAM /Consultant
HEALTH BREAK		
10:30am - 12:30pm	Presentations by Groups	JAM /Consultant
	END OF DAY 2	

Photo Gallery





