

Out-scaling climate-smart technologies to smallholder farmers in Malawi, Zambia and Zimbabwe

Vulnerability study



1) Vulnerability assessment

- Vulnerability assessment done in 3 target areas
- PRAs done in Zaka (Zimbabwe), Balaka (Southern Malawi), Mwansambo (Central Malawi), Chanje (Eastern Zambia)
- Included a literature review and a sound assessment
- Activity is completed with a report which went through 3 rounds of review

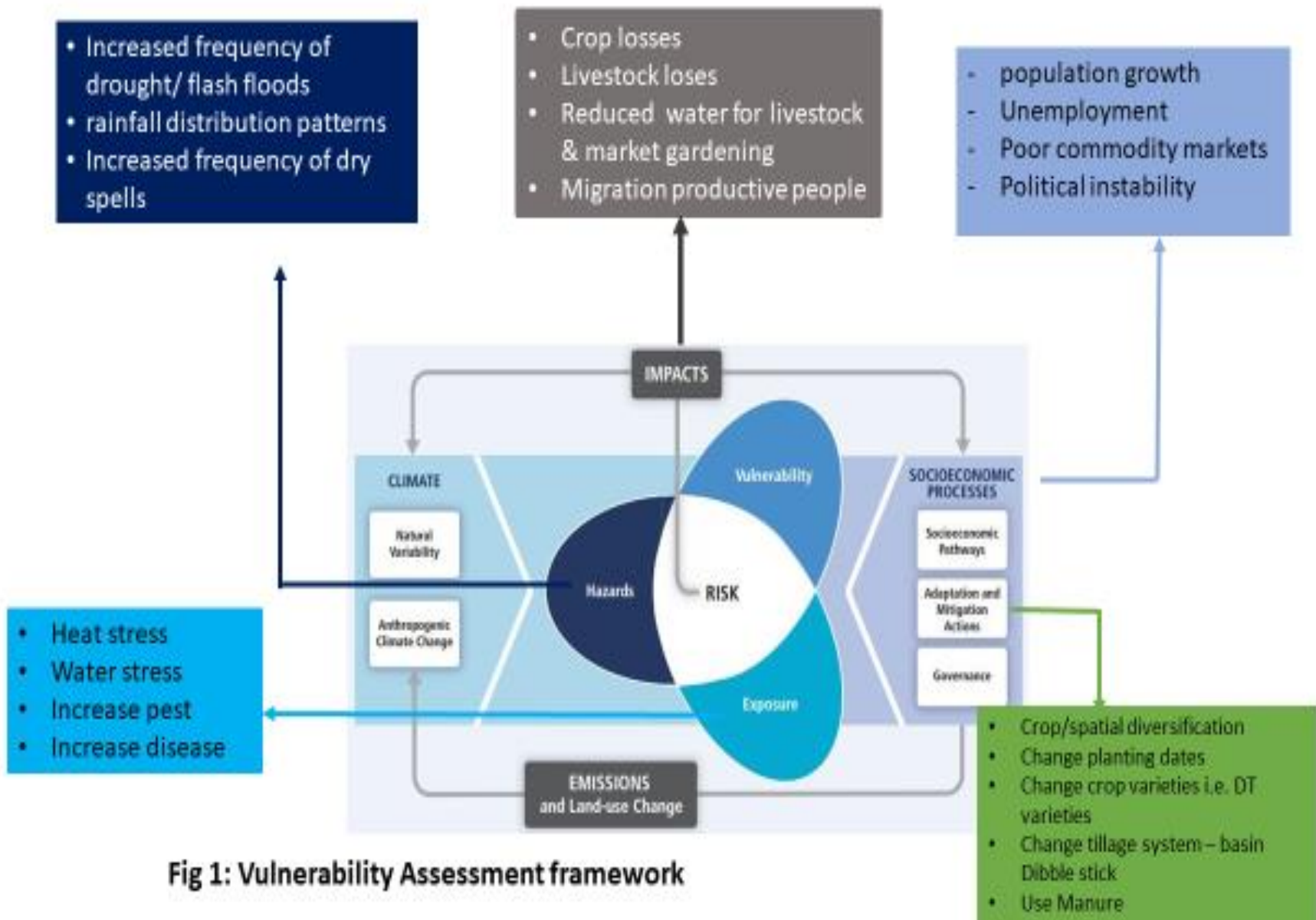


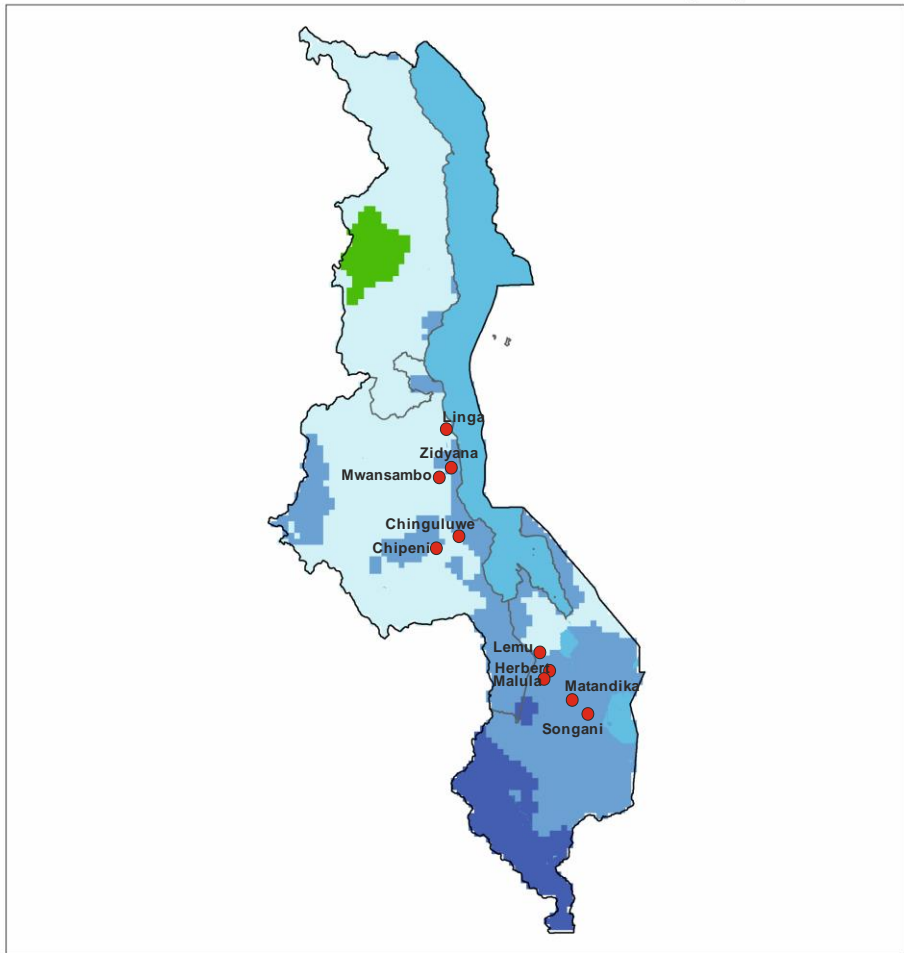
Fig 1: Vulnerability Assessment framework

Why is it important

- Identify national and local hotspots for planning adaptation measures
- Identify adaptation measure and evaluate their effectiveness
- Identifying entry points for intervention



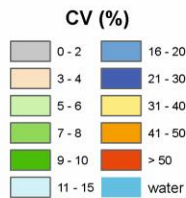
Risk exposure- Malawi



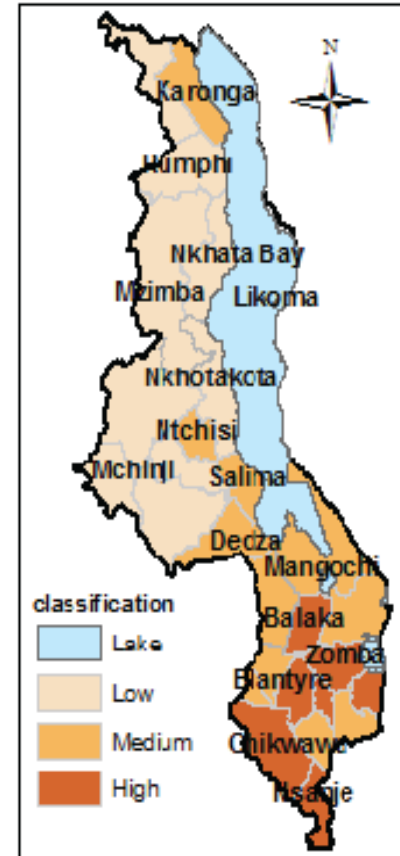
Std. Dev. / Average, Jul - Jun, 1982 - 2011



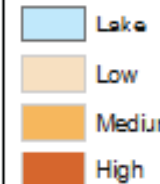
Map Produced by: USGS/EROS
Data Source: Climate Hazards Group InfraRed
Precipitation with Station (CHIRPS-2.0) (USGS/UCSB)



Rainfall Coefficient of Variation

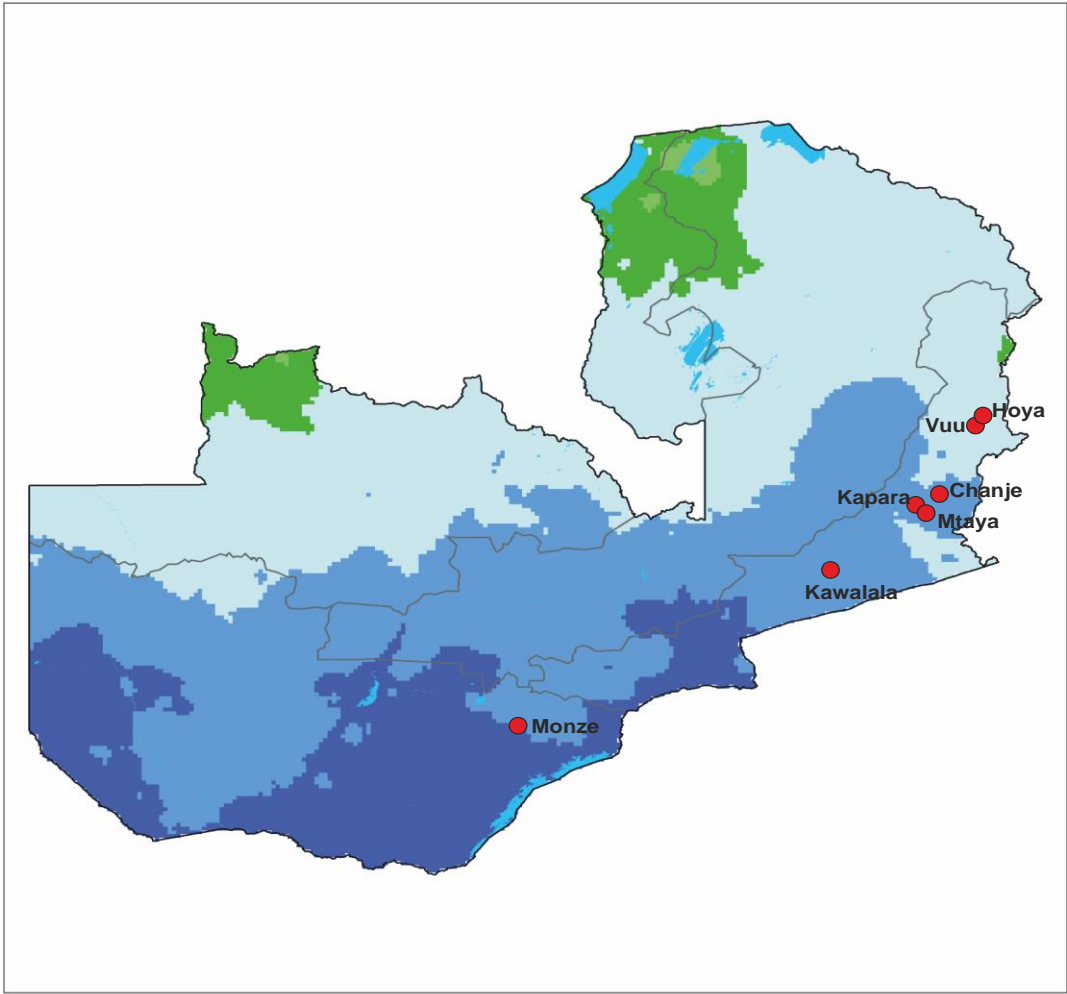


classification



Exposure to Drought

Risk exposure- Zambia

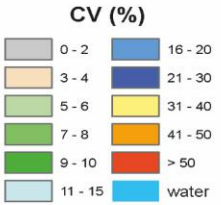


Rainfall Coefficient of variation

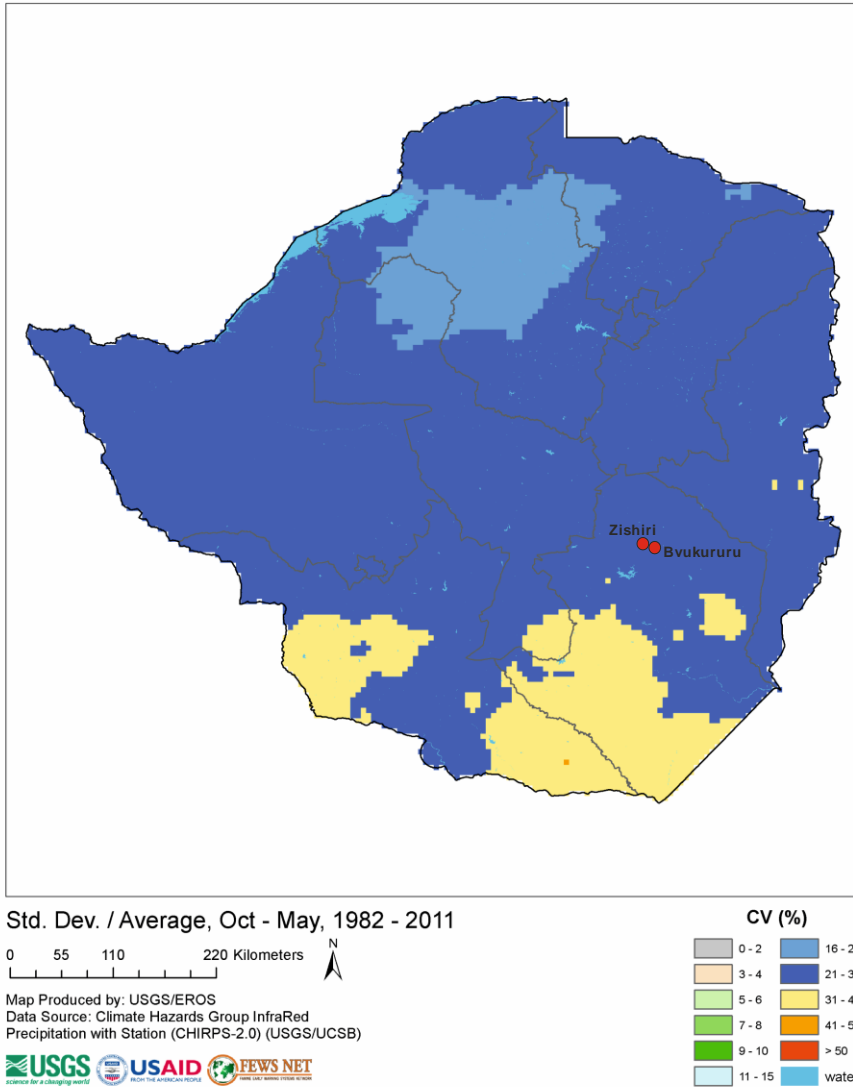
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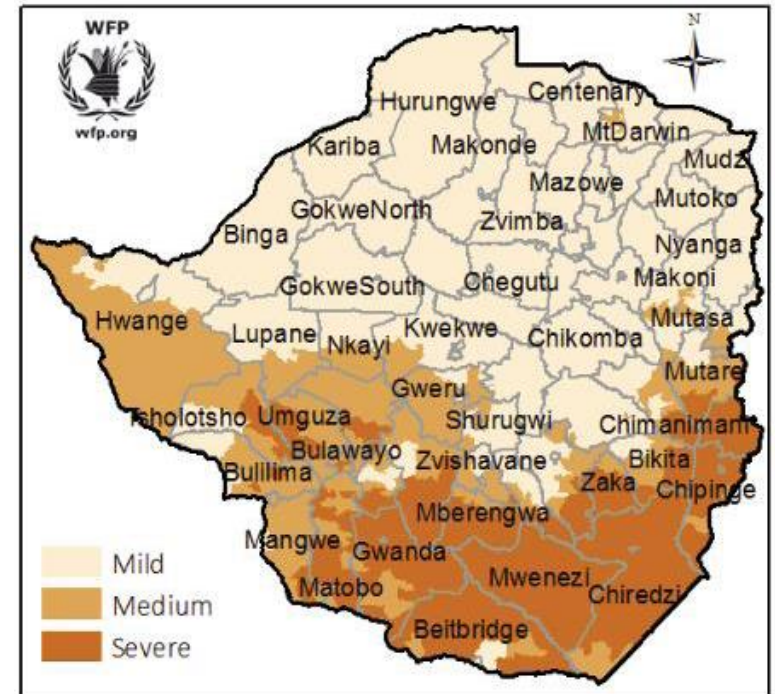
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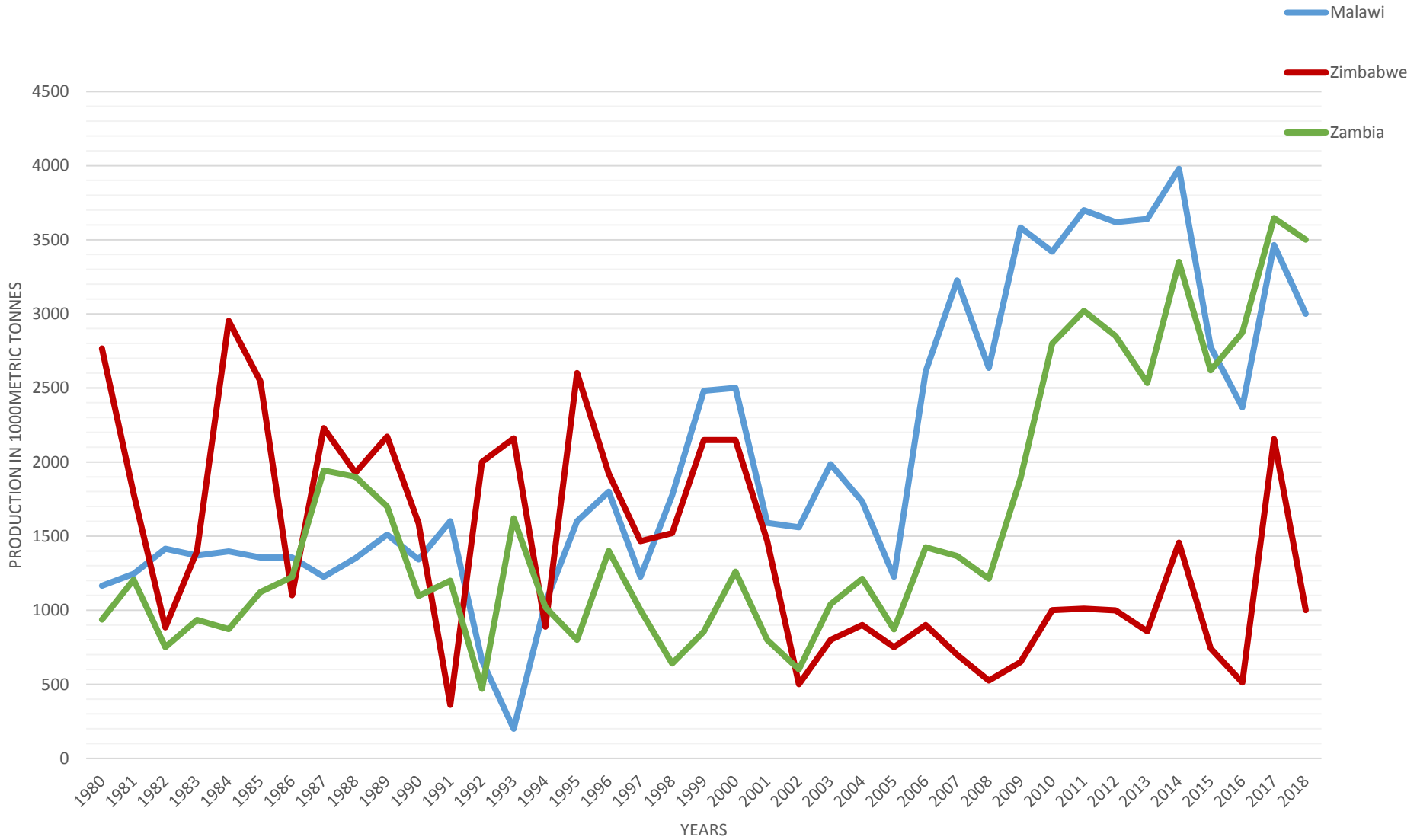
Risk exposure- Zimbabwe



Rainfall Coefficient of Variation



Exposure to Drought



Maize Production trend

Climate Risk/Impact Assessment matrix used in the survey

	Consequence of hazard					
	1 = Insignificant	2 = minor	3 = Moderate	4 = Major	5 = extreme	
Probability of hazard	5 = almost certain	medium	high	very high	very high	very high
	4 = likely	medium	medium	high	very high	very high
	3 = possible	low	medium	medium	high	very high
	2 = unlikely	Low	low	medium	medium	high
	1 = rare	Very low	Very low	low	medium	medium

Assessment of Risk – Malawi sites

Lemu						Mwansambo				
Climate hazard	Existing Risks			Future Risk		Existing risk			Future risk	
	Likelihood	Consequence	Risk	Likelihood	Consequence	Likelihood	Consequence	Risk	Likelihood	Consequence
Heat wave	possible	major	high	possible	major	Unlikely	moderate	medium	possible	moderate
Erratic season onset	likely	moderate	high	possible	moderate	likely	moderately	high	likely	high
Early season termination	likely	moderate	high	possible	moderate	likely	moderate	high	likely	moderate
Flash floods/cyclones	rarely	minor	Very low	rarely	minor	likely	moderate	high	likely	high
Dry spells	almost certain	major	very high	almost certain	major	likely	moderate	high	almost certain	very high
Severe droughts	likely	major	very high	likely	major	rarely	major	medium	unlikely	major
Moderate droughts	likely	moderate	high	likely	major	likely	major	very high	possible	moderate

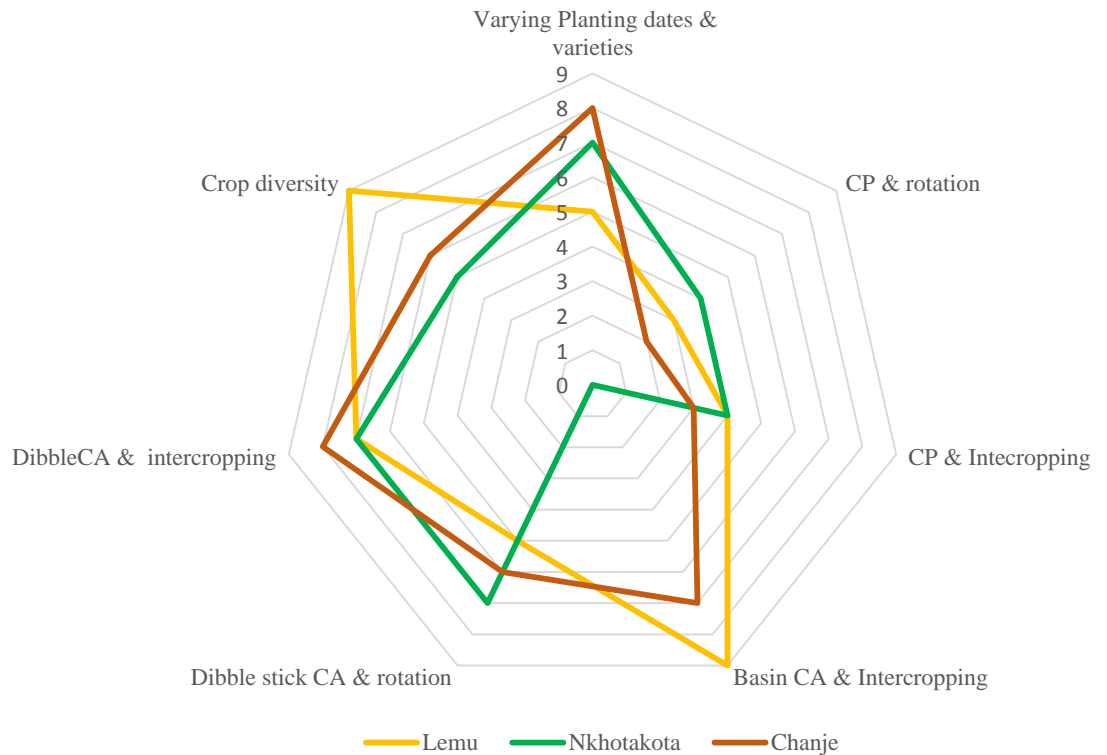
Assessment of Risk- Eastern Zambia

Chanje					
Climate hazard	Existing Risks			Future Risk	
	Likelihood	Consequence	Risk	Likelihood	Consequence
Heat wave	possible	moderate	medium	likely	major
Erratic season onset	likely	moderate	high	likely	moderate
Early season termination	likely	moderate	high	likely	moderate
Flash floods/cyclones	unlikely	moderate	medium	unlikely	moderate
Dry spells	likely	major	very high	likely	major
Severe droughts	likely	extreme	very high	Likely	extreme
Moderate droughts	likely	moderate	high	likely	moderate

Assessment of Risk- Zimbabwe sites

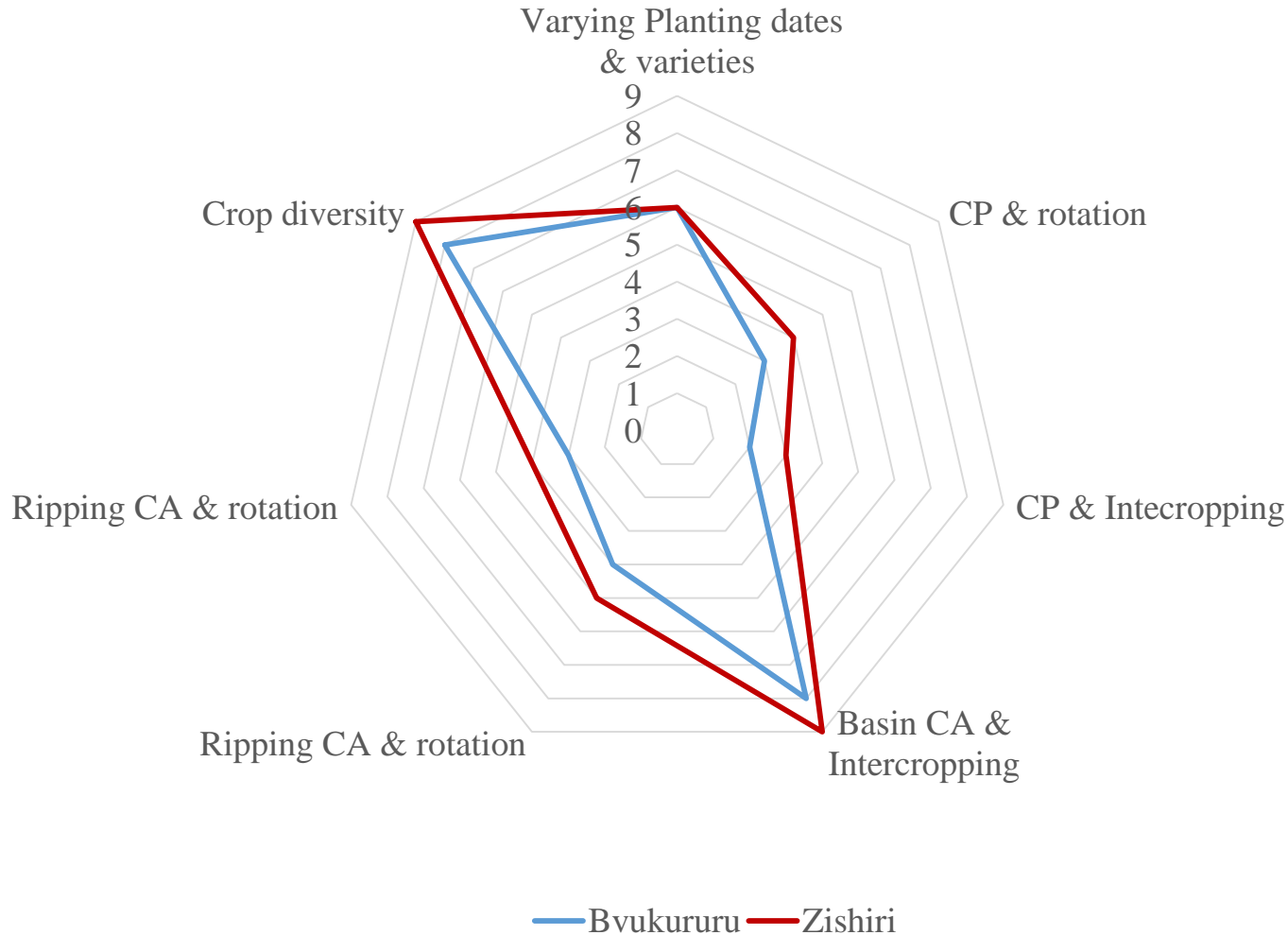
Bvukururu						Zishiri				
Climate hazard	Existing Risks			Future Risk		Existing risk			Future risk	
	Likelihood	Consequence	Risk	Likelihood	Consequence	Likelihood	Consequence	Risk	Likelihood	Consequence
Heat wave	possible	major	high	likely	major	possible	major	high	likely	major
erratic season onset	almost certain	major	very high	almost certain	major	almost certain	major	very high	almost certain	major
Early season termination	likely	moderate	high	likely	moderate	likely	moderate	verhigh	likely	moderate
Flash floods/cyclones	unlikely	extreme	high	likely	extreme	unlikely	extreme	high	likely	extreme
Dry spells	likely	major	very high	likely	major	likely	major	very high	likely	major
Severe droughts	likely	extreme	very high	likely	extreme	likely	extreme	very high	likely	extreme
Moderate droughts	likely	moderate	high	likely	moderate	likely	major	very high	likely	major

Adaptation strategies



(1-2= not important all, 3-4 = less important, 5-6 = important, 7-8 =very important, 9-10 = extremely important)

Adaptation strategies



Summary of Response strategies

Chanje, Eastern Zambia				
Climate hazard	Existing Risk	Adaptation Strategies		Vulnerability Profile
		Proactive adaptation strategies	Reactive	
Heat wave	medium	<ul style="list-style-type: none"> • Various CA form & agroforestry • Diversification crop & market gardening 	<ul style="list-style-type: none"> • Migration, Casual labour, Small business, Charcoal selling 	More Vulnerable
Erratic season onset	high	<ul style="list-style-type: none"> • Varying planting dates and varieties • Various CA forms 	<ul style="list-style-type: none"> • Small business, Casual labour, Charcoal 	Extremely vulnerable
Early season termination	high	<ul style="list-style-type: none"> • planting short season varieties • Various CA forms 	<ul style="list-style-type: none"> • Small business, Casual labour, Charcoal 	More vulnerable
Flash floods/cyclones	medium	<ul style="list-style-type: none"> • Agro-forestry • Stone bunds 	<ul style="list-style-type: none"> • Small business, Casual labour, Brick making & selling 	More Vulnerable
Dry spells	very high	<ul style="list-style-type: none"> • Varying planting dates & varieties • Various CA forms & Agroforestry • Crop diversification 	<ul style="list-style-type: none"> • Small business, Casual labour 	Most Vulnerable
Severe droughts	very high	<ul style="list-style-type: none"> • Varying planting dates & varieties • Various CA forms & Agroforestry • Crop diversification 	<ul style="list-style-type: none"> • Reducing meals, • Dropping children from school, • Migration, • Charcoal selling. 	Most vulnerable
Moderate droughts	high	<ul style="list-style-type: none"> • Varying planting dates & varieties • Various CA forms • Crop diversification 	<ul style="list-style-type: none"> • Small business, bicycle tax business, Vending, casual labour, • brick making and selling 	Extremely vulnerable

Lemu, Southern Malawi					Mwansambo, Central Malawi			
Climate hazard	Existing Risk	Adaptation Strategies		Vulnerability Profile	Existing risk	Adaptation strategies		Vulnerability
		Proactive	Reactive			Proactive	Reactive	
Heat wave	high	<ul style="list-style-type: none"> Mulching intercropping 	None	More vulnerable	medium	<ul style="list-style-type: none"> Mulching 	none	Less vulnerable
erratic season onset	high	<ul style="list-style-type: none"> Varying planting dates & varieties Various CA forms 	<ul style="list-style-type: none"> Replanting 	Extremely vulnerable	high	<ul style="list-style-type: none"> Dibble stick CA Varying planting dates & varieties 	Replanting	Most vulnerable
Early season termination	high	<ul style="list-style-type: none"> Planting short season varieties Crop diversification Stream bank cultivation 	<ul style="list-style-type: none"> Selling small stock. & land Casual labour Migration 	Most vulnerable	high	<ul style="list-style-type: none"> Varying planting dates & varieties Dibble stick CA Crop diversification Stone bunds & terracing 	<ul style="list-style-type: none"> Selling small stock Casual labour Migration 	More vulnerable
Flash floods/cyclones	Very low	None	None	Least vulnerable	high	<ul style="list-style-type: none"> Stone bunds Crop diversification Spatial diversification 	<ul style="list-style-type: none"> Selling small stock Casual labour Migration 	More vulnerable
Dry spells	very high	<ul style="list-style-type: none"> Varying planting dates & varieties Various CA forms Crop diversification 	<ul style="list-style-type: none"> Selling small stock. & land Casual labour 	Extremely vulnerable	high	<ul style="list-style-type: none"> Varying planting dates & varieties Dibble stick CA Crop diversification 	<ul style="list-style-type: none"> Selling small stock Casual labour Migration 	More vulnerable
Severe droughts	very high	<ul style="list-style-type: none"> Various CA forms Planting short season varieties Crop diversification 	<ul style="list-style-type: none"> Charcoal selling Selling small stock & land Prostitution migration 	Most vulnerable	medium	<ul style="list-style-type: none"> Varying planting dates & varieties Dibble stick CA Crop diversification Stone bunds & terracing 	<ul style="list-style-type: none"> Selling small stock Casual labour Migration 	Less vulnerable
Moderate droughts	Very high	<ul style="list-style-type: none"> Varying planting dates & varieties Various CA forms Crop diversification 	<ul style="list-style-type: none"> Selling small stock. & land Casual labour Migration charcoal 	Most vulnerable	Very high	<ul style="list-style-type: none"> Varying planting dates & varieties Dibble stick CA Crop diversification Stone bunds & terracing 	<ul style="list-style-type: none"> Selling small stock Casual labour Migration 	More vulnerable

Bvukururu, Southern Zimbabwe

Zishiri, Southern Zimbabwe

Climate hazard	Existing Risk	Adaptation Strategies		Vulnerability Profile	Existing risk	Adaptation strategies		Vulnerability Profile
		Proactive	Reactive			Proactive	Reactive	
Heat wave	high	<ul style="list-style-type: none"> Basin CA Crop variety diversification 	<ul style="list-style-type: none"> Borrow money from local savings club Winter irrigation 	Less vulnerable	high	<ul style="list-style-type: none"> Basin CA Crop variety diversity 	<ul style="list-style-type: none"> Replanting 	More vulnerable
Erratic season onset	very high	<ul style="list-style-type: none"> Varying planting dates & Varieties Crop diversity Diversification (market gardening & fruit trees) 	<ul style="list-style-type: none"> Small business Brick molding for sale 	Extremely vulnerable	very high	<ul style="list-style-type: none"> Vary planting dates & varieties Crop diversity 	<ul style="list-style-type: none"> Replanting Molding bricks & fire wood selling 	Extremely vulnerable
Early season termination	high	<ul style="list-style-type: none"> Plant short season varieties Crop diversity Irrigate high value crops (ground nuts) 	<ul style="list-style-type: none"> Winter irrigation Small business Brick molding for sale 	More vulnerable	very high	<ul style="list-style-type: none"> Plant short season varieties Crop diversity Irrigate high value crops (ground nuts) 	<ul style="list-style-type: none"> Small business Brick molding for sale Casual labour 	Most vulnerable
Flash floods/cyclones	high	<ul style="list-style-type: none"> Agro- forestry Terracing 	<ul style="list-style-type: none"> Winter irrigation Small business Savings clubs 	Most vulnerable	high	<ul style="list-style-type: none"> Agro- forestry Terracing 	<ul style="list-style-type: none"> Small business Brick molding for sale Casual labour 	Most vulnerable
Dry spells	very high	<ul style="list-style-type: none"> Basin CA Varying planting dates & Varieties Crop diversity Diversification (market gardening & fruit trees) 	<ul style="list-style-type: none"> Winter irrigated maize. Small business Savings clubs 	More vulnerable	very high	<ul style="list-style-type: none"> Basin Ca Varying planting dates & Varieties Crop diversity Diversification (market gardening & fruit trees) 	<ul style="list-style-type: none"> Small business Brick molding for sale Casual labour 	More vulnerable
Severe droughts	very high	<ul style="list-style-type: none"> Basin CA Varying planting dates & Varieties Crop diversity Diversification (market gardening & fruit trees) 	<ul style="list-style-type: none"> Winter irrigated maize. small business savings clubs sale livestock 	Most vulnerable	very high	<ul style="list-style-type: none"> Basin CA Varying planting dates & Varieties Crop diversity Fruit production 	<ul style="list-style-type: none"> Small business Brick molding for sale -Casual labour 	Extremely vulnerable
Moderate droughts	high	<ul style="list-style-type: none"> Basin CA Varying planting dates & Varieties Crop diversification Diversification (market gardening & fruit trees) 	<ul style="list-style-type: none"> Winter irrigate maize. small business savings clubs sale livestock 	Most vulnerable	Very high	<ul style="list-style-type: none"> Basin CA Varying planting dates & Varieties Crop diversification Diversification (market gardening & fruit trees) 	<ul style="list-style-type: none"> Small business Brick molding for sale Casual labour 	More vulnerable

Climate vulnerability assessment

Results

- Climate calamities partially / perfectly correlated with socio-economic shocks.
- high population densities, high poverty levels, limited economic off- farm activities and high reliance on crop production
- Diversification as the key strategy

