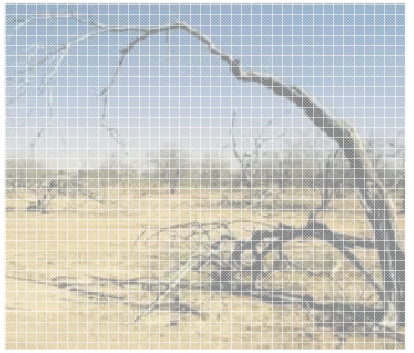
Drought and rainfall variability in southern Africa:

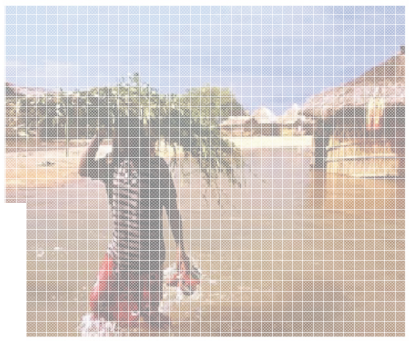
Livelihood impacts & Network response

David Love, WaterNet

WATERnet

Building Capacity for Water Resources Management in Southern Africa



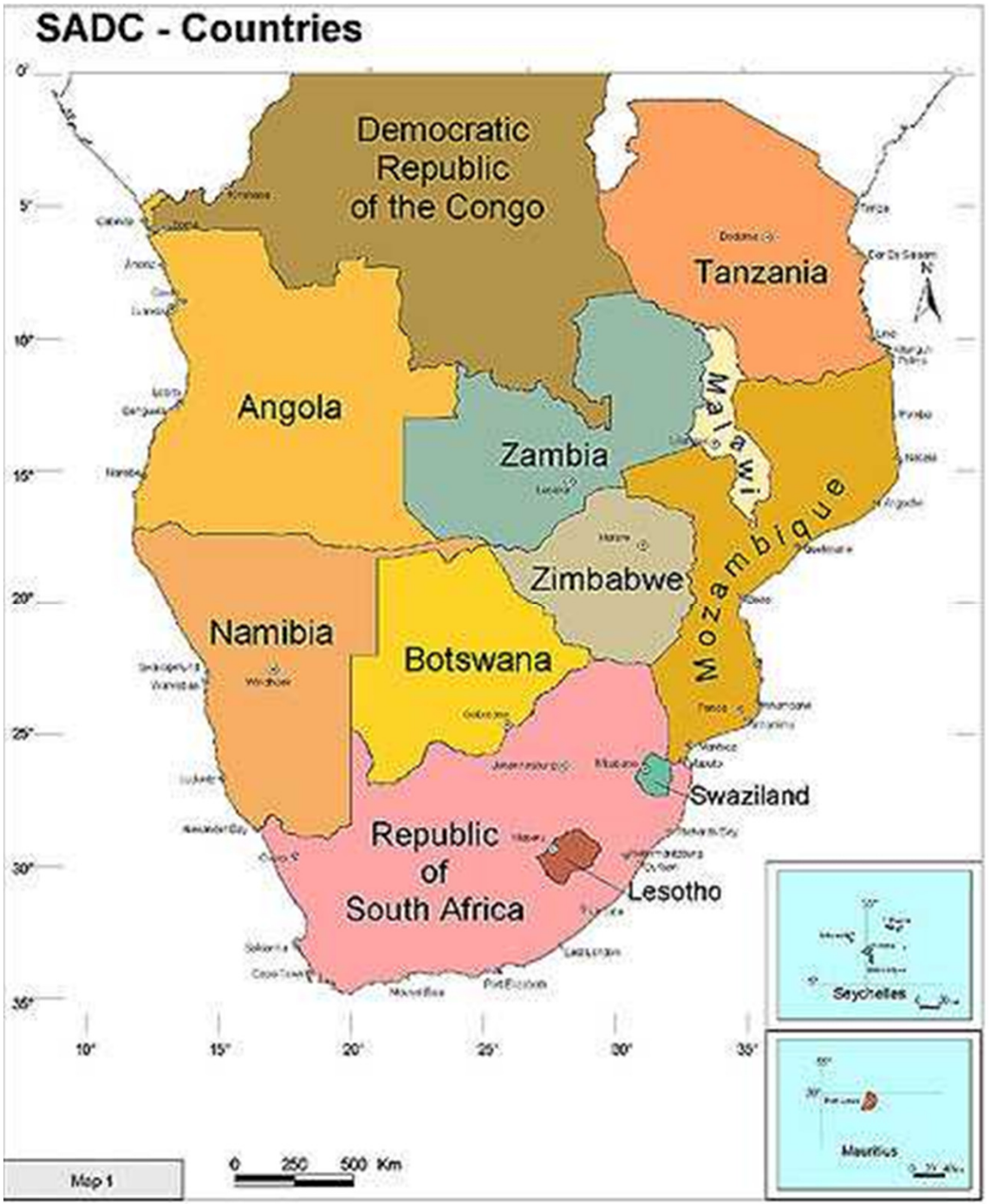


SADC

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

TOWARDS A COMMON FUTURE

a future SADC Subsidiary institution

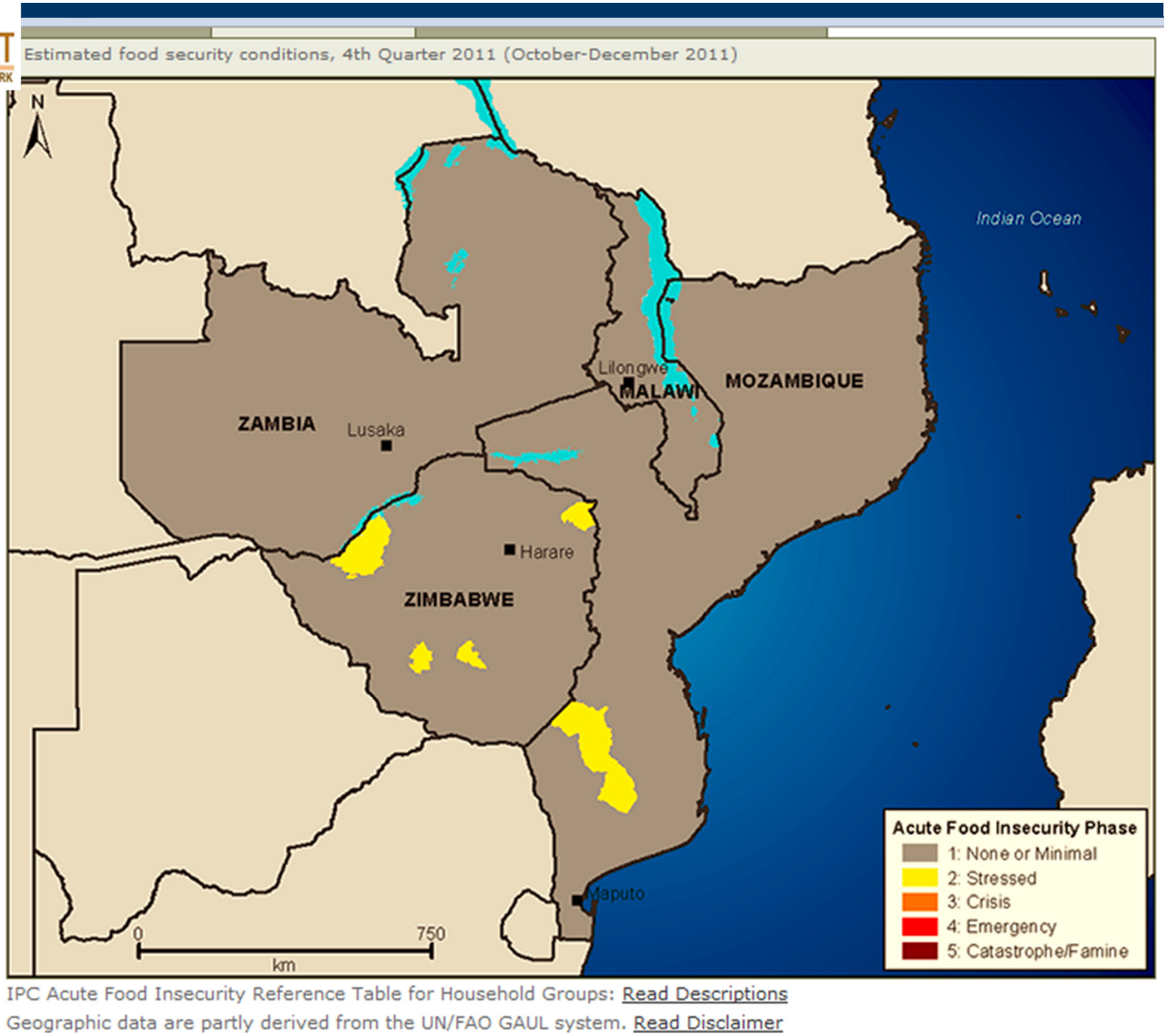


SOUTHERN AFRICAN DEVELOPMENT COMMUNITY
SADC
TOWARDS A COMMON FUTURE

WATERnet

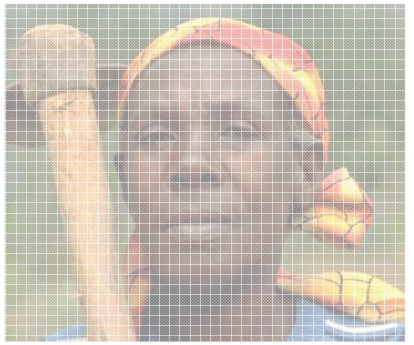
Building Capacity for Water Resources Management in Southern Africa

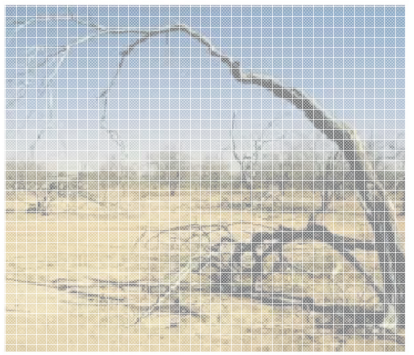
Food insecurity even in normal years



Drought

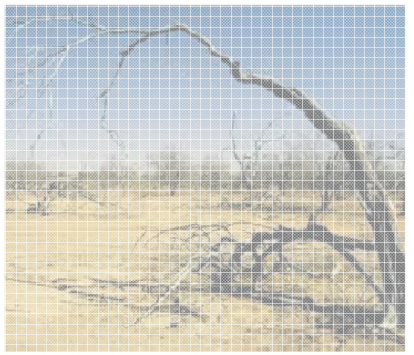
- Drought year rainfall drops 40 to 70% of 1960-1990 MAR
- El Nino:
  - Neg. correlation to MEI (r=0.45-0.75)
  - 120% inc in probability of drought (p=0.0005)
  - Although 1997/8 not as severe as predicted (20-50%)

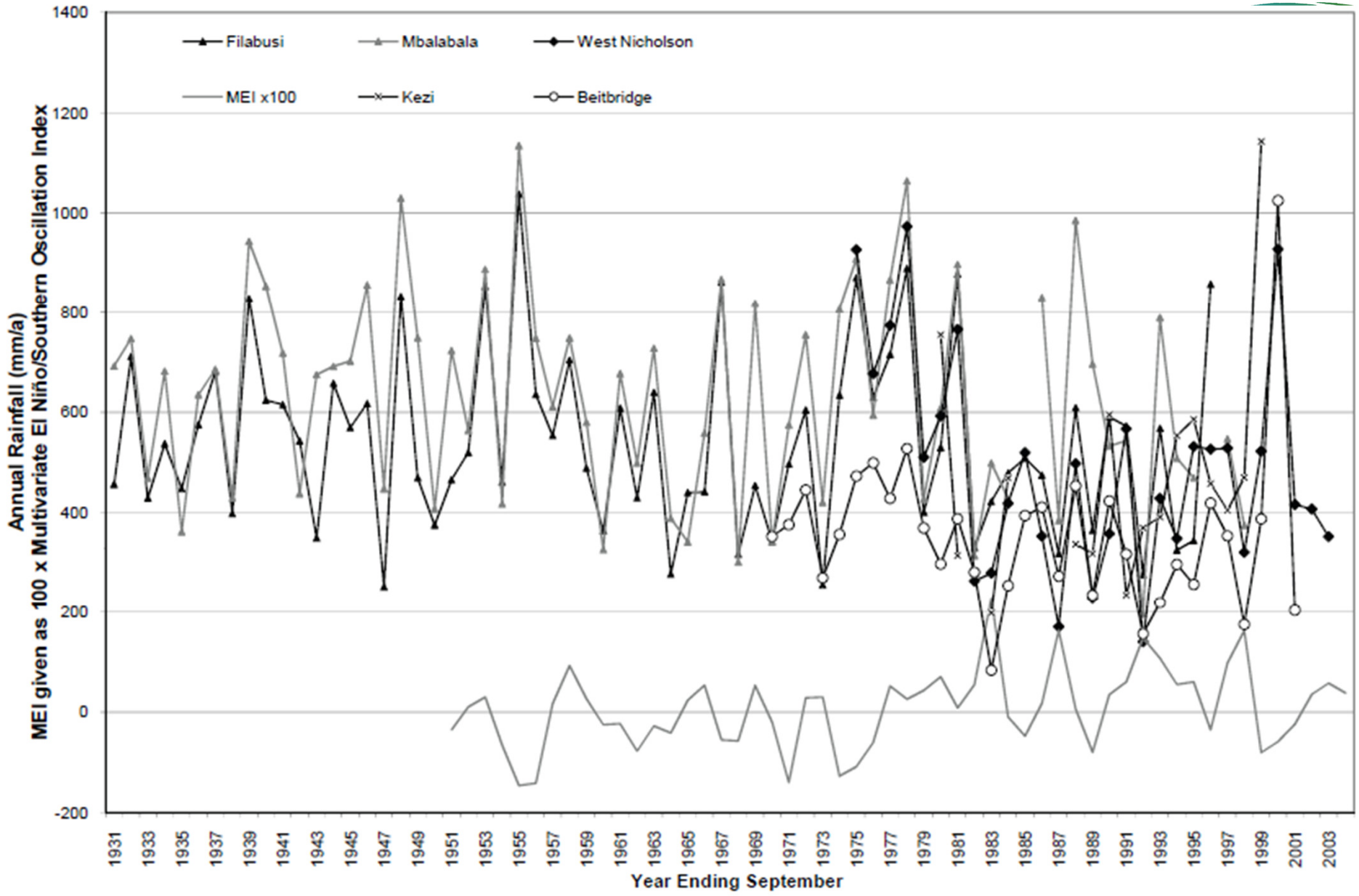




Drought

- Cycles:
  - 3 to 5 year cycles, within
  - 17 to 20 year cycles in 5YMA




Filabusi
Mbalabala
West Nicholson
MEI x100
Kezi
Beitbridge
Annual Rainfall (mm/a)
MEI given as 100 x Multivariate El Niño/Southern Oscillation Index
1400
1200
1000
800
600
400
200
0
-200
1931
1933
1935
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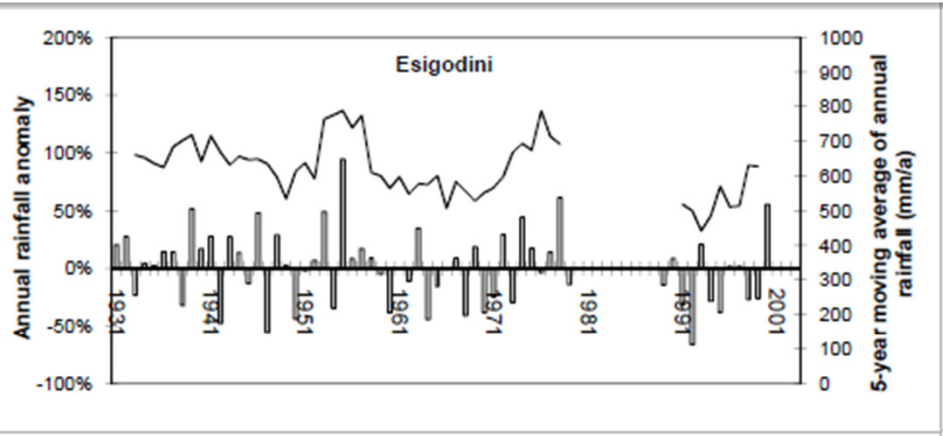
2001
2003
Year Ending September


Esigodini
Annual rainfall anomaly
5-year moving average of annual rainfall (mm/a)
200%
150%
100%
50%
0%
-50%
-100%
1000
900
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1931
1941
1951
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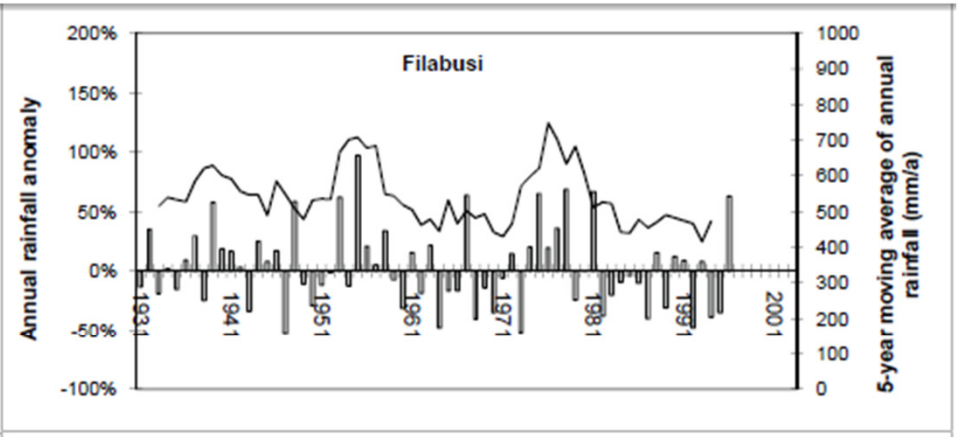
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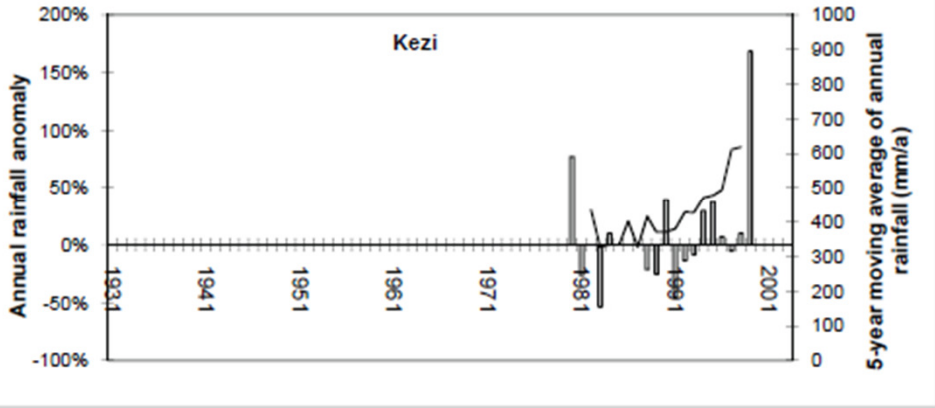
Kezi
Annual rainfall anomaly
5-year moving average of annual rainfall (mm/a)
200%
150%
100%
50%
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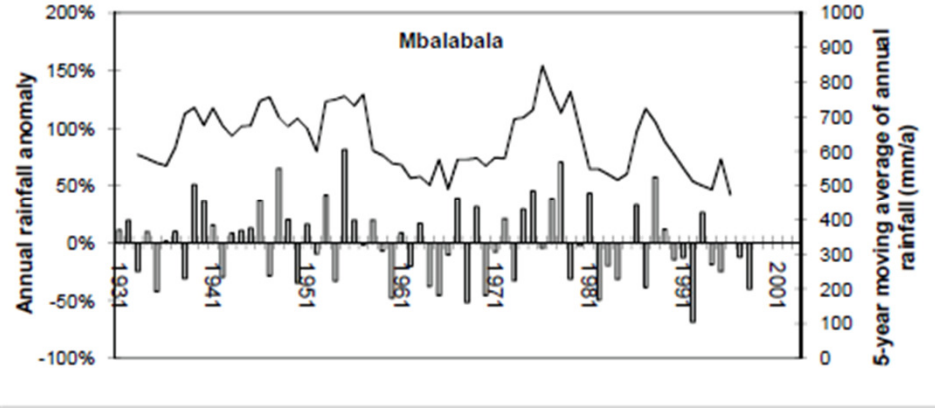
Mbalabala
Annual rainfall anomaly
5-year moving average of annual rainfall (mm/a)
200%
150%
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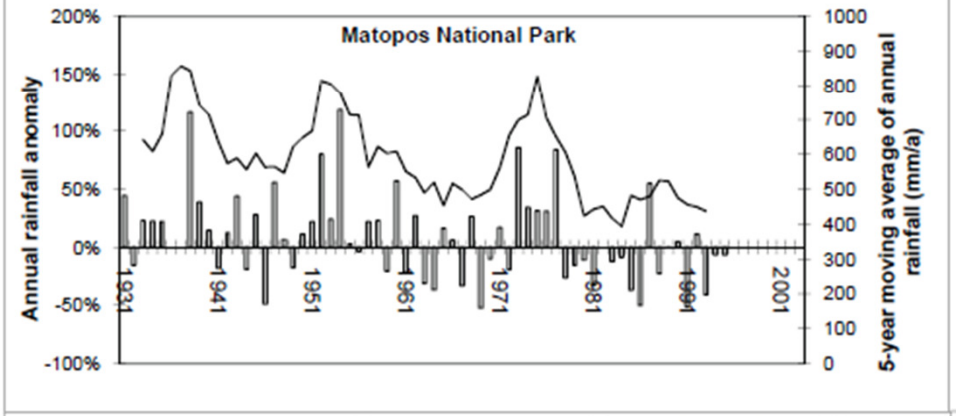
Matopos National Park
Annual rainfall anomaly
5-year moving average of annual rainfall (mm/a)
200%
150%
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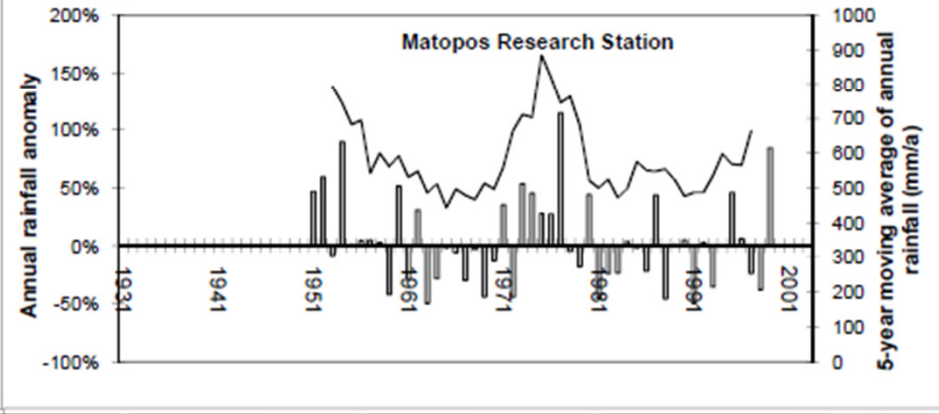
Matopos Research Station
Annual rainfall anomaly
5-year moving average of annual rainfall (mm/a)
200%
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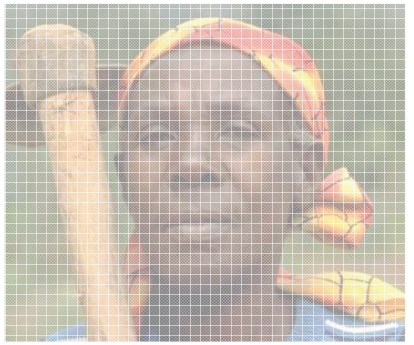
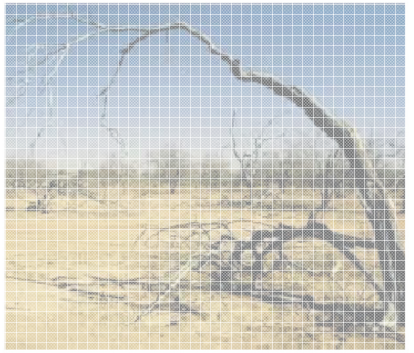
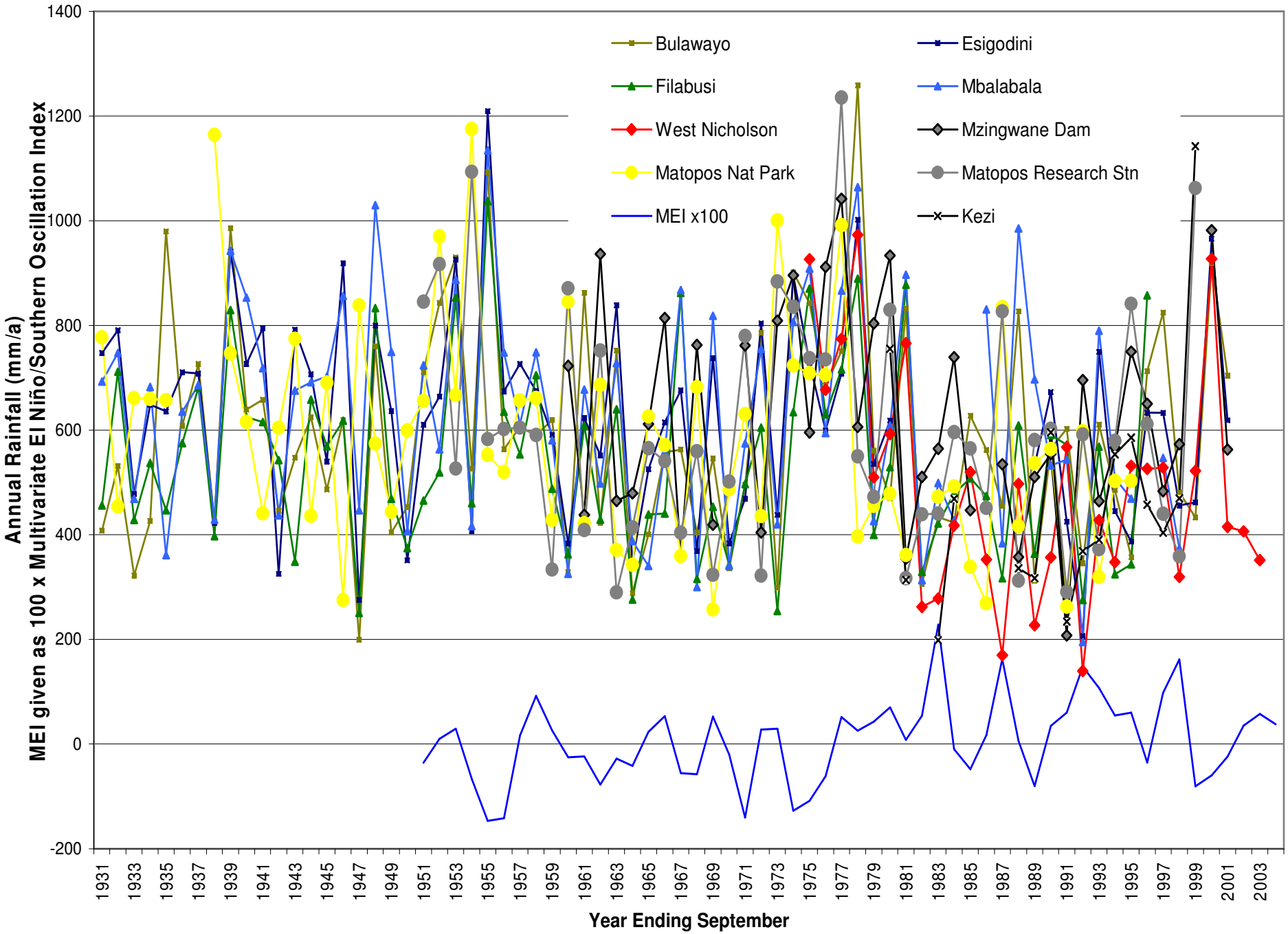
Rainfall Variability

- High inter-annual variability
- High spatial variability
- Variable start and end

- Most importantly **dry spells**






Annual Rainfall (mm/a)
MEI given as 100 x Multivariate El Niño/Southern Oscillation Index
Year Ending September
Bulawayo
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Filabusi
Mbalabala
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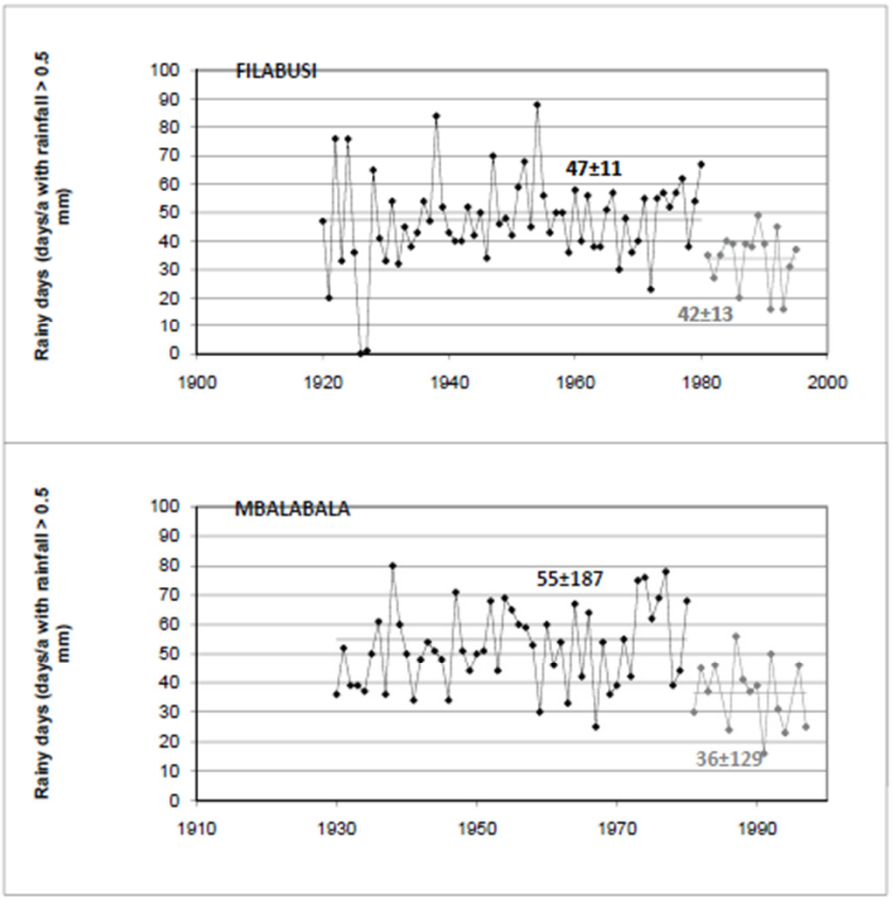
Rainfall Variability



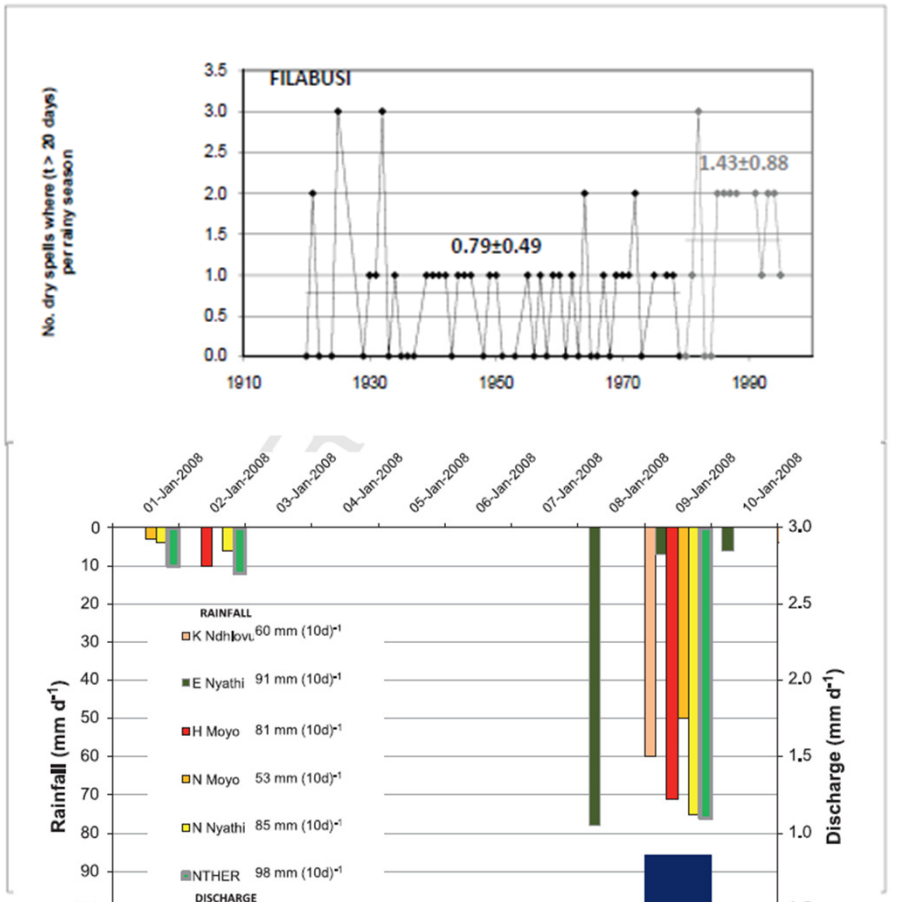


Table 5

Statistical analyses of rainfall parameters recorded, northern Limpopo Basin. Significant change points are illustrated by change in colour in the series on the right of the table: grey represents a reference or homogeneous period, black a wetter period and white a drier period. Cohen's d statistics are shown in italics for a medium effect and in bold for a large effect.

Station	Parameter	Trend analyses		Change points detected by Pettitt test (p =0.8) and t-test (α = 0.025)		
		Spearman rank test α = 0.025	Mann-Kendall test α = 0.025	Number detected	Effect size: Cohen's d	Hydrological Year 1920 1930 1940 1950 1960 1970 1980 1990 2000
Flisbusi	Annual Rainfall					
	Wet days			1	**0.84**	
	Days rainfall >10 mm					
	Days rainfall >20 mm					
	Days rainfall >30 mm					
	Longest Dry spell			2	*0.69* ; *0.33*	
	Dry spells 5-7 days					
	Dry spells 8-14 days					
	Dry spells >14 days	Significant increase	Significant increase	2	**0.80** ; *0.79*	
	Dry spells >20 days	Significant increase	Significant increase	1	**0.80**	
	Dry spells total					
Mbalabala	Annual Rainfall					
	Wet days			1	**1.17**	
	Days rainfall >10 mm					
	Days rainfall >20 mm					
	Days rainfall >30 mm					
	Longest Dry spell			1	**0.74**	
	Dry spells 5-7 days					
	Dry spells 8-14 days			1	*0.66*	
	Dry spells >14 days					
	Dry spells >20 days			1	*0.61*	
	Dry spells total		Significant increase			
Mzingwane Dam	Annual Rainfall			1	*0.73*	
	Wet days			1	*0.74*	
	Days rainfall >10 mm					
	Days rainfall >20 mm			1	**0.83**	
	Days rainfall >30 mm					
	Longest Dry spell			1	*0.66*	
	Dry spells 5-7 days					
	Dry spells 8-14 days			1	*0.76*	
	Dry spells >14 days					
	Dry spells >20 days					
	Dry spells total				*0.76*	
Matopos Nat. Park	Annual Rainfall	Significant decrease	Significant decrease	1	*0.66*	
	Wet days			1	*0.66*	
	Days rainfall >10 mm	Significant decrease	Significant decrease	2	*0.36* ; *0.67*	
	Days rainfall >20 mm	Significant decrease	Significant decrease	2	*0.27* ; *0.76*	
	Days rainfall >30 mm					
	Longest Dry spell					
	Dry spells 5-7 days					
	Dry spells 8-14 days					
	Dry spells >14 days			1	*0.69*	
	Dry spells >20 days					
	Dry spells total					

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Impacts: cropping

Food security

Food aid

Problem of maize

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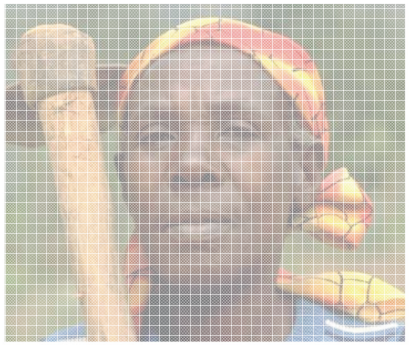

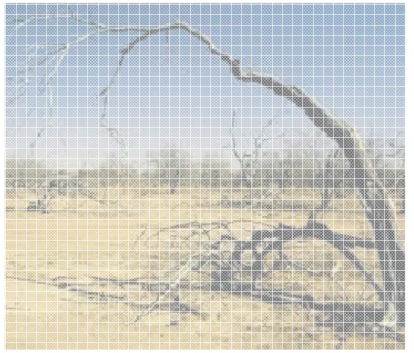

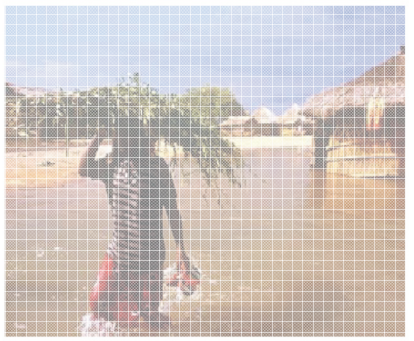

Impacts: livestock

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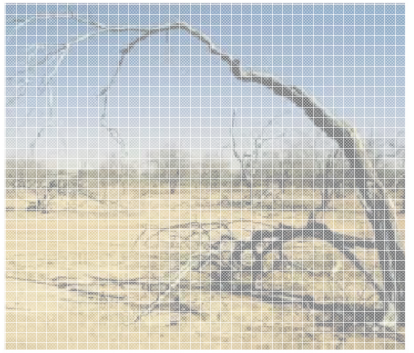
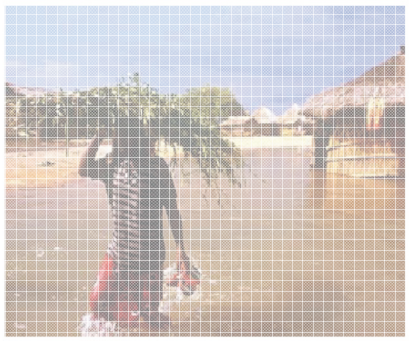


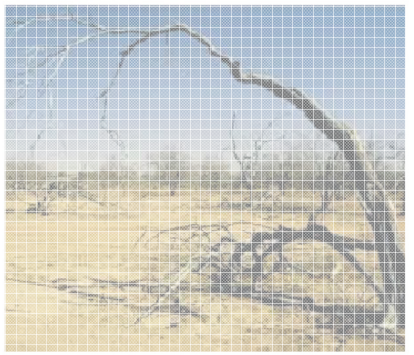


Impacts: water supply

Water supplies for cities and mines
Inter-basin transfers

Livelihood impacts

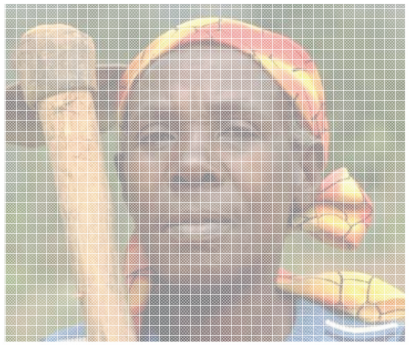
- Other aspects of vulnerability:
  - Food pricing
  - Markets and transport
  - Labour
  - HIV/AIDS

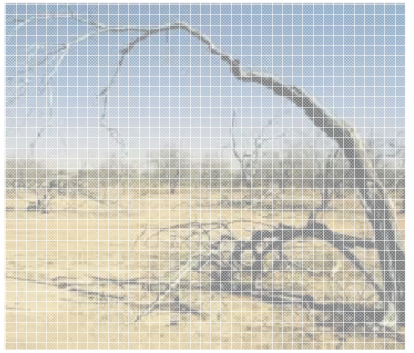


Networks

Small countries working together

WATERnet
Building Capacity for Water Resources Management in Southern Africa





Collaborative outreach

Global Water Partnership Southern Africa

AgWA
agricultural water for africa partnership

SACCNet
southern africa climate change network

Collaborative research

WATERnet

DEWFORA

CGIAR Challenge Program on WATER & FOOD

Disaster Risk Reduction Unit
Climate Services Centre

SADC

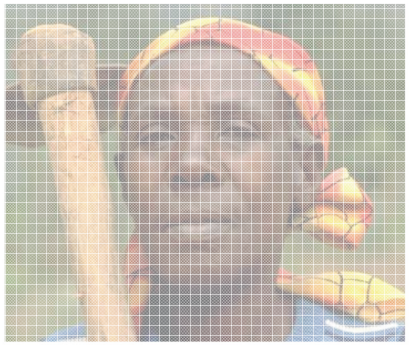
FEWS NET
FAMINE EARLY WARNING SYSTEMS NETWORK

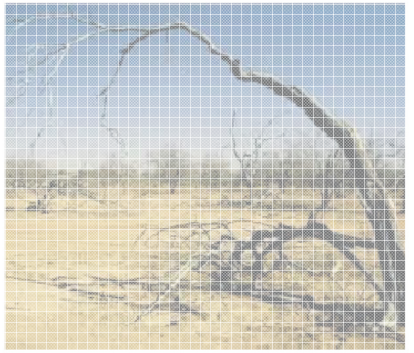
SADC Member State Governments

DEWFORA

WATERnet
Building Capacity for Water Resources Management in Southern Africa

- Improved drought early warning and forecasting systems in Africa:
  - Monitoring
  - Risk & vulnerability assessment
  - Forecasting & warning
  - Response





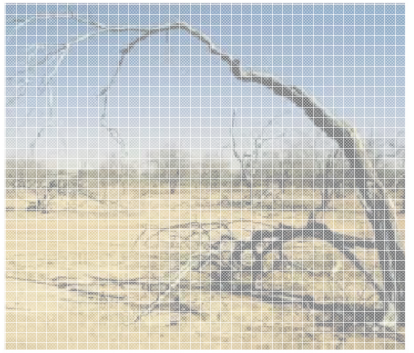
Challenge Program on Water & Food

CGIAR Challenge Program on WATER & FOOD

WATERnet

Building Capacity for Water Resources Management in Southern Africa

- Sustainable **small** water infrastructure
- Farm systems (crop-livestock)
- Re-orienting and integrating water governance
- Targeting and scaling out
- Learning for adaptive management



SADC
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TOWARDS A COMMON FUTURE

Water climate & development

- Support to integration of water security and climate change adaptation into nat. dev planning
- "No regrets" investment and financing strategies for water security and climate resilience

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Every drop counts
AMCOW
Count every drop
African Ministers' Council on Water

African Water Facility
Facilité africaine de l'eau
Mobilising Resources for Water in Africa

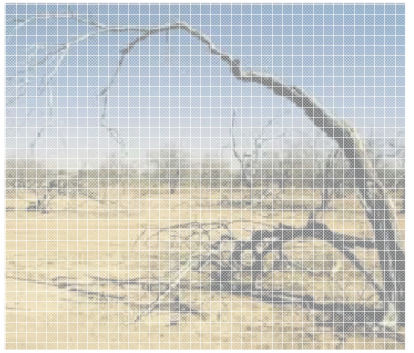
Global Water Partnership
Southern Africa

Cap-Net
UNDP

Agricultural Water for Africa Partnership

WATERnet

Building Capacity for Water Resources Management in Southern Africa



AgWA

agricultural water for africa partnership

SADC

SOUTHERN AFRICAN DEVELOPMENT COMMUNITY

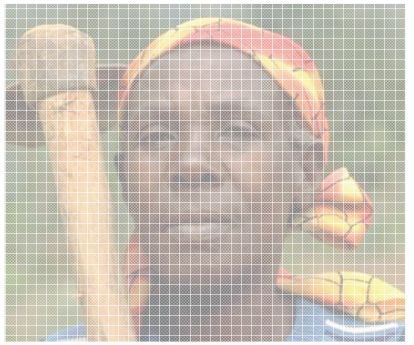
TOWARDS A COMMON FUTURE

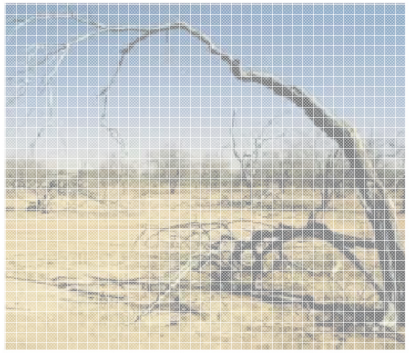
AgWA

AgWA
agricultural water for africa partnership

WATERnet
Building Capacity for Water Resources Management in Southern Africa

- Endorsed from Heads of State and Ministers at Sirte Agricultural Water and Energy
- to support agricultural water management and development in Africa
- to complement Sustainable Land Management and Land Tenure work under CAADP Pillar I





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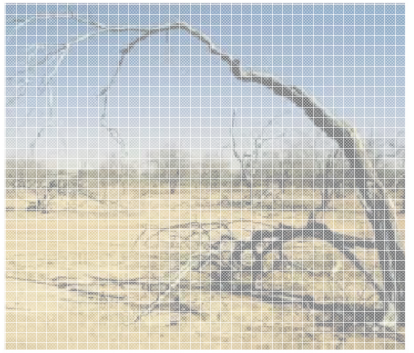
TOWARDS A COMMON FUTURE

AgWA

- Country support tool
- Expert pool
- Dialogue with investment agents (financial partners)
- Monitoring and evaluation framework for ag water man
- Web site



Thank-you

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a future SADC
Subsidiary institution