

CLIMATE RISK PROFILE

PARTICIPATORY CLIMATE RISK ASSESSMENT REPORT FOR KAPENGURIA MUNICIPALITY.
(SIYOI, MNAGEI AND KAPRNGURIA WARD.)

DEPARTMENT OF LANDS, PHYSICAL PLANNING, HOUSING AND URBAN DEVELOPMENT

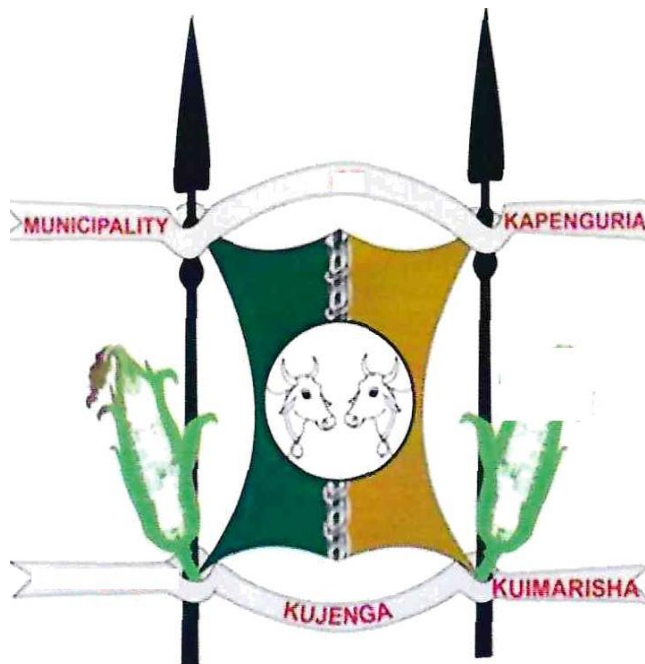


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1. Introduction:

Siyoi, Mnagei and Kapenguria wards are extremely susceptible to impacts of changing climate. Over the years, the municipality has come face to face with unprecedented challenges of climate change impacts and the corresponding socio-economic losses to communities living in the municipality. Most livelihoods and economic activities in the municipality are reliant on climate sensitive sectors namely agriculture, livestock, water, forest, and wildlife. Dependence on these natural resources means that recurring droughts, erratic rainfall patterns and floods because of climate change will continue to negatively impact livelihoods and community assets. Pastoral and agro-pastoral production forms the dominant livelihood in kapenguria municipality, involving about 80 percent of its population. Major sources of income within this livelihood include sales of livestock, livestock products, and crop production, which account for over 80 percent of all county income. Climate change is happening now and is projected to worsen in the future. Kapenguria municipality is extremely susceptible to impacts of climate change because most livelihoods and economic activities are reliant on climate sensitive sectors. The most vulnerable sectors impacted on by climate change in the municipality are agriculture, livestock, pastoralism, forestry, water resources, health, energy, rangelands, tourism, social infrastructure and human settlement and the physical infrastructure. In order to cushion key sectors against the impact of climate change, the municipality needs to undertake locations specific Climate change vulnerability assessment to provide valuable information that will be used to develop management actions in response to climate change.

The Participatory Climate Risk and Assessment is a tool that Communities are required to identify issues affecting them after which a report is to be generated. The findings are then incorporated into the Climate Change Action Plan after which they will be consolidated into the County Integrated Development Plan. The report will then be integrated into regional Climate Change Action Plan because of some of the shared ecosystems. The overall findings will then be integrated into the National Climate Change Action Plan.

The PCRA tool provides the basis for incorporating climate risk considerations into community planning and development and is designed to conduct participatory analyses of risks and their impacts on livelihood resources in within communities.

PCRA objectives:

- Understand how climate and other hazards affect lives and livelihood resources.
- Learn how local people currently respond to these hazards
- Identify adaptation strategies to strengthen the threatened livelihood resources and enhance people's resilience
- Include gender considerations throughout the assessment of climate and disaster risks

The report contains data collected form Siyoi Ward. The facilitator provided a frame of Siyoi Ward Map while the participants mapped hazards within their Ward. The map provided identified the settled areas, important facilities and resources in their Ward which was validated by the participants present during the workshop. In the hazard map, they identified the areas at risk from different types of hazards, and mark these in the appropriate locations on the map.

2.0 SIYOI WARD

2.1 HAZARD IDENTIFICATION

The objective of this activity is to ensure that communities and other key local actors actively participate and have a strong voice in the participatory Climate Risk Assessment Process. During Focus Group discussion, the group identified the main climate and weather hazards that are relevant to them (hazards due to normal seasonal variability; hazards to slow onset changes in seasonal variability; hazards due to (changes in) extreme weather events). The participants identified five hazards that have the greatest impact on them and ranked them according to severity. Among the hazards identified included;

1. Floods
2. Scanty rainfall
3. Gulley erosion
4. Windy storms
5. Crops and Livestock diseases

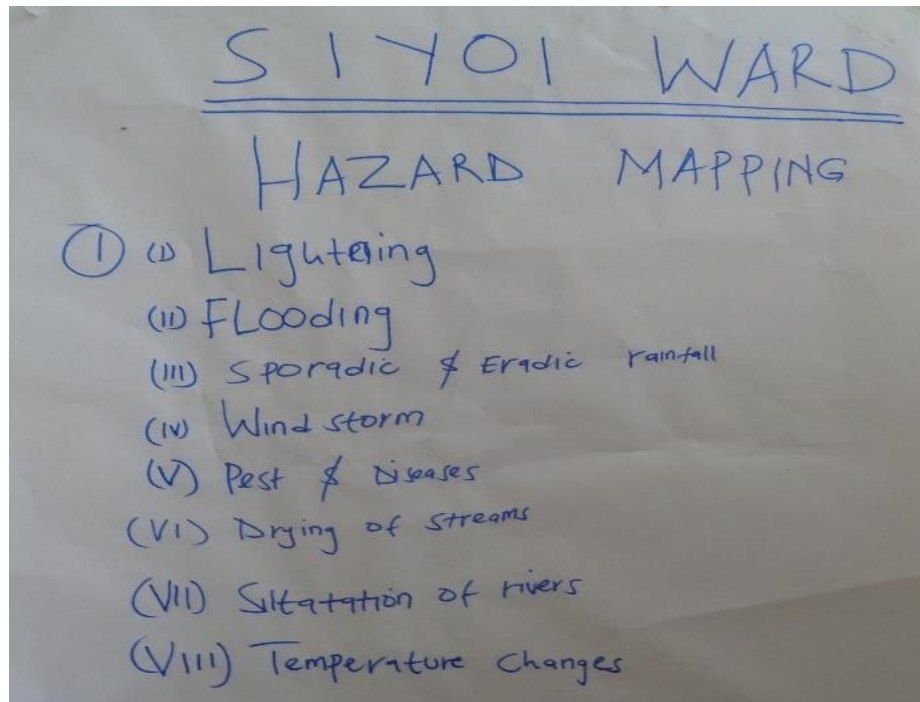


Figure 1 HAZARD IDENTIFICATION AND PRIORITIZATION OF SIYOI WARD

2.2 HAZARD MAPPING

The participants identified different hazards experienced within their localities and their spatial distribution were mapped using different codes.

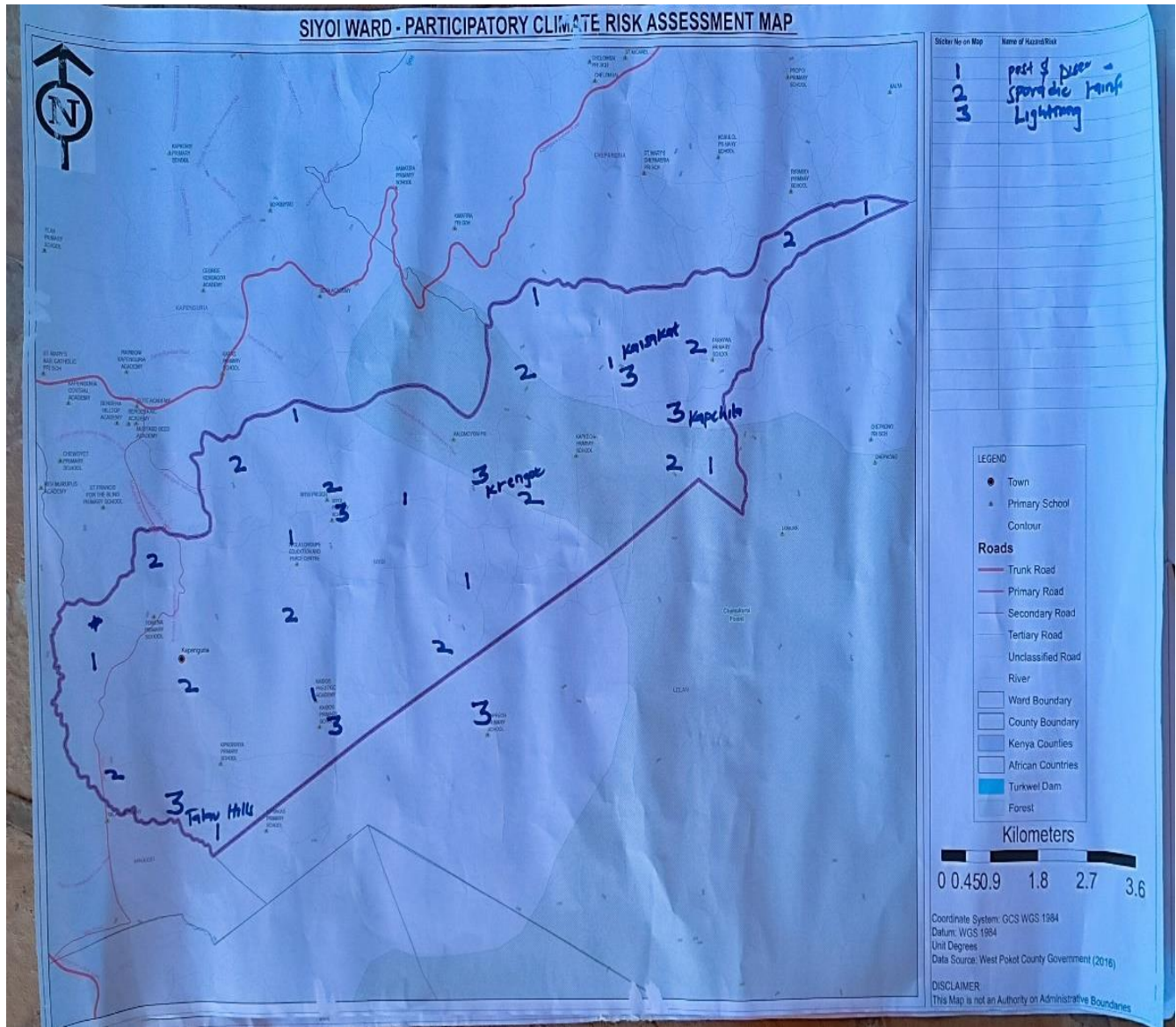


Figure 2 SIYOI WARD HAZARD MAPPING

2.3 HAZARD PRIORITIZATION

The participants prioritized 3 hazards according to severity to their community. Among the listed hazards included;

2. Sporadic rainfall
3. Lightening
1. Pests and diseases

2.4 SEASONALITY OF HAZARDS

The objective of conducting seasonality of hazards was to, analyses seasonal changes in activities and periods of stress or scarcity, identify important livelihood activities, events, and document community observations of changing trends in seasonal patterns of the events and risks. Below is a seasonal calendar for the hazards.

Table 1 SEASONAL CALENDAR

		MONTH OF THE YEAR											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NO	EVENTS												
1.	SPORADIC RAINFALL												
2.	LIGHTENING												
3.	PESTS AND DISEASES												



Figure 3 SEASONALITY OF HAZARDS WITHIN SIYOI WARD

2.5 VULNERABILITY ASSESSMENT

The purpose of a Vulnerability assessment was to enable participants identify the assets and resources most important to people's livelihoods and determine which of the community's livelihood assets and resources are most vulnerable to the main hazards in the community (3 main-prioritized hazards).

The exercise allowed the community members to determine the livelihood assets and resources most vulnerable to climate hazards as identified in the hazard map. The outcome of the exercise were vulnerability matrices generated.

Table 2: VULNERABILITY ASSESSMENT

NO.	CATEGORIES	SPORADIC RAINFALL	LIGHTENING	PEST AND DISEASES	FLOODING	DRYING OF STREAMS	
1.	NATURAL	3	2	3	2	3	13
2.	PHYSICAL	3	3	2	3	1	12
3.	ECONOMICAL	3	3	3	3	2	14
4.	SOCIAL	3	3	3	2	3	14
		12	11	11	10	9	

Rating Scale:

3 = Very Much, 2 = Much, 1 = Not very Much, 0 = Not at all

VULNERABILITY ASSESSMENT

CATEGORY	Sporadic Rainfall	Lightning	pest & Diseases	Flooding	Drying of Streams	
Natural	3	2	3	3 2	3	13
Physical Infrastructure	3	3	2	3	1	12
Economical	3	3	3	3	3 2	14
Social	3	3	3	2	3	14
	12	11	10	10	9	

Scale: 3 Very much
 2 Much
 1 Not very much
 0 Not at all

Figure 4: VULNERABILITY ASSESSMENT FOR SIYOI WARD

2.6 RESPONSES TO THE IMPACTS OF HAZARDS

The participants ranked their responses on hazards according to their effectiveness and sustainability as outlined in the Table 3 below.

Table 3. RESPONSES TO THE IMPACTS OF HAZARDS

HAZARDS	IMPACTS	LOCAL RESPONSES	EFFECTIVENESS	SUSTAINABILITY
Sporadic rainfall	Soil erosion	Early warning to hazards	●●●	●●●
	Loss of live	Knowledge transfer by elders	●●	●
	Destruction of infrastructure	Proper drainage systems	●●	●
		Building gabions	●●●	●●●
	Destruction and low yield of crop production	Education awareness through barazas, schools, churches	●●●	●●●
Lightening	Loss of lives and properties	Wearing of shoes	●●●	●●●
		Early warning to lightening e.g stop wearing red clothes, standing under trees during rain time.	●●●	●●●
	Loss of livelihoods	Looking for alternative livelihoods	●●●	●●●
	Damages to lives and properties	Installing of lightening arrestors	●●●	●●●
Pests and diseases	Loss of lives through starvation	Education and awareness creation	●●●	●●
	Loss of livelihoods	Knowledge transfer	●●●	●
	Low yields in Livestock and crops	Early warning to crops and livestock diseases	●●●	●●

Effectiveness and Sustainability

●●●= Very effective

●●= Effective

●= Not effective

RESPONSES TO CLIMATIC HAZARDS				
HAZARD	IMPACT	LOCAL RESPONSES	EFFECTIVENESS	SUSTAINABILITY
② Sporadic Rain-fall	Soil erosion Destruction of human infrastructure Loss of Lives Destruction and low yield of crop production	Early warning to Hazard Educational awareness through barazas, Chiefs, Schools, Churches Knowledge transfer by the elders	● ● ● ● ● ● ● ●	● ● ● ● ● ● ●
③ Lightning	Loss of lives & properties Loss of livelihood Damage to lives and properties	Wearing of shoes Early warning to lightning eg wearing red clothes standing under trees Installing of lightning arrestors	● ● ● ● ● ● ● ● ●	● ● ● ● ● ● ● ● ●
① Pest & Diseases	Loss of lives Loss of livelihood Low production of crops & Livestock	Early warning to crops and diseases Educational awareness Knowledge transfer	● ● ● ● ● ● ● ●	● ● ● ● ● ●

Figure 5 RESPONSE TO THE IMPACT ON THEIR EFFECTIVENESS AND SUSTAINABILITY

2.7 ADAPTATION STRATEGIES

The participants stated the following adaptation strategies;

- Increasing extension services to the ward level
- Support initiatives that increase resilience to climate change.
- Formulation and implementation of climate change policies
- Increasing awareness creation on climate change.
- Promoting clean energy technologies.
- Diversifying livelihoods
- Afforestation and reforestation
- Subsidies (example, fertilizers, which should be subsidized and accessible)
- Social security

2.8 GOVERNMENT SUPPORT

2.8.0 ENVIRONMENT

- Strengthen early warning and climate information services through improving the Climate Information Service Providers network and enhancing integration of local/indigenous knowledge into early warning systems.
- Enhance participatory scenario planning with communities.
- Undertake climate vulnerability and risk assessments on ecosystems and provide guidance on relevant adaptation actions.
- Develop a forestry adaptation strategy.
- Strengthen tree-planting and conservation initiatives.

- Provide guidance and improve access to climate resilient tree species and cultivars.
- Integrate ecosystem and community-based approaches in sector strategies in support of adaptation to reduce natural resource-based conflicts.
- Continue the rehabilitation of water catchment areas in order to provide sustainable ecosystem services

2.8.1 AGRICULTURE

- Promote indigenous knowledge on crops.
- Increase awareness on climate change impacts on the agriculture value chain.
- Conduct climate risk and vulnerability assessments of the agriculture value chain.
- Coordinate and mainstream climate change adaptation into agricultural extension.
- Promote new food habits.
- Establish, maintain and promote the uptake of climate change related information on agriculture.
- Develop and up-scale specific adaptation actions - promotion and bulking of drought tolerant traditional high value crops; water harvesting

for crop production; index-based weather insurance; conservation agriculture; agro-forestry; and Integrated soil fertility management.

- Develop and apply Performance Benefit Measurement methodologies for adaptation and development for the sector;
- Support adaptation of private sector agricultural value chain actors through capacity building efforts.

2.8.2 WATER AND SANITATION

- Enhance capacity of institutions and bodies responsible for water and sanitation on climate change impacts and the water sector.
- Promote awareness on climate change impacts and the water sector including promoting public awareness on water conservation (recycling, wastewater management) and efficient water use.
- Mainstream disaster risk reduction (DRR) measures in the water sector planning and service delivery, particularly in vulnerable, high-risk regions.
- Promote the use of efficient irrigation systems.
- Strengthen water resource monitoring and assessment for early warning and planning.
- Promote technologies that enhance water resource efficiency.
-

2.8.3 LIVESTOCK DEVELOPMENT

- Increase awareness on climate change impacts on the livestock sector.
- Strengthen land use management systems including rangeland management, fodder banks and strategic reserves.
- Conduct capacity building in indigenous knowledge, livestock insurance schemes, early warning systems, early action, livestock management and breeding.
- Develop new feeds.
- Promote livelihood diversification and market access (camels, indigenous poultry, beekeeping, rabbits, emerging livestock, guinea fowls, ostriches etc.).
- Establish price stabilization schemes and strategic livestock based food reserves.
- Restore degraded grazing lands.
- Enhance selection, breeding and management of animals to adapt to climate change.
- Promote climate smart agriculture.

2.8.4 INFRASTRUCTURE

- Conduct risk and vulnerability assessments of existing infrastructure.
- Conduct risk and vulnerability assessments of upcoming infrastructure (roads, buildings).
- Conduct capacity building on infrastructure climate proofing.
- Climate proof buildings, and roads infrastructure through use of appropriate designs and building materials

2.8.5 EDUCATION AND TRAINING

- Assess the inclusion of climate change adaptation in school curricula.
- Design appropriate education material with climate change issues.
- Integrate climate change adaptation issues into the formal education curriculum.
- Integrate climate change adaptation into the education policy.
- Develop and implement a public awareness mechanism on climate change adaptation.
- Operationalize the climate change resource center and enhance linkages with other resource centres at all levels.

2.8.6 GENDER, VULNERABLE GROUPS AND YOUTH

- Enhance access to the youth and women enterprise funds.
- Strengthen and expand social protection and insurance mechanisms against main climate hazards.
- Establish affordable and accessible credit lines for the urban and rural poor, youth and other vulnerable groups.
- Create awareness for climate opportunities that women and youth can access.
- Promote livelihood diversification for vulnerable groups in order to reduce rural-urban migration
- Promote and support climate resilient sustainable livelihoods

2.9 COMMUNITY ADAPTATION GOALS

Participants identify short- and long-term adaptation goals for the community.

- ✓ Enforcement of agriculture legislation within the Ward
- ✓ Planting of indigeneous species in degraded landscapes e.g Syzygium species
- ✓ Control of land fragmentation and making sure there is no encroachment in riparian lands
- ✓ Introduction of indigenou vegetables where there is no need for spraying and inorganic fertilizers



Figure 6: Participant responses during the session

3.0 MNAGEI WARD

3.1 HAZARD IDENTIFICATION

The objective of this activity is to ensure that communities and other key local actors actively participate and have a strong voice in the participatory Climate Risk Assessment Process. During Focus Group discussion, the group identified the main climate and weather hazards that are relevant to them (hazards due to normal seasonal variability; hazards to slow onset changes in seasonal variability; hazards due to (changes in) extreme weather events). The participants identified five hazards that have the greatest impact on them and ranked them according to severity. Among the hazards identified included;

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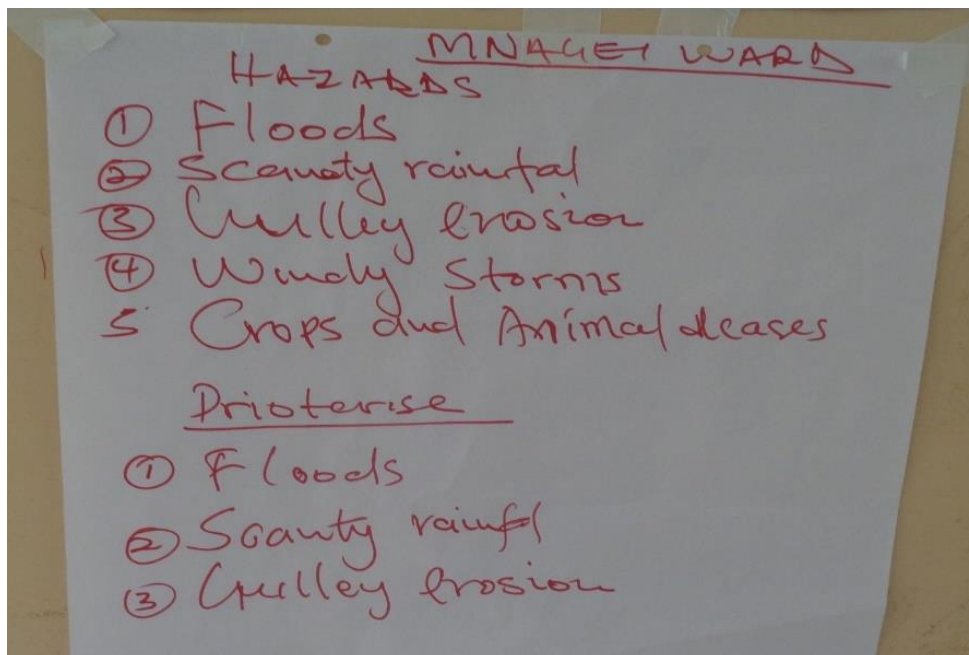


Figure 7HAZARD IDENTIFICATION AND PRIORITIZATION OF MNAGEI WARD

3.2 HAZARD MAPPING

The participants identified different hazards experienced within their localities and their spatial distribution were mapped using different codes.

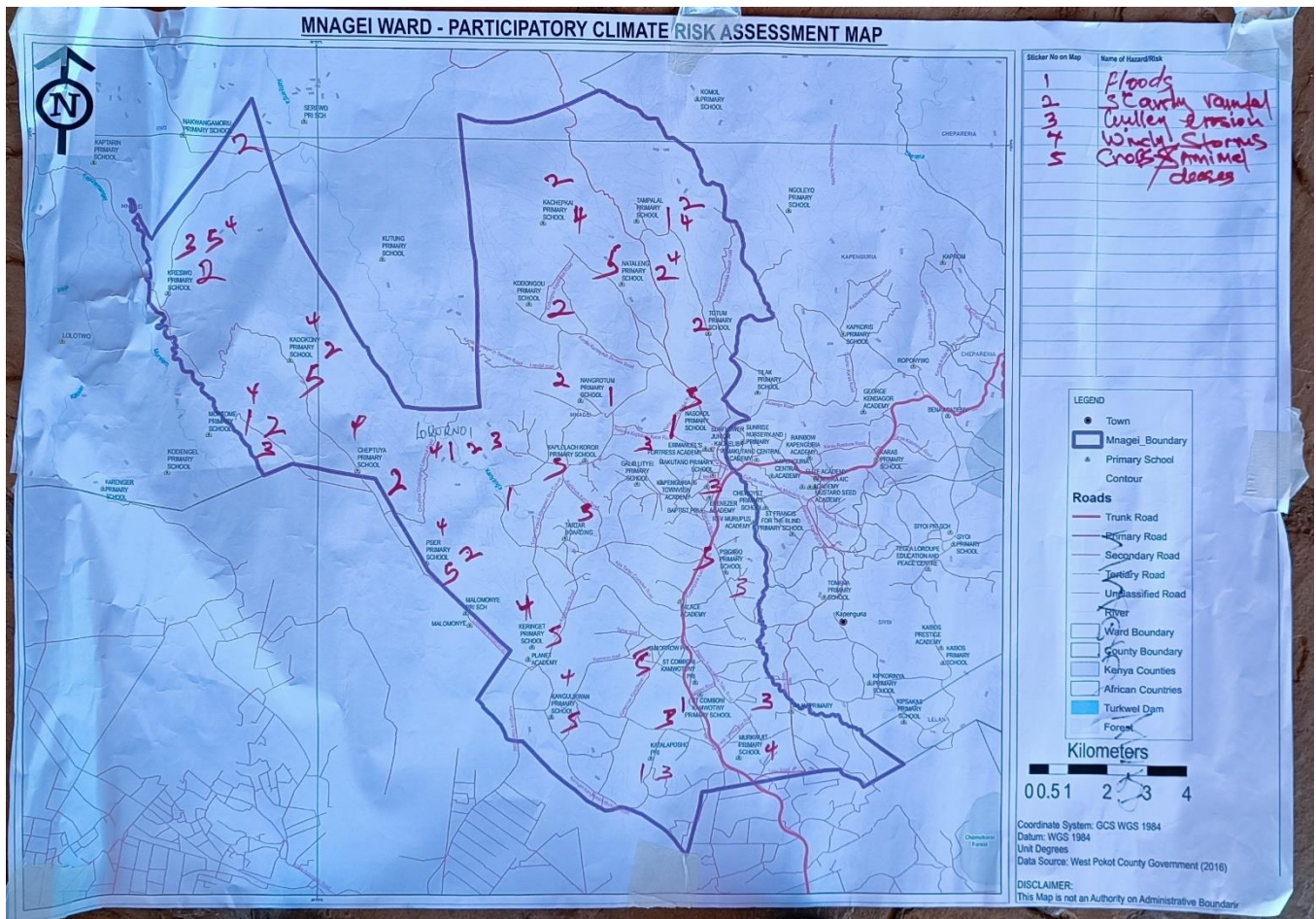


Figure 8 MNAGEI WARD HAZARD MAPPING

3.3 HAZARD PRIORITIZATION

The participants prioritized 3 hazards according to severity to their community. Among the listed hazards included;

1. Floods
2. Scanty rainfall
3. Gully erosion

3.4 SEASONALITY OF HAZARDS

The objective of conducting seasonality of hazards was to, analyses seasonal changes in activities and periods of stress or scarcity, identify important livelihood activities, events, and document community observations of changing trends in seasonal patterns of the events and risks. Below is a seasonal calendar for the hazards.

Table 45. SEASONALITY OF HAZARDS

		MONTH OF THE YEAR											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NO.	EVENTS												
1.	FLOODS												
2.	SCANTY RAINFALL												
3.	GULLEY EROSION												

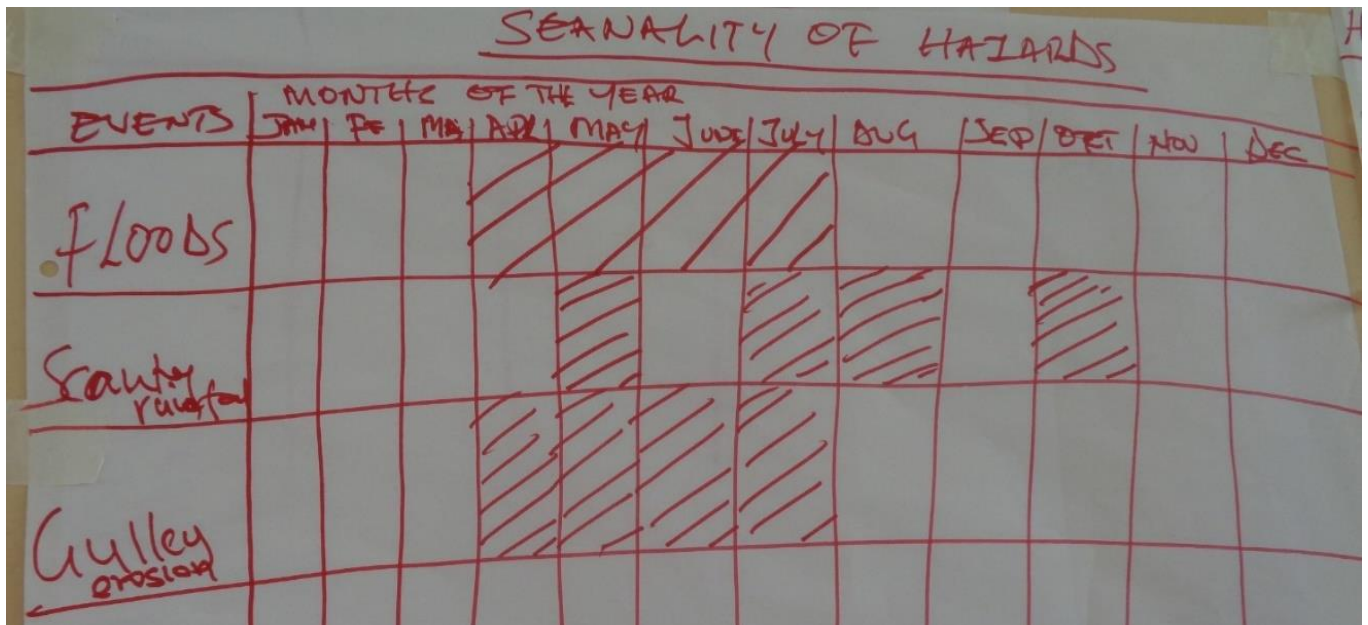


Figure 9 SEASONALITY OF HAZARDS WITHIN MNAGEI WARD

3.5 VULNERABILITY ASSESSMENT

The purpose of a Vulnerability assessment was to enable participants identify the assets and resources most important to people's livelihoods and determine which of the community's livelihood assets and resources are most vulnerable to the main hazards in the community (3main-prioritized hazards).

The exercise allowed the community members to determine the livelihood assets and resources most vulnerable to climate hazards as identified in the hazard map. The outcome of the exercise were vulnerability matrices generated.

Table 56. VULNERABILITY ASSESSMENT

NO.	CATEGORIES	FLOODS	SCANTY RAINFALL	GULLEY EROSION	
1.	NATURAL	3	3	3	9
2.	PHYSICAL	2	3	3	8
3.	ECONOMICAL	2	3	2	7
4.	SOCIAL	1	3	1	5
		8	12	9	

Rating Scale:

3 = Very Much

2 = Much

1 = Not very Much

0 = Not at all

VULNERABILITY ASSESSMENT

CATEGORIES

- ① Natural
- ② Physical
- ③ Economical
- ④ Social

CATEGORIES	Floods	Scanty rainfall	Gully erosion	
Natural	3	3	3	9
Physical	2	3	3	8
Economical Economical	2	3	2	7
Social	①	3	①	⑤
Scale	3 - very much 2 - much ① - Not much 0 - Not at all			
		12	9	

Figure 10 VULNERABILITY ASSESSMENT FOR MNAGEI WARD

3.6 RESPONSES TO THE IMPACTS OF HAZARDS

The participants ranked their responses on hazards according to their effectiveness and sustainability as outlined in the table below.

Table 67. RESPONSES TO THE IMPACTS OF HAZARDS

HAZARDS	IMPACTS	LOCAL RESPONSES	EFFECTIVENES S	SUSTAINABILITY
Floods	Loss of Lives	Education	●●●	●●●
		Awareness creation	●●	●
		Terraces	●●●	●●●
	Soil erosion	Afforestation	●●●	●●●
	Loss of properties	Education and awareness creation	●●	●●
	Destruction of infrastructure	Proper drainage systems	●●	●
		Building gabions	●●●	●●●
	Displacement of people	Evacuation	●●●	●●
	Waterborne diseases	Water treatment and education in sanitation	●●	●●
Scanty Rainfall	Loss of crops	Construction of water harvesting structures	●●●	●●●
		Irrigation	●●●	●●
	Decline in Crops and animal production	Domesticating drought resistant livestock	●●●	●●
		Crop insurance	●●	●●
	Decline in animal forage	Migration to other areas where forage is available	●●●	●●
Starvation	Alternative livelihoods	●●●	●●●	
Increased animal and crop diseases	Growing of orphaned crops			
	Introduction of hybrid animals	●●●	●●●	
Gulley erosion		Construction of Proper drainages	●●●	●●

	Destruction of roads			
		Construction of gabions	●●●	●●●
	Loss of soil fertility	Building of soil conservation structures e.g. terraces	●●●	●●●
		Building weirs	●●●	●●
		Afforestation	●●●	●●●
		Proper land use	●●●	●●●
	Loss of animals due to accidents e.g falls	Relocation	●●●	●●
		Create barriers	●●●	●●
	Decline in crop and animals production	Construction of Soil conservation structures	●●●	●●●

●●●= Very effective

●●= Effective

●= Not effective

RESPONSES TO CLIMATIC HAZARDS

HAZARDS	IMPACT	LOCAL RESPONSES	EFFECTIVENESS	SUSTAINABILITY
Floods	Loss of lives	Educational awareness	...	...
	Loss of property	Evacuation	..	.
	Soil erosion	Afforestation	...	...
	Construction of infrastructure	Levees	...	...
	Displacement	Evacuation	...	.
	Water born diseases	Water treatment Education	....	....

Scale

... Very effective
 .. Effective
 . Not effective

	Impact	Local responses	Effective	Sustainability
Scanty rainfall	Loss of property crops	Educational awareness	...	...
	Less production	Alternative production	..	.
	Migration to other counties	Sanctums construction water harvesting	...	.
	Starvation	Stone food grain resist drought resist crops	...	.
	Disease-Animal Crop disease	Migration where possible	..	.
Creeley Erosion	Disruption of roads	Construction of Cabins	...	...
	Loss of fertile soil	Hold Manure	..	..
	Displacement	Afforestation	...	...
	Loss of animal No production	Soil Conservation	...	...

Figure 11 RESPONSE TO THE IMPACT ON THEIR EFFECTIVENESS AND SUSTAINABILITY

3.7 ADAPTATION STRATEGIES

The main objective of the session was to review the adaptation options and identify broad thematic adaptation priorities covering both current and future climate risks based on prioritized hazards and local community response mechanisms to hazards. The participants generated information about adaptation responses to the most important climate hazards that they currently faced and to future climate hazard scenarios

The following sectoral adaptation strategies were suggested;

3.7.0 ENVIRONMENT

- Strengthen early warning and climate information services and enhancing integration of local/indigenous knowledge into early warning systems.
- Strengthen tree-planting and conservation initiatives.
- Provide guidance and improve access to climate resilient tree species
- Integrate ecosystem and community based approaches to reduce natural resource based conflicts.
- rehabilitation of water catchment areas in order to provide sustainable ecosystem services

3.7.1 AGRICULTURE

- Promote indigenous knowledge on crops.
- Increase awareness on climate change impacts on the agriculture value chain.
- Promote new food habits.
- Promote the uptake of climate change related information on agriculture.
- promotion and bulking of drought tolerant traditional high value crops; water harvesting for crop production; conservation agriculture and agro-forestry;
- Support adaptation of private sector agricultural value chain actors through capacity building efforts.
- Promote climate smart agriculture

3.7.2 WATER AND SANITATION

- Promote awareness on climate change impacts and public awareness on water conservation and efficient water use.
- Promote the use of efficient irrigation systems.
- Promote technologies that enhance water resource efficiency.
- Increase water harvesting and storage

3.7.3 LIVESTOCK DEVELOPMENT

- Increase awareness on climate change impacts on the livestock.
- Strengthen land use management systems including rangeland management, fodder banks and strategic reserves.
- Conduct capacity building in indigenous knowledge ,early warning systems, livestock management and breeding.
- Develop new feeds and strategic livestock based food reserves.
- Promote livelihood diversification and market access
- Restore degraded grazing lands.
- Improve animal disease control and surveillance

3.7.4 INFRASTRUCTURE

- Climate proof buildings, and roads infrastructure through use of appropriate designs and building materials

3.7.5 GENDER, VULNERABLE GROUPS AND YOUTH

- Promote livelihood diversification for vulnerable groups
- Promote and support climate resilient sustainable livelihoods

PICTORIAL EVIDENCE



4.0 KAPENGURIA WARD

4.1 HAZARD IDENTIFICATION

The objective of this activity is to ensure that communities and other key local actors actively participate and have a strong voice in the participatory Climate Risk Assessment Process. During Focus Group discussion, the group identified the main climate and weather hazards that are relevant to them (hazards due to normal seasonal variability; hazards to slow onset changes in seasonal variability; hazards due to (changes in) extreme weather events). The participants identified five hazards that have the greatest impact on them and ranked them according to severity. Among the hazards identified included;

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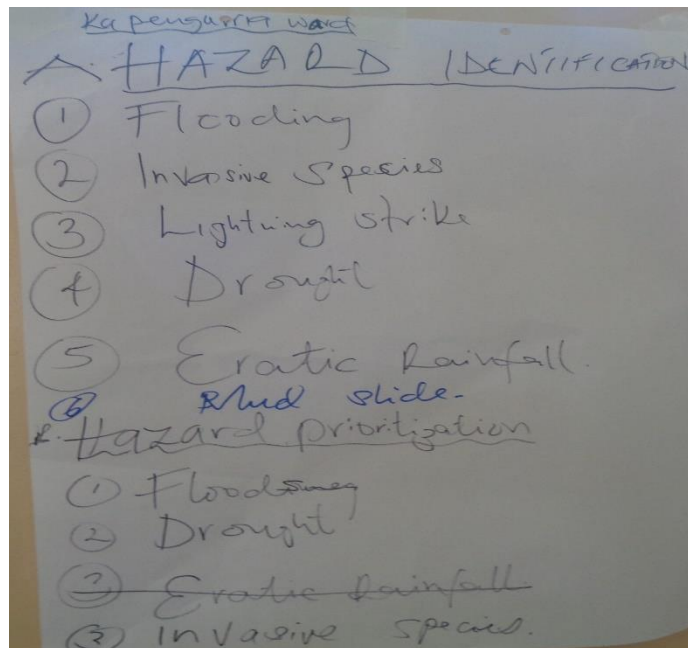


Figure 12 HAZARD IDENTIFICATION AND PRIORITIZATION OF KAPENGURIA WARD

4.2 HAZARD MAPPING

The participants identified different hazards experienced within their localities and their spatial distribution were mapped using different codes.

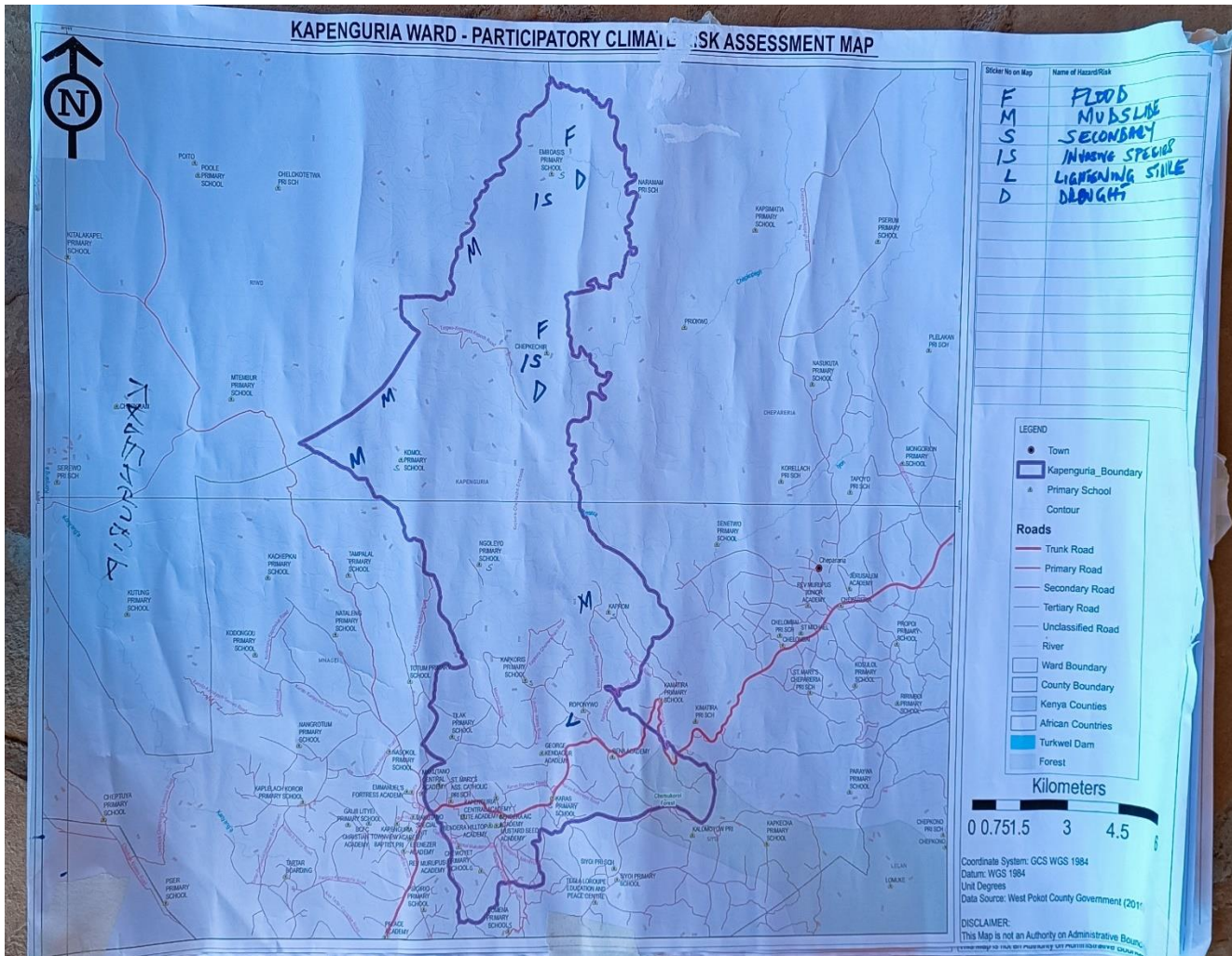


Figure 13 KAPENGURIA WARD HAZARD MAPPING

4.3 HAZARD PRIORITIZATION

The participants prioritized 3 hazards according to severity to their community. Among the listed hazards included;

1. Floods
2. Drought
3. Invasive species

4.4 SEASONALITY OF HAZARDS

The objective of conducting seasonality of hazards was to, analyses seasonal changes in activities and periods of stress or scarcity, identify important livelihood activities, events, and document community observations of changing trends in seasonal patterns of the events and risks. Below is a seasonal calendar for the hazards.

SEASONAL CALENDAR

Table 7. SEASONAL CALENDAR

		MONTH OF THE YEAR											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OC T	NOV	DEC
NO	EVENTS												
1.	FLOODS												
2.	DROUGHTS												
3.	INVASIVE SPECIES												

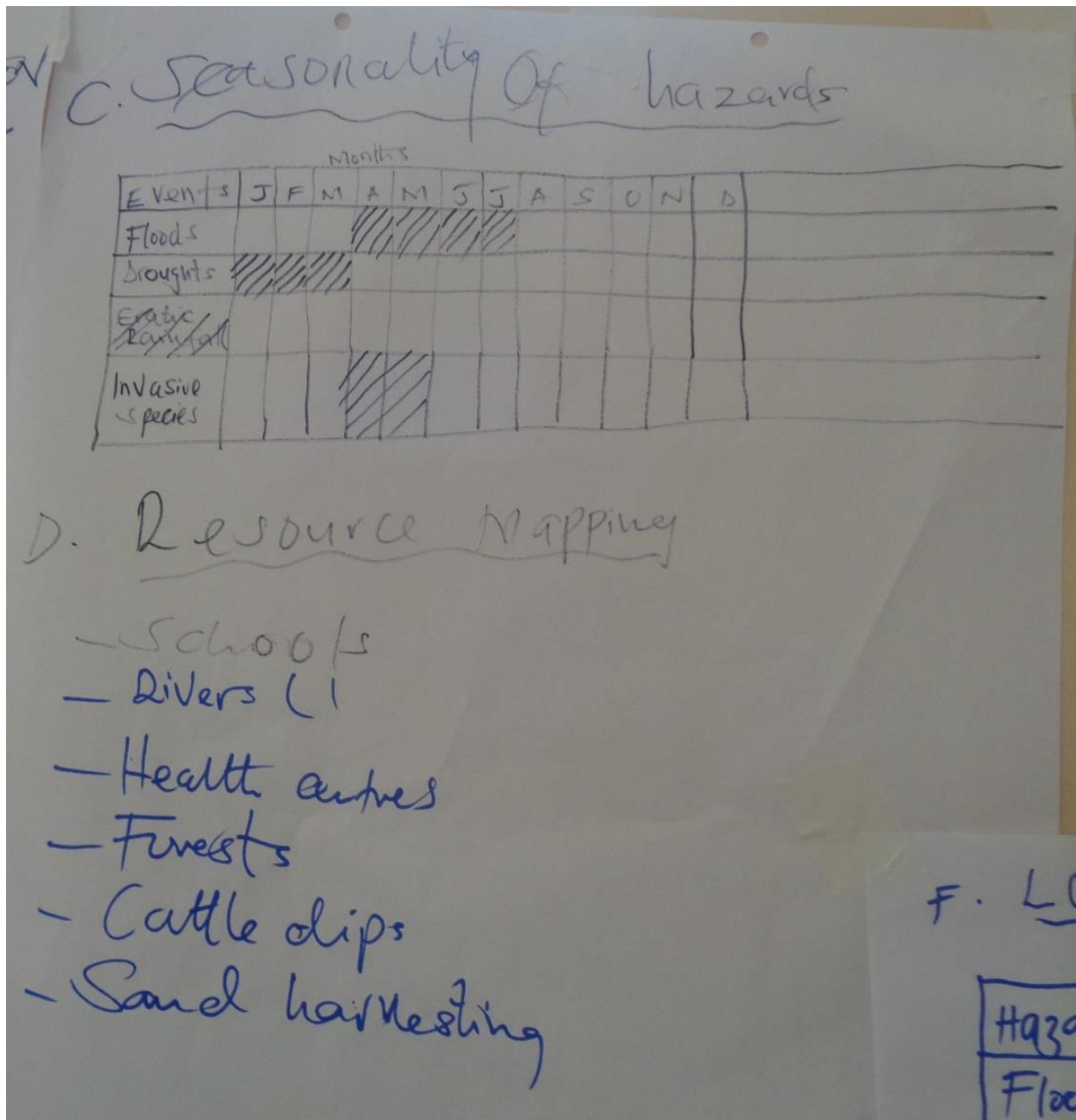


Figure 14 SEASONALITY OF HAZARDS WITHIN KAPENGURIA WARD

4.5 VULNERABILITY ASSESSMENT

The purpose of a Vulnerability assessment was to enable participants identify the assets and resources most important to people's livelihoods and determine which of the community's livelihood assets and resources are most vulnerable to the main hazards in the community (3 main-prioritized hazards).

The exercise allowed the community members to determine the livelihood assets and resources most vulnerable to climate hazards as identified in the hazard map. The outcome of the exercise were vulnerability matrices generated.

Table 8: VULNERABILITY ASSESSMENT

NO.	CATEGORIES	FLOODS	DROUGHT	INVASIVE SPECIES	
1.	NATURAL	3	3	0	6
2.	PHYSICAL	3	1	0	4
3.	ECONOMICAL	3	3	3	9
4.	SOCIAL	2	2	2	6
		11	9	5	

Rating Scale:

3 = Very Much

2 = Much

1 = Not very Much

0 = Not at all

E. VULNERABILITY ASSESSMENT

CATEGORY	FLOODS	DROUGHT	INVASIVE SPECIES	TTL
NATURAL	3	3	0	6
PHYSICAL	3	1	0	4
ECONOMICAL	3	3	3	9
SOCIAL	2	2	2	6
TTL	11	9	5	

Scale: 3 - Very Much
 2 - Much
 1 - Not very Much
 0 - Not at ALL

Figure 15: VULNERABILITY ASSESSMENT FOR KAPENGURIA WARD

4.6 RESPONSES TO THE IMPACTS OF HAZARDS

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Table 9:RESPONSES TO THE IMPACTS OF HAZARDS

HAZARDS	IMPACTS	LOCAL RESPONSES	EFFECTIVENES S	SUSTAINABILITY
Floods	Loss of Lives and properties	Relocation to safer areas	●●●	●●●
		Awareness creation	●●	●
		Terraces	●●●	●●●
	Destruction of farms	Afforestation	●●●	●●●
	Loss of infrastructure e.g roads	Education and awareness creation	●●	●●
Drought	Loss of crops	Construction of water harvesting structures	●●●	●●●
		Irrigation	●●●	●●
	Decline in Crops and animal production	Domesticating drought resistant livestock	●●●	●●
		Crop insurance	●●	●●
	Decline in animal forage	Migration to other areas where forage is available	●●●	●●
	Starvation	Alternative livelihoods	●●●	●●●
	Invasive species	Increased animal and crop diseases	Spraying	●●●

●●●= Very effective

●●= Effective

●= Not effective

F. LOCAL Response to Hazards

Hazards	Impacts	Local Response	Effectiveness	Sustainability
Floods	<ul style="list-style-type: none"> - Loss lives - property - destruction of farms - road destruction - diseases 	<ul style="list-style-type: none"> - relocation to safe areas - Awareness	...	.
Drought	<ul style="list-style-type: none"> - low production in Agriculture - loss of animals 	<ul style="list-style-type: none"> - Migrations - planting of drought resistant crops	...	...
Invasive Species	<ul style="list-style-type: none"> - loss of animals 	<ul style="list-style-type: none"> - Quarantining 	low	.

Scale :-
 ... - Very
 .. - Effect
 . - Not

Figure 16: RESPONSE TO THE IMPACT ON THEIR EFFECTIVENESS AND SUSTAINABILITY

4.7 ADAPTATION STRATEGIES

The main objective of the session was to review the adaptation options and identify broad thematic adaptation priorities covering both current and future climate risks based on prioritized hazards and local community response mechanisms to hazards. The participants generated information about adaptation responses to the most important climate hazards that they currently faced and to future climate hazard scenarios

The following sectoral adaptation strategies were suggested;

4.7.1 ENVIRONMENT

- Strengthen early warning and climate information services and enhancing integration of local/indigenous knowledge into early warning systems.
- Strengthen tree-planting and conservation initiatives.
- Provide guidance and improve access to climate resilient tree species

- Integrate ecosystem and community based approaches to reduce natural resource based conflicts.
- rehabilitation of water catchment areas in order to provide sustainable ecosystem services

4.7.2 AGRICULTURE

- Promote indigenous knowledge on crops.
- Increase awareness on climate change impacts on the agriculture value chain.
- Promote new food habits.
- Promote the uptake of climate change related information on agriculture.
- promotion and bulking of drought tolerant traditional high value crops; water harvesting for crop production; conservation agriculture and agro-forestry;
- Support adaptation of private sector agricultural value chain actors through capacity building efforts.
- Promote climate smart agriculture

4.7.3 WATER AND SANITATION

- Promote awareness on climate change impacts and public awareness on water conservation and efficient water use.
- Promote the use of efficient irrigation systems.
- Promote technologies that enhance water resource efficiency.
- Increase water harvesting and storage

4.7.4 LIVESTOCK DEVELOPMENT

- Increase awareness on climate change impacts on the livestock.
- Strengthen land use management systems including rangeland management, fodder banks and strategic reserves.
- Conduct capacity building in indigenous knowledge, early warning systems, livestock management and breeding.
- Develop new feeds and strategic livestock based food reserves.
- Promote livelihood diversification and market access
- Restore degraded grazing lands.
- Improve animal disease control and surveillance

4.7.5 INFRASTRUCTURE

- Climate proof buildings, and roads infrastructure through use of appropriate designs and building material

4.7.6 GENDER, VULNERABLE GROUPS AND YOUTH

- Promote livelihood diversification for vulnerable groups
- Promote and support climate resilient sustainable livelihoods



4.8 KAPENGURIA MUNICIPALITY CLIMATE RISK PROFILE

CLIMATE CHANGE RELATED CHALLENGES

Climate change phenomenon has been a threat in the recent past and has had negative impact on the people's livelihood. Human activities such as, deforestation and unregulated industrial waste disposal are largely seen as the causative factors of this global scour. Kapenguria municipality has experienced some climate change related challenges as stated below;

i. Changes in precipitation patterns

The normal rainfall patterns have been altered. Flooding has been experienced in some parts of the ward as a result of high rainfall intensity leading to destruction of property and infrastructure as well as proliferation of water related disease and damage to the ecosystem. A prolonged dry season has affected food production and resulted in drying up of water sources.

ii. Landfills and soil erosion

Solid waste collected and disposed within the urban centres has led to emission of greenhouse gases such as methane into the atmosphere; leachate also percolates underground affecting the underground water. Impacts of climate hazards such as eroded soils, landslides, rocks fall and gullies are more common in sloppy areas in the municipality.

iii. Urbanization

Increasing urbanization has led to destruction of ecosystem to create space for settlement and businesses. The cutting down of trees, use of motor-vehicles and motorcycles and use of firewood as a source of heat have resulted in emission of carbon-dioxide gas into the atmosphere significantly affecting the quality of air. Generation of both solid, liquid and E-waste has significantly increased due to high population increase.

iv. Impact on Environment

Most of the tree species planted along the rivers and water catchment are eucalyptus known to draw large amounts of water. This has led to drying of streams and rivers downstream.

LEVEL OF VULNERABILITY/INEQUALITIES

KAPENGURIA MUNICIPALITY CLIMATE RISK PROFILE

Ward	Climate Profile/Risk	Effect/Impact
Siyoi	<ul style="list-style-type: none"> • Changes in Climatic conditions • Sporadic rainfall in Krenget • Intense Hailstones and lightening in Talau, Kaibos, Kapchila, Kaisagat lightning 	<ul style="list-style-type: none"> • Erratic rainfall with delays • Increased crop pests and diseases. • Declining soil fertility • Environmental Damage to trees and forests. • Reduced agricultural production and productivity

Ward	Climate Profile/Risk	Effect/Impact
kapenguria	<ul style="list-style-type: none"> • Changes in Climatic conditions • Increased storms & lightning in roponywo • Landslides and mudslides Komol • Deforestation at kamatira forest • Floods in Emboasis • Drought in Chepkechir • Invasive species in Chepkechir 	<ul style="list-style-type: none"> • Damage to trees and forests • Erratic rainfall patterns and prolonged dry season which leads to stresses on water sources. • Crop pests and diseases • Declining soil fertility • Reduced agricultural production and productivity
Mnagei	<ul style="list-style-type: none"> • Changes in Climatic condition • Scarce rainfall in Nateleng, Totum, Kreswo, Pser • Windy storms in Lokornor, Pser, Keringet, Kangulikan, Murkwijit 	<ul style="list-style-type: none"> • Change in rainfall patterns and prolonged dry season which leads to stresses on water sources. And reduced agricultural activity. • Destruction of infrastructure and destruction of trees.
Mnagei	<ul style="list-style-type: none"> • Changes in Climatic Conditions • Soil erosion and rock-slides ,Kitala posho, Lokornoi, Nasokol, Makutano, Psigirio, Kreswo, Kaplelach Koror. • Flooding Tampalal, Nangrotum, Comboni 	<ul style="list-style-type: none"> • Increased pollution and sedimentation in streams and rivers. • Damage infastructure • Road closures • Property damage and infrastructure. Loss of human life. • Increase in incidences of flooding and vector borne diseases such as malaria

VULNERABILITY AND EXPOSURE TRENDS

These include low-income households, the elderly, those experiencing homelessness and vulnerable children and women. Many of these groups live in urban areas that are prone to vagaries of climate change.

Small scale traders

The main business activities in the County Urban areas are small scale traders dealing in household merchandise, cereals, vegetables and fruits. Seasonal variability in supplies of agricultural produce affects traders; in addition, infrastructure destruction during heavy rains affects transportation of goods especially using motorcycles.

Women, Elderly, PWDs and Children

Women are affected more due to the roles in fetching water and firewood. Expectant mothers are more exposed to human diseases such as malaria since their immune system is weak. Old age and associated health complications hampers ability to cope with climatic hazards and their impacts. Similarly, children also suffer more due to high incidences of vector borne diseases such as malaria and water borne diseases such as amoebiasis, cholera and other diarrheal diseases due to their weak immune system.

Households with low income

Poverty is the first proxy indicator of vulnerability. Poor urban households are more vulnerable because of their high dependence on natural resources and their limited capacity to cope with climate change vulnerability and extremes. Low-income outdoor workers who engage in heavy physical work are more exposed to varying climate and weather changes and are disproportionately likely to suffer from illnesses and deaths related to weather vagaries.