CLIMATE CHANGE VULNERABILITY ASSESSMENTS IN SELECTED COASTAL COMMUNITIES IN THE WIO REGION

By

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INTRODUCTION

- Climate change poses significant threats to people whose livelihoods rely on coastal systems, particularly in LDCs.
- Vulnerability to climate change may differ from one site to another due to: (1) types of pressures and their intensities; (2) ecosystem and community sensitivity; (3) adaptive capacity.
- Identifying social vulnerabilities and community adaptation strategies to climate change is crucial for building climate-change resilient community initiatives.
- Climate Change Vulnerability Assessments were carried out in selected social and ecological systems in Kenya, Tanzania, Mozambique and Madagascar.

INTRODUCTION CONT'D

- The study entailed:
  1. Description of the intensity of climate change threats and identification of potential impacts, relative to the capacity of the interacting human and ecological systems to cope with such threats
  2. Identification of communities that are most vulnerable to climate change impacts and recommend suitable adaptation options.

Main activities

1) Gathering and analysing of social and economic data relevant to Climate Change Vulnerability Assessment (CCVA) of local communities dependent on major coastal ecosystems and developing knowledge management products
2) Identify specific adaptation technology needs, and national plans with a focus on the needs of coastal communities
3) Mapping of risks and possible responses to extreme climatic events,
4) Identify potential networks for the sharing of information on successful adaptation, and
5) Contribute to management and policy option on climate change necessary for decision making.

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METHODOLOGY

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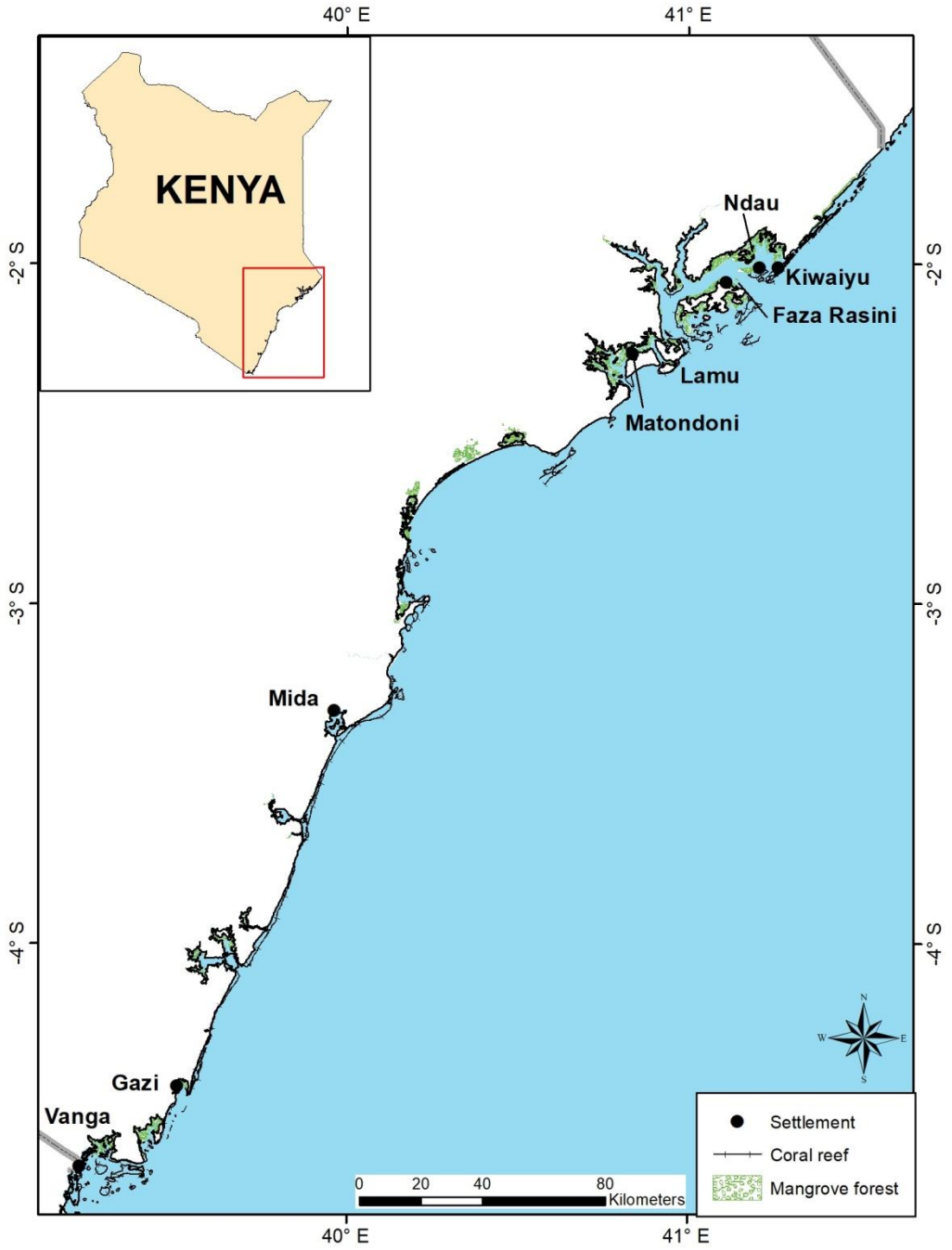


Fig. 1: Location of study sites in Kenya

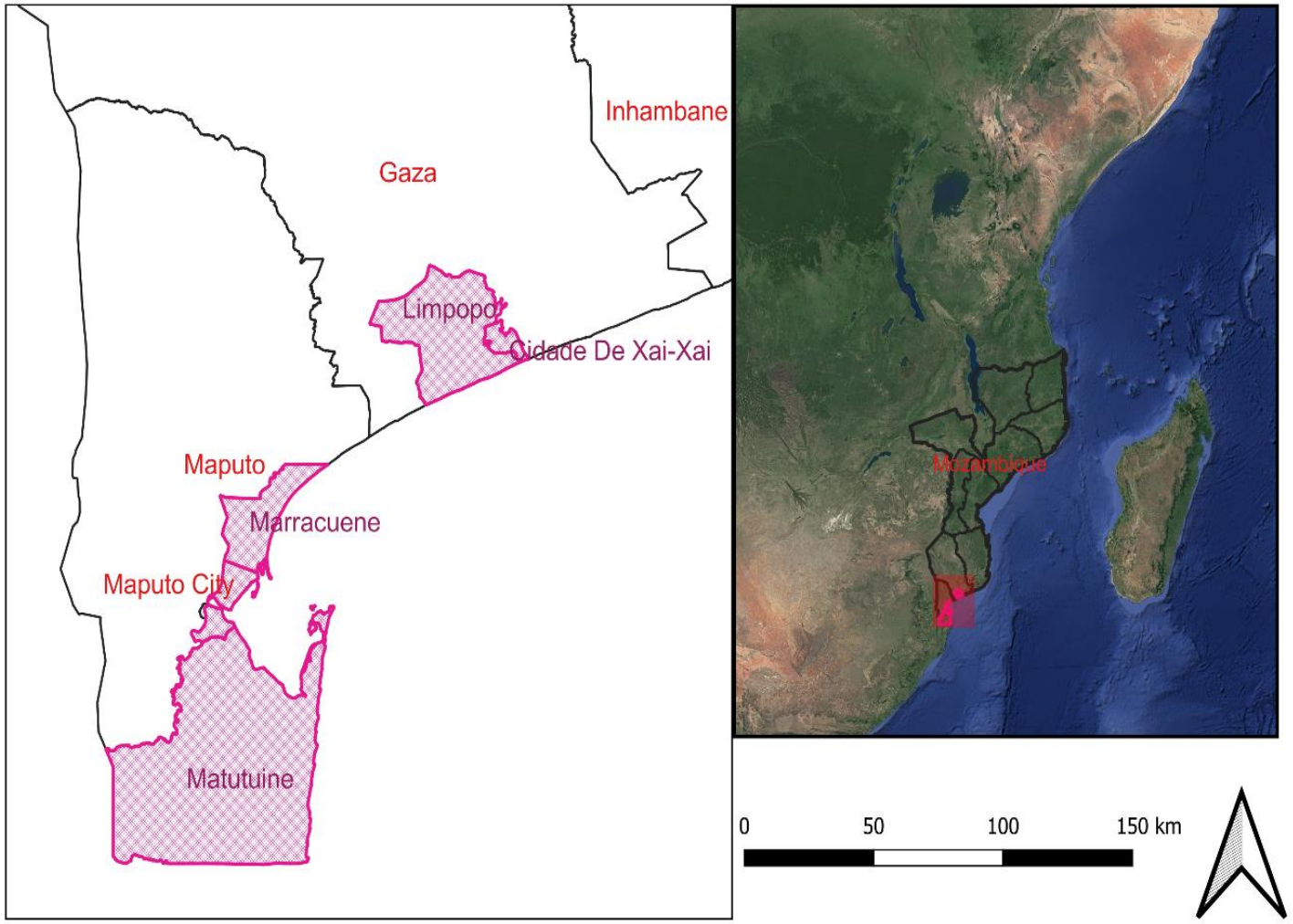


Fig. 2. Location of study sites in Mozambique (Maputo bay including Inhaca and Xai-xai Including Limpopo)

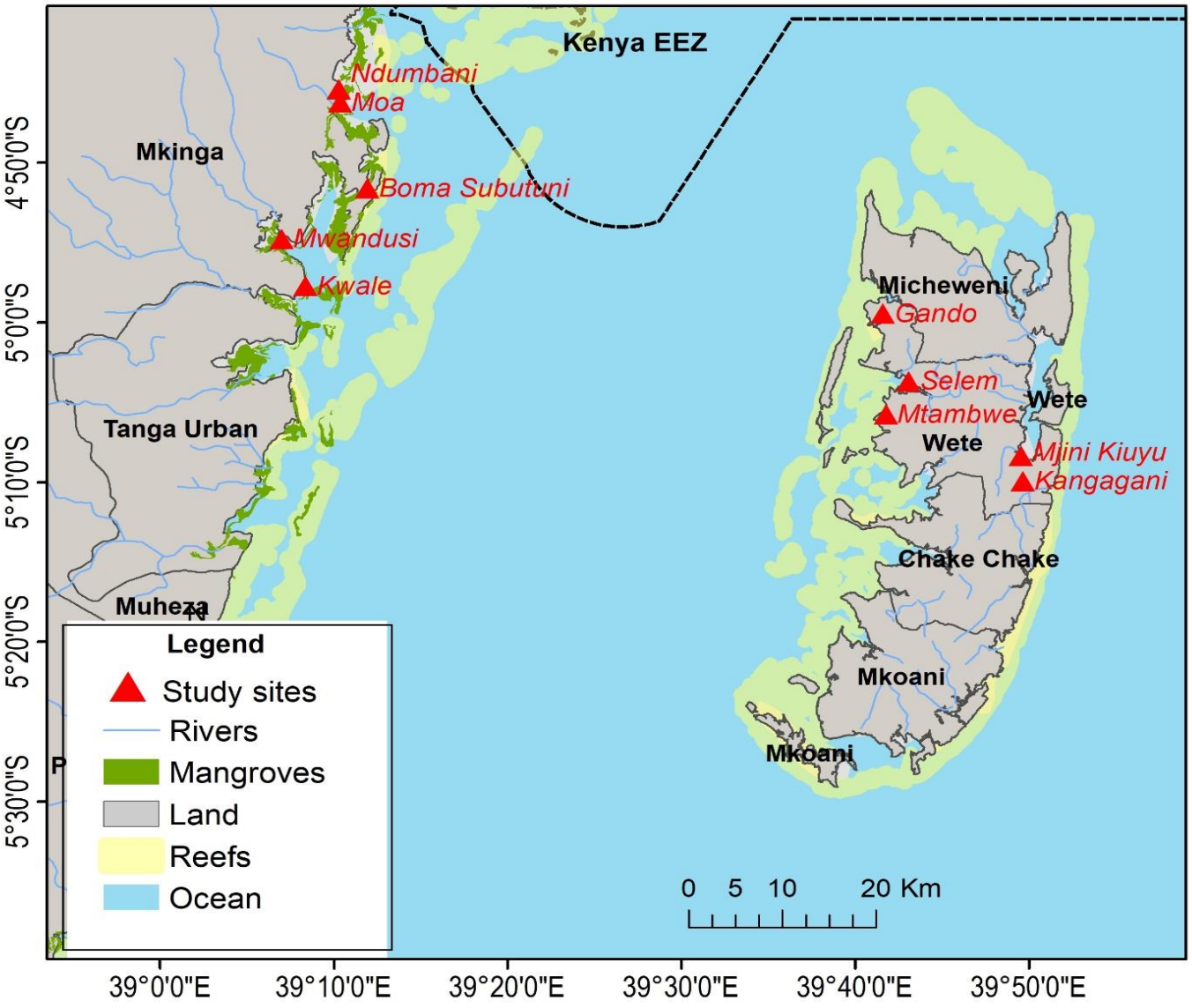
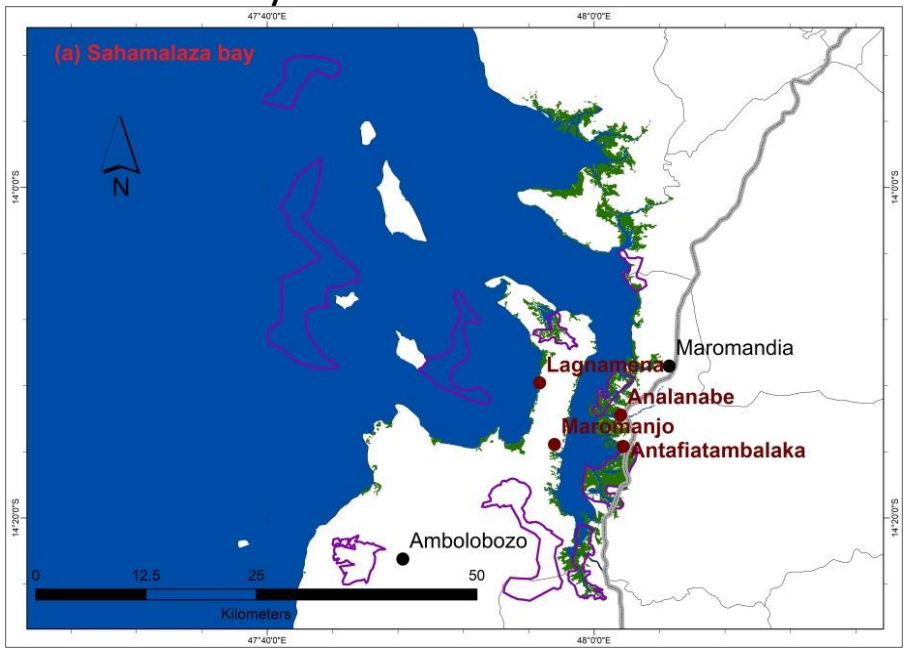
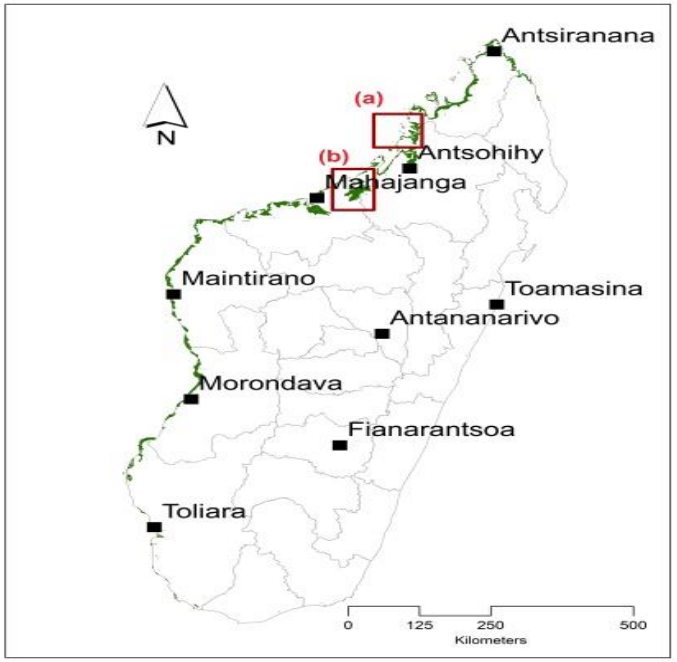


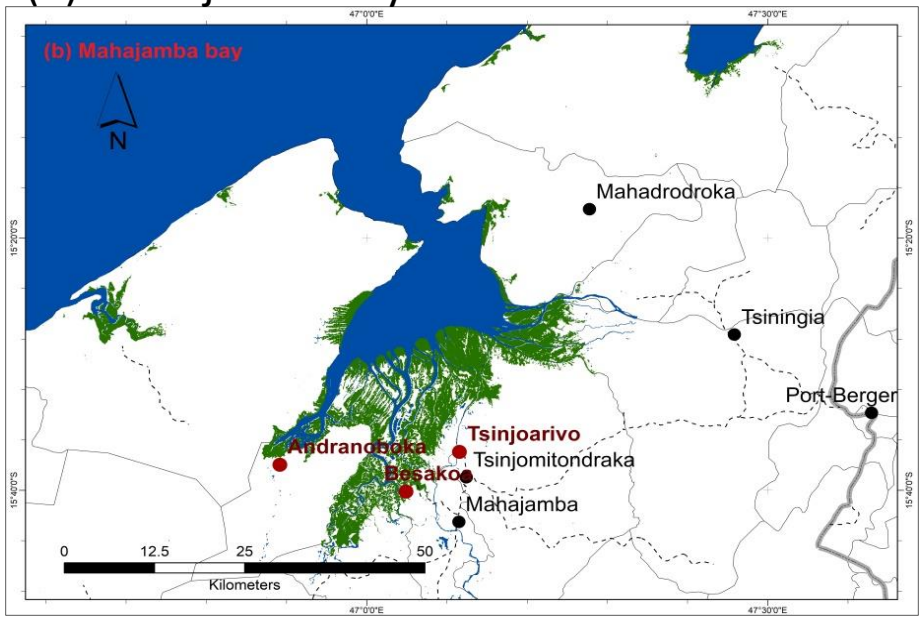
Fig. 3. Location of study sites Tanzania (Mkinga District of Tanga region in mainland Tanzania, and the Wete District of Pemba, Zanzibar)

Sahamalaza Bay





(b) Mahajamba Bay



Commune outline
Marine protected areas outline
Mangrove
Paved roads
Unpaved roads
Chef lieu commune
Selected villages

Data source: Mangrove (Regional Centre for Mapping of Resources for Development (RCMRD)); Marine protected areas (SAPM)

Fig. 4. Location of study site in Madagascar

METHODOLOGY

- Five (5) steps for CCVA that are detailed in the WIOSAP CCVA Toolkit were followed namely:
  1) establishing context
  2) compiling relevant data
  3) evaluating vulnerability dimensions
  4) synthesizing dimensions into a composite index of vulnerability, and
  5) operationalizing and mainstreaming vulnerability

METHODOLOGY CONT'D

- Data gathering involved:
  - Harmonization of data collection methodology
    - Several meetings of experts from KE, Mz, Tz and Md held
    - Best regional team work
  - Literature Review
  - Household questionnaire survey
  - Key informant interviews
  - Focus group discussions

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METHODOLOGY CONT'D

- Data analysis
  - Harmonization of data compilation and analysis methodology with support of Macquarie University
  - Data analysis involved:
    - Scoring, standardizing and weighting of scores
    - Weighting of domains using weights generated from Analytical Hierarchy Process (AHP)
    - Estimation of sensitivity and social adaptive capacity scores
    - Computation of Material Style of Life using PCA-Mix

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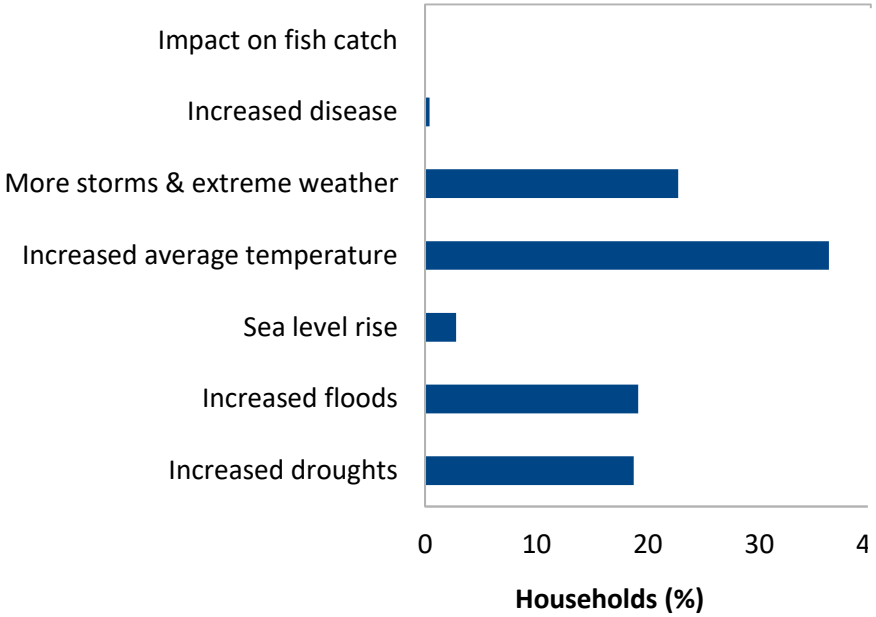
Table 1: Determination of social climate change vulnerability index

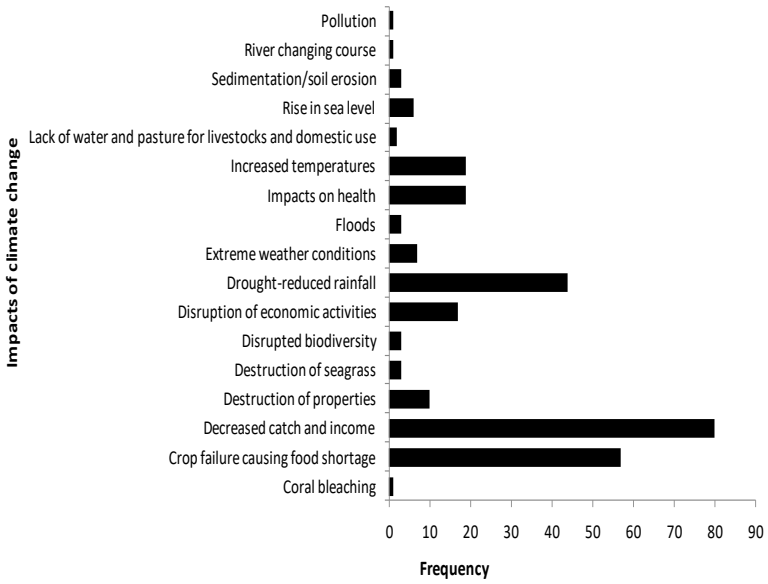
Indicator								Domain				Dimension		SCCVI
(i) 1.1.1	Scoring	1.1.1 scored	Standardization	1.1.1 standardized	Weighting[1]	1.1.1 weighted	Summation	1.1	Weghting[2]	1.1 weighted	Summation	1. Sensitivity index	Subtraction	Social Climate Change Vulnerability index
(i) 1.1.2		1.1.2 scored		1.1.2 standardized		1.1.2 weighted								
(i) 1.1.3		1.1.3 scored		1.1.3 standardized		1.1.3 weighted								
(i) 1.2.1		1.2.1 scored		1.2.1 standardized		1.2.1 weighted		1.2		1.2 weighted				
(i) 1.2.2		1.2.2 scored		1.2.2 standardized		1.2.2 weighted								
(i) 1.2.3		1.2.3 scored		1.2.3 standardized		1.2.3 weighted								
(i) 2.1.1		2.1.1 scored		2.1.1 standardized		2.1.1 weighted		2.1		2.1 weighted		2. Adaptive capacity index		
(i) 2.1.2		2.1.2 scored		2.1.2 standardized		2.1.2 weighted								
(i) 2.1.3		2.1.3 scored		2.1.3 standardized		2.1.3 weighted								
(i) 2.2.1		2.2.1 scored		2.2.1 standardized		2.2.1 weighted		2.2		2.2 weighted				
(i) 2.2.2		2.2.2 scored		2.2.2 standardized		2.2.2 weighted								
(i) 2.2.3		2.2.3 scored		2.2.3 standardized		2.2.3 weighted								

RESULTS

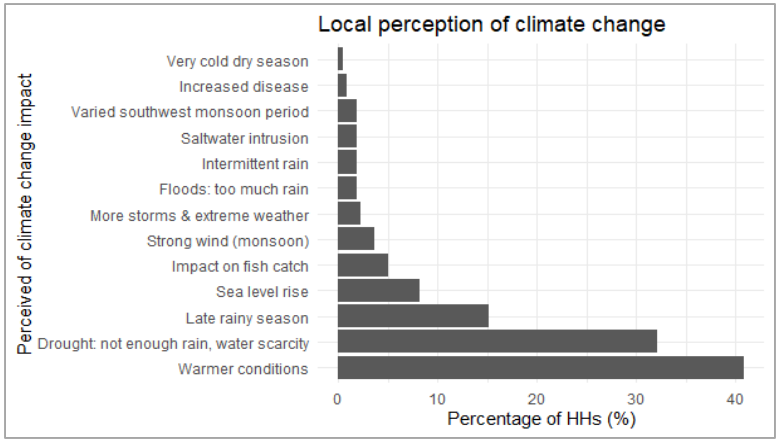
Local perceptions of climate change impacts



a) Mozambique



b) Kenya

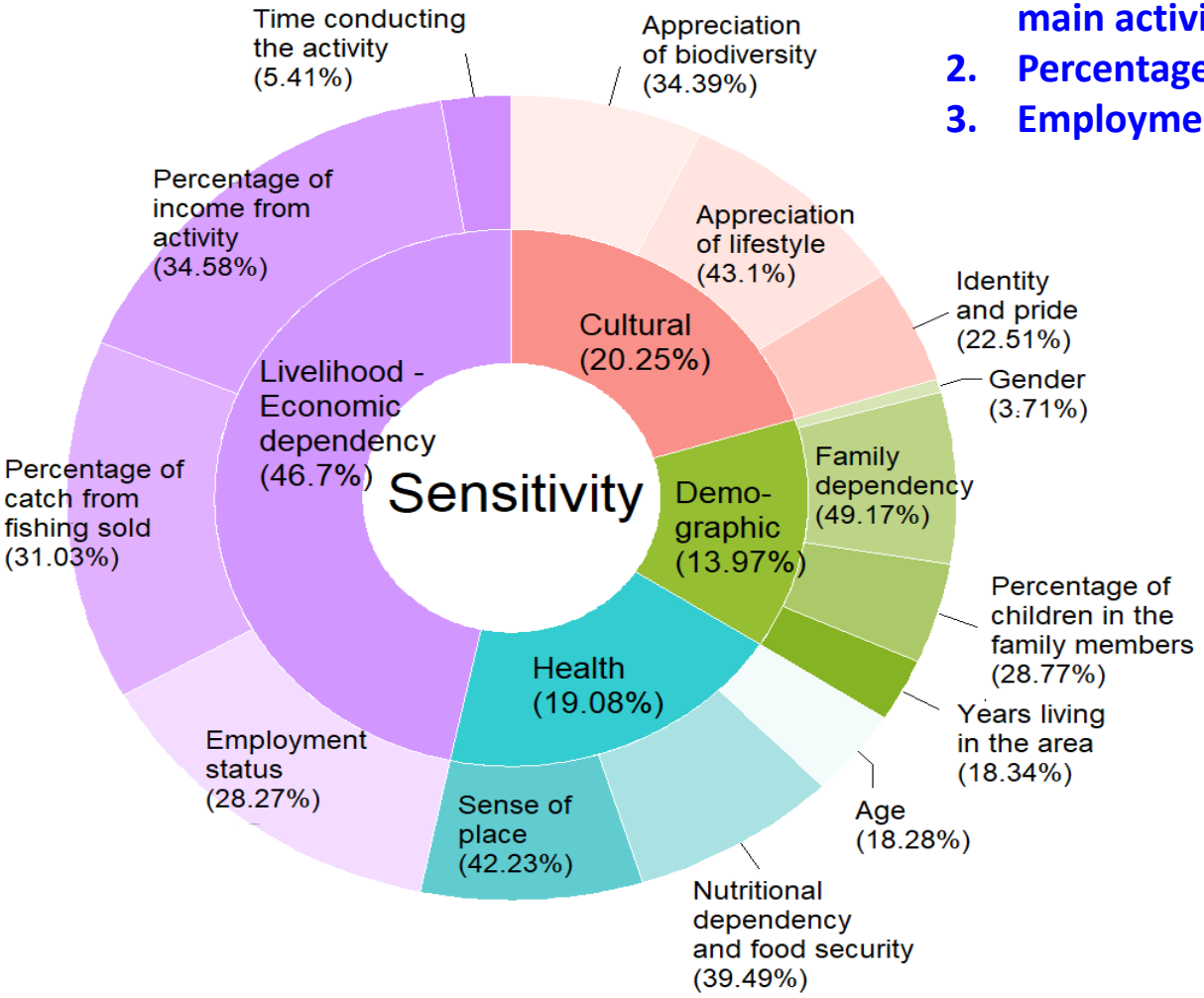


c) Madagascar

Indicators and domains of sensitivity - Madagascar

Critical Sensitivity Indicators:

1. **Percentage of income from main activity**
2. **Percentage of catch sold**
3. **Employment status**



Key indicators and their proportional contribution to the dimensions - Kenya

Dimension	Domain	Indicator	Sum of weighted score	Proportional contribution to the dimension
Sensitivity	**Livelihood**	Employment status	8.738	2.0
		Percentage of catch from fishing sold	38.822	8.8
		Percentage of income from main activity	82.254	18.6
		Time conducting the activity	21.433	4.9
	Demographic	Sex	12.399	2.8
		Years living in the village	25.716	5.8
		Percentage of children in the household	25.195	5.7
		Family dependency	22.065	5.0
	Cultural	Appreciation of biodiversity	69.132	15.7
		Identity and pride	49.153	11.1
	Health	Age	8.743	2.0
		Nutritional dependency	61.982	14.0
		Sense of place	15.624	3.5
				100.0
Adaptive Capacity	**Learning**	Level of education	8.400	1.4
		Knowledge of rules	12.453	2.1
		Access to information	148.800	24.5
	Assets	Access to credit	45.397	7.5
	Flexibility	Livelihood multiplicity	9.966	1.6
		Adapt to live without fishing	23.640	3.9
		Gear	1.092	0.2
		Spatial mobility	21.378	3.5
	Agency	Perceived capacity to change	35.528	5.9
		Recognition of causality	20.641	3.4
		Level of participation	94.179	15.5
	Organization	Trust in organization	19.718	3.3
		Community cohesion	48.777	8.0
		Linking social capital	116.145	19.2
				100.0

Critical Sensitivity Indicators

1. Percentage of income from the main activity
2. Appreciation of biodiversity
3. Nutritional dependency

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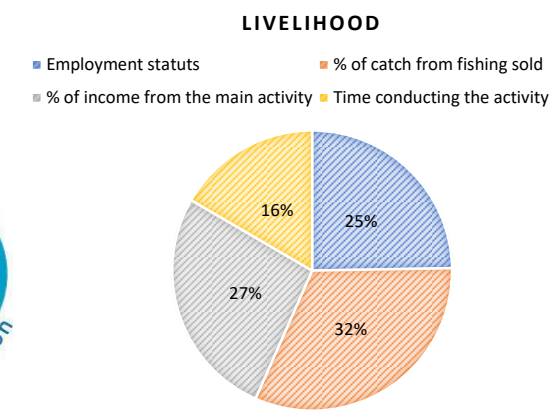
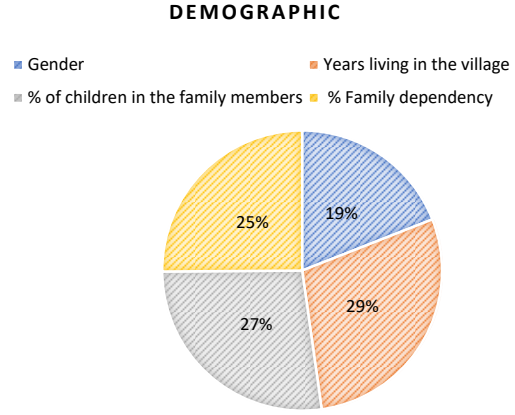
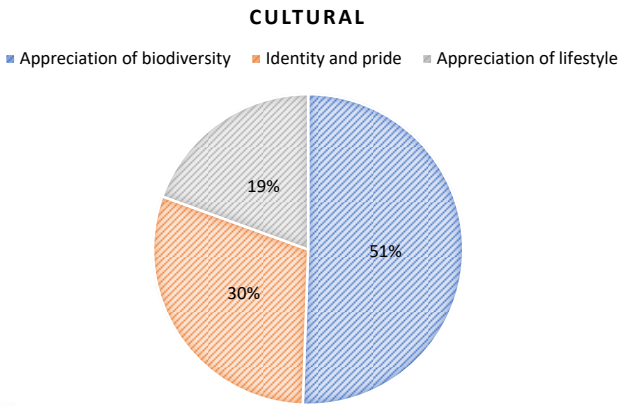
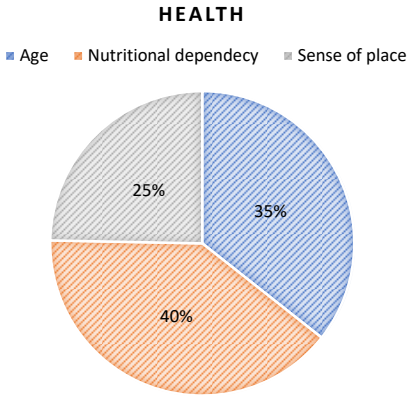
Key indicators and their proportional contribution to the dimensions - Mozambique





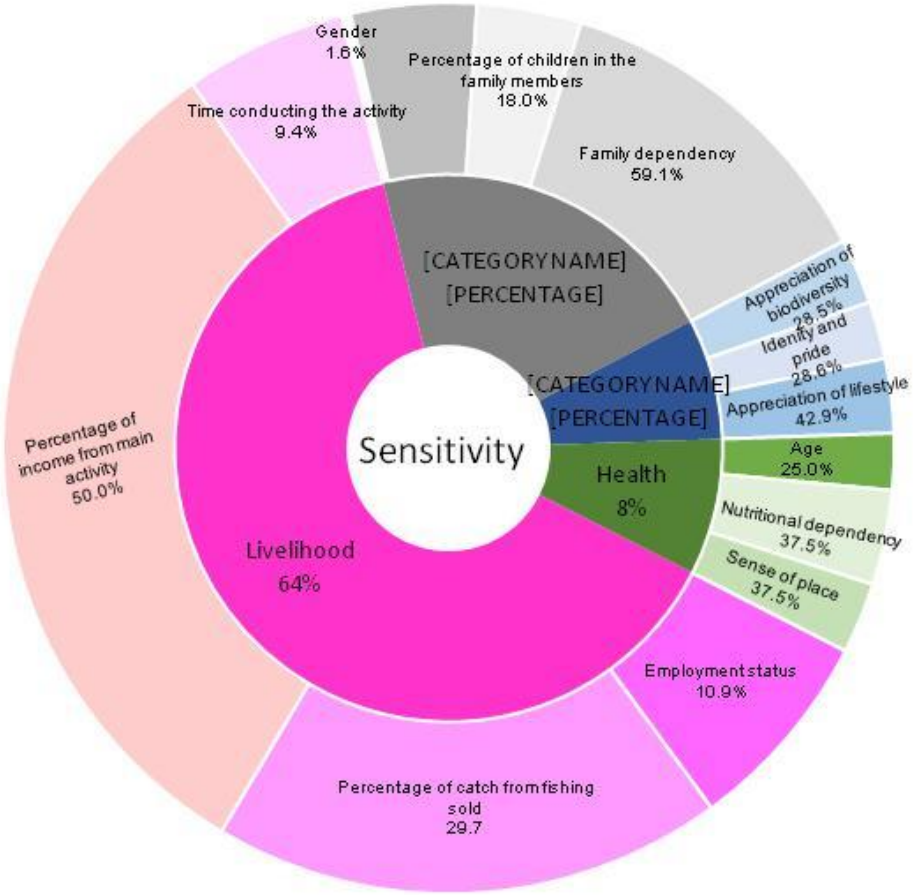




Critical Sensitivity Indicators - Mz

1. Appreciation of biodiversity
2. Nutritional dependency

Indicators and domains of sensitivity - Tanzania



Critical Sensitivity Indicators:

1. **Percentage of income from main activity**
2. **Percentage of catch sold**

Critical Sensitivity Indicators			
Madagascar	Kenya	Mozambique	Tanzania
Percentage of income from the main activity	Percentage of income from the main activity	Appreciation of biodiversity	Percentage of income from the main activity
Percentage of catch sold	Appreciation of biodiversity	Nutritional dependency	Percentage of catch sold
	Nutritional dependency		

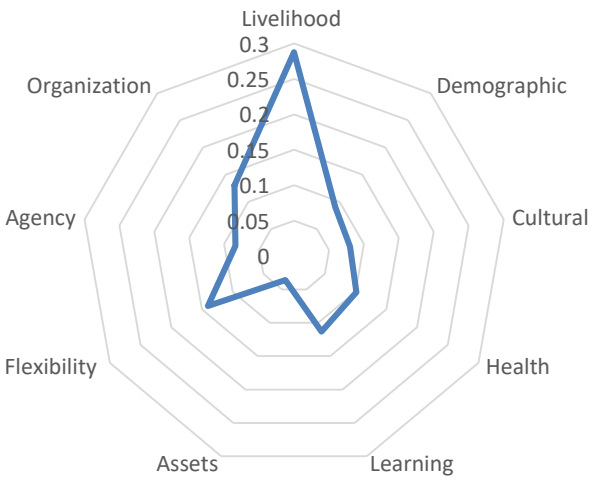
Sensitivity and Adaptive Capacity - KE

Dimension	Domain	Aggregated domains	Domain Weights	Aggregated weighted domains	Percentage contribution of each domain
Sensitivity	Livelihood	151.247	0.47	71.086	59
	Demographic	85.376	0.08	6.830	6
	Cultural	118.285	0.13	15.377	13
	Health	86.348	0.32	27.631	23
Sensitivity Index				**120.925**	**100**
Adaptive Capacity	Learning	169.653	0.34	57.682	49
	Assets	45.397	0.14	6.356	5
	Flexibility	56.076	0.31	17.383	15
	Agency	150.348	0.09	13.531	12
	Organization	184.640	0.12	22.157	19
Adaptive Capacity Index				**117.109**	**100**
Social Climate Change Vulnerability Index (Adaptive Capacity Index less Sensitivity Index)				**3.816**	

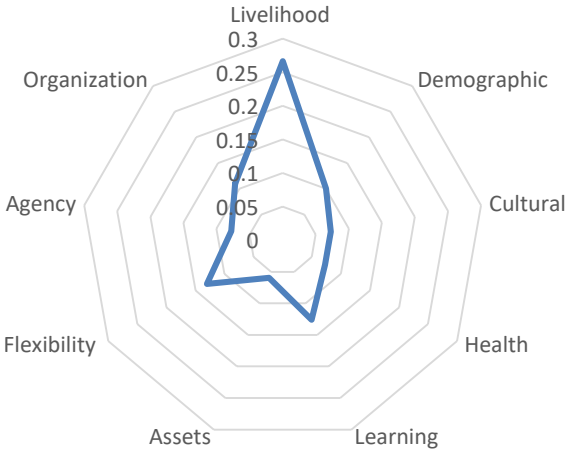
Livelihood domain is the most critical

Results - CCVI

Gazene

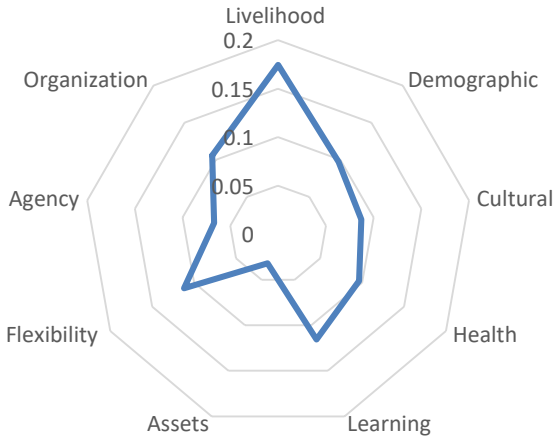


Farol

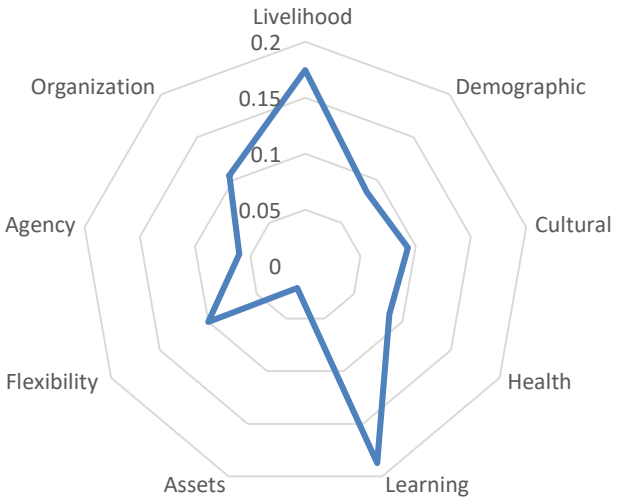


Livelihood domain is the most critical in the four studied communities

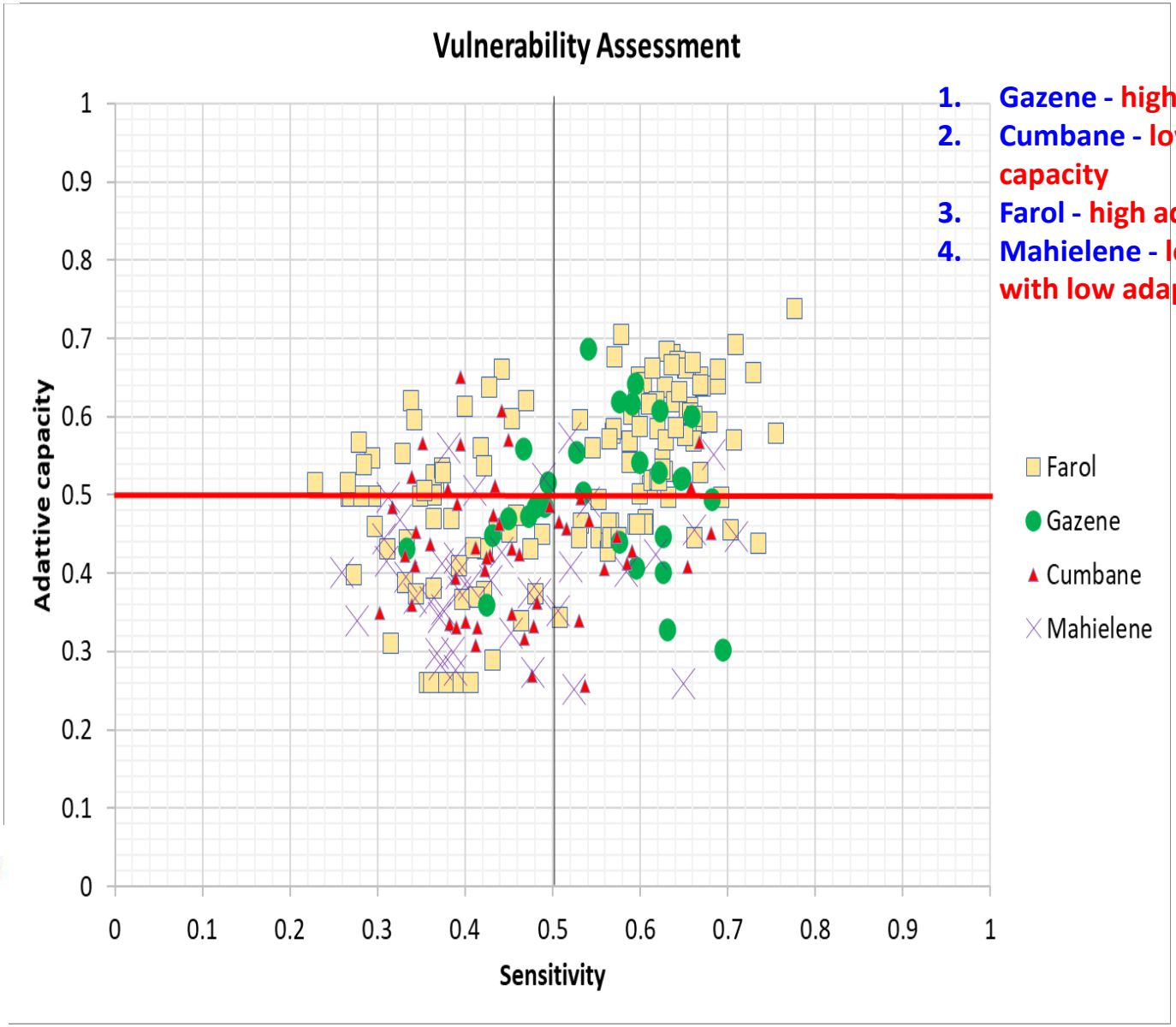
Cumbane



Mahielene



CCVI - Mz



1. Gazene - high sensitivity
2. Cumbane - low adaptive capacity
3. Farol - high adaptive capacity,
4. Mahielene - low sensitivity with low adaptive capacity.

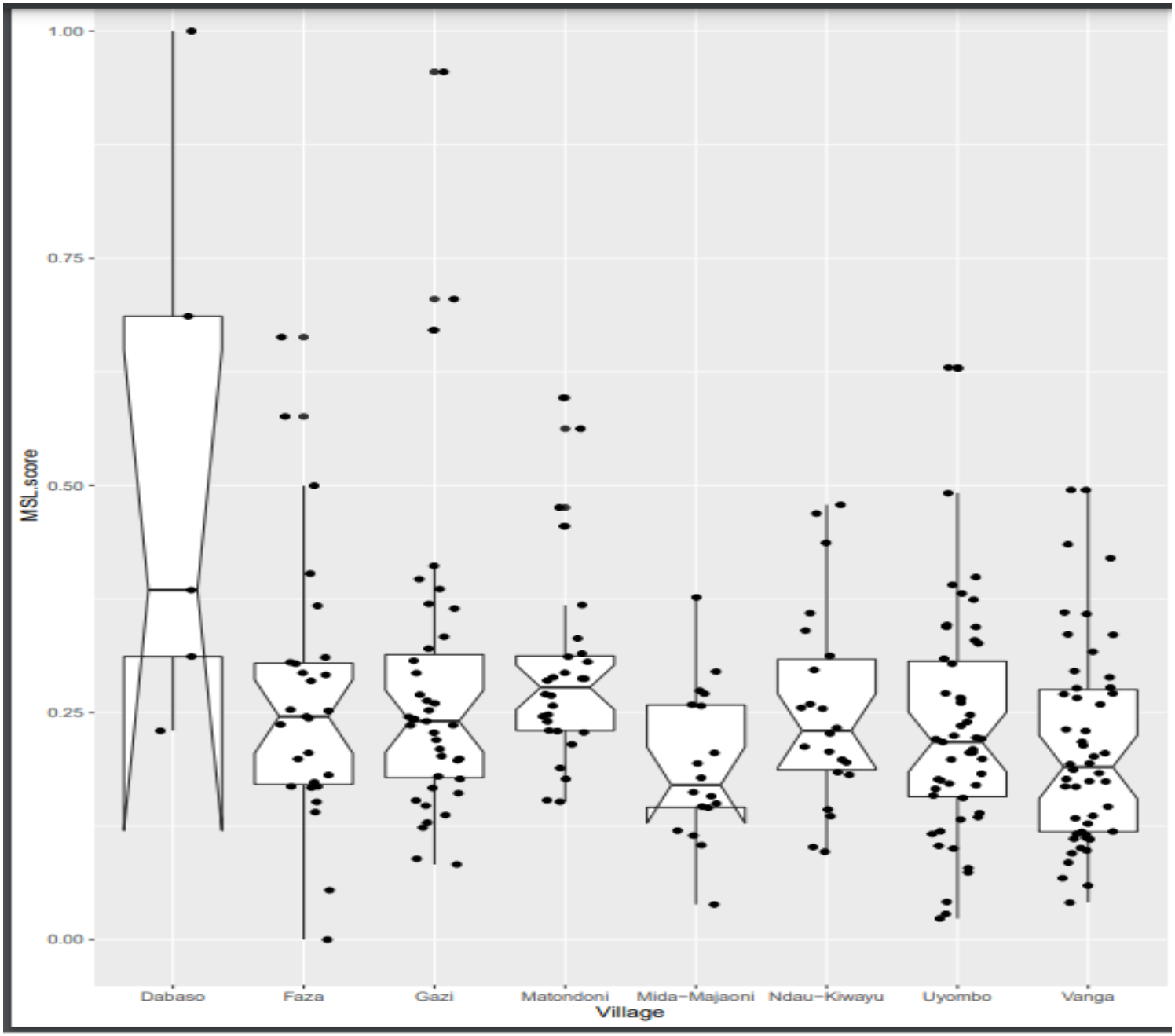
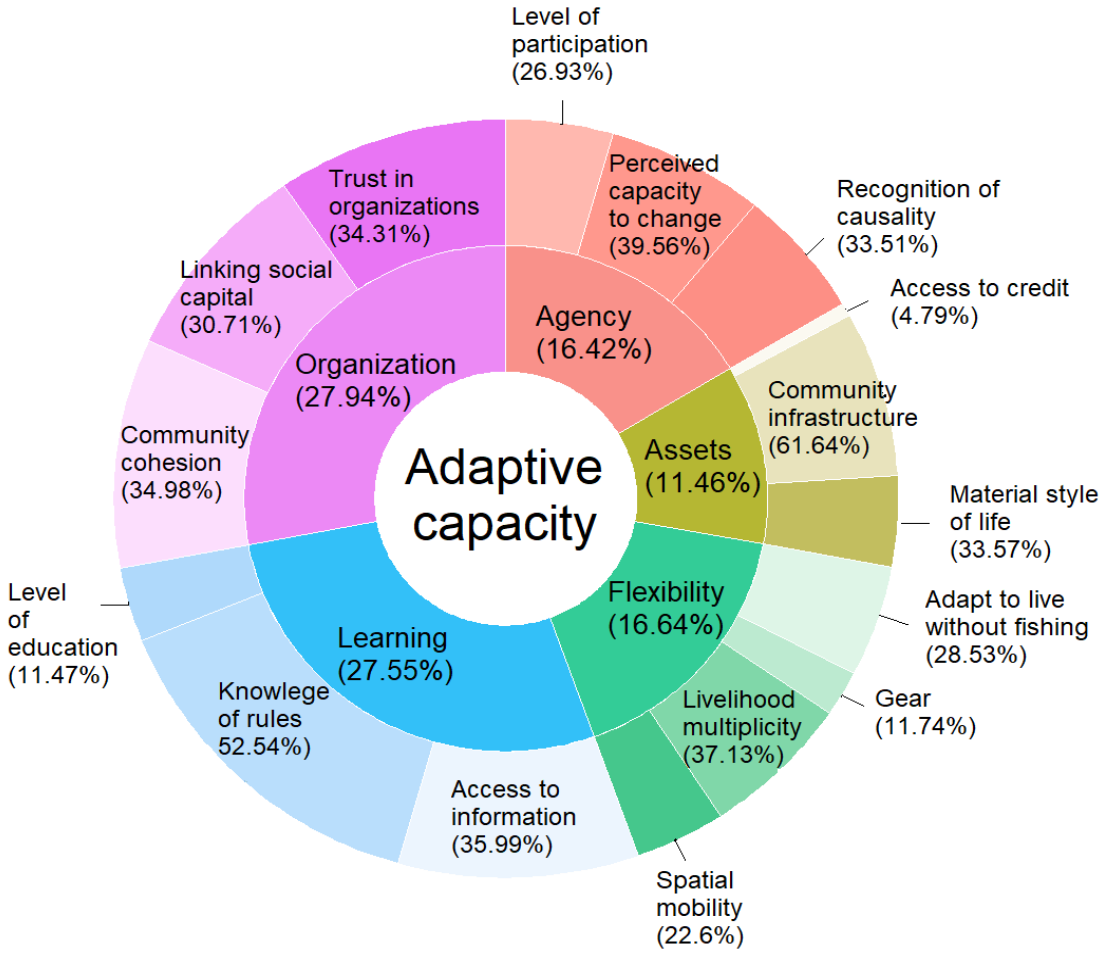
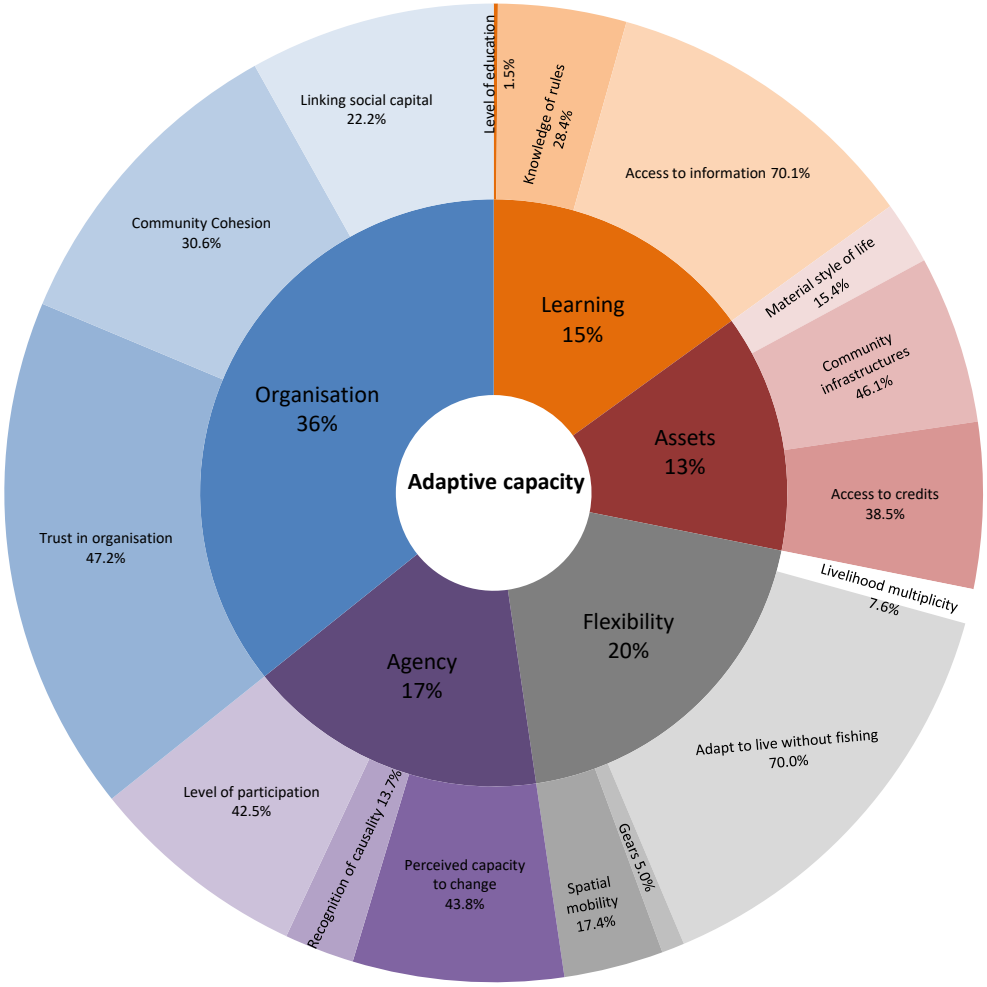


Fig. 4: Variability in MSL among villages

Adaptive Capacity - Md



Adaptive Capacity - Tz



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Critical Sensitivity and Adaptive Capacity Domains		
Country	**Sensitivity**	**Adaptive Capacity**
Madagascar	Livelihood •Percentage of income from main activity •Percentage of catch sold •Employment status •Time conducting the activity	Learning •Access to info. •Level of educ. •Knowledge of rules
Kenya	Livelihood	Learning
Mozambique	Livelihood	Learning
Tanzania	Livelihood	Organization •Trust in organization •Community cohesion

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Conclusions

- In Mz, the livelihood and learning domains contribute more to the overall CCVI in all studied communities. Gazene (which depends on fishing) is the most sensitive community followed by Farol (agriculture and fishing), Cumbane (Agriculture) and Mahielene (agriculture and fishing).
- To improve the CCVIs, actions that influence the indicators of the livelihood, learning and organization domains should be given priority. These actions will reduce sensitivity and increase social adaptive capacity

Conclusions

- The indicators that contribute more to the overall sensitivity in almost all communities are:
  - ***employment status***,
  - ***percentage of income from the main activity***,
  - ***appreciation of biodiversity***, ***nutritional dependency***,

Conclusions

- Indicators that contribute more to overall adaptive capacity in almost all communities in Mz:
  - ***access to information***,
  - ***community infrastructure***,
  - ***perceived capacity to change***,
  - ***level of participation***,
  - ***adapt to live without fishing*** and
  - ***trust in organizations***.
  - ***linking social capital -*** for Gazene and Mahielene, and
  - ***community cohesion*** for Gazene and Farol.

Conclusions

- Most critical indicators of adaptive capacity in KE are:
  - Access to information
  - Linking social capital
  - Level of participation
  - Community cohesion
  - Access to credit

Recommended Climate Change Adaptation Options

- There is need for the Governments to mainstream climate change adaptation planning and implementation in climate policy and planning processes
- Provision of basic social services, infrastructure, livelihood diversification & employment, strengthening of food production and supply systems, and community-based adaptation are critical towards enhancing the quality of life and livelihoods, particularly of low-income groups, and the vulnerable and marginalized groups.
  - The National and County Governments should seek to develop effective partnerships with the private sector organizations and the civil society in order to mobilize resources across scales to provide infrastructure and services to enhance the adaptive capacity

Recommended Climate Change Adaptation Options

- Targeted research that aims at improving the knowledge base on specific climate change related impacts & improved access to information on climate variability is essential to inform fishers and coastal farmers on decisions regarding the timing of fishing activity & management, and planting of crops
- Protection and restoration of the coastal wetland and coral reefs should be promoted through setbacks and limiting encroachment for development, establishment or strengthening of co-management areas

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Recommended Climate Change Adaptation Options

- Integrate climate adaptation into social protection programs, including cash transfers, youth workforce programmes and other social support services, which have proved to be socially feasible in order to increases resilience to climate change, especially when supported by basic services and infrastructure
- It is important to promote the adoption of energy saving technologies to reduce the demand for fuelwood and charcoal in both rural and urban areas. Communities depend heavily on fuelwood which is often sourced from the mangrove of coastal forests to cook.

Outputs from the CCVAs

- 4 technical reports
- 5 manuscripts
- IEC materials
- Strong regional networking on CCVA

Acknowledgements

- UNEP – Nairobi Convention Secretariat
- Macquarie University
- National institutions from KE, Tz, Mz, & Md.

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THANK YOU

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