

ALL DRY  
PERIODS ARE  
NOT  
DROUGHTS

Evidenz workshop  
Bonn  
20 – 21 Sept 2017

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# CONTENTS



- Drought classification
- Drought monitoring through indicators
- Dry periods not droughts for all
- Drought risk assessment
- Strategy
- Planning
- Implementation

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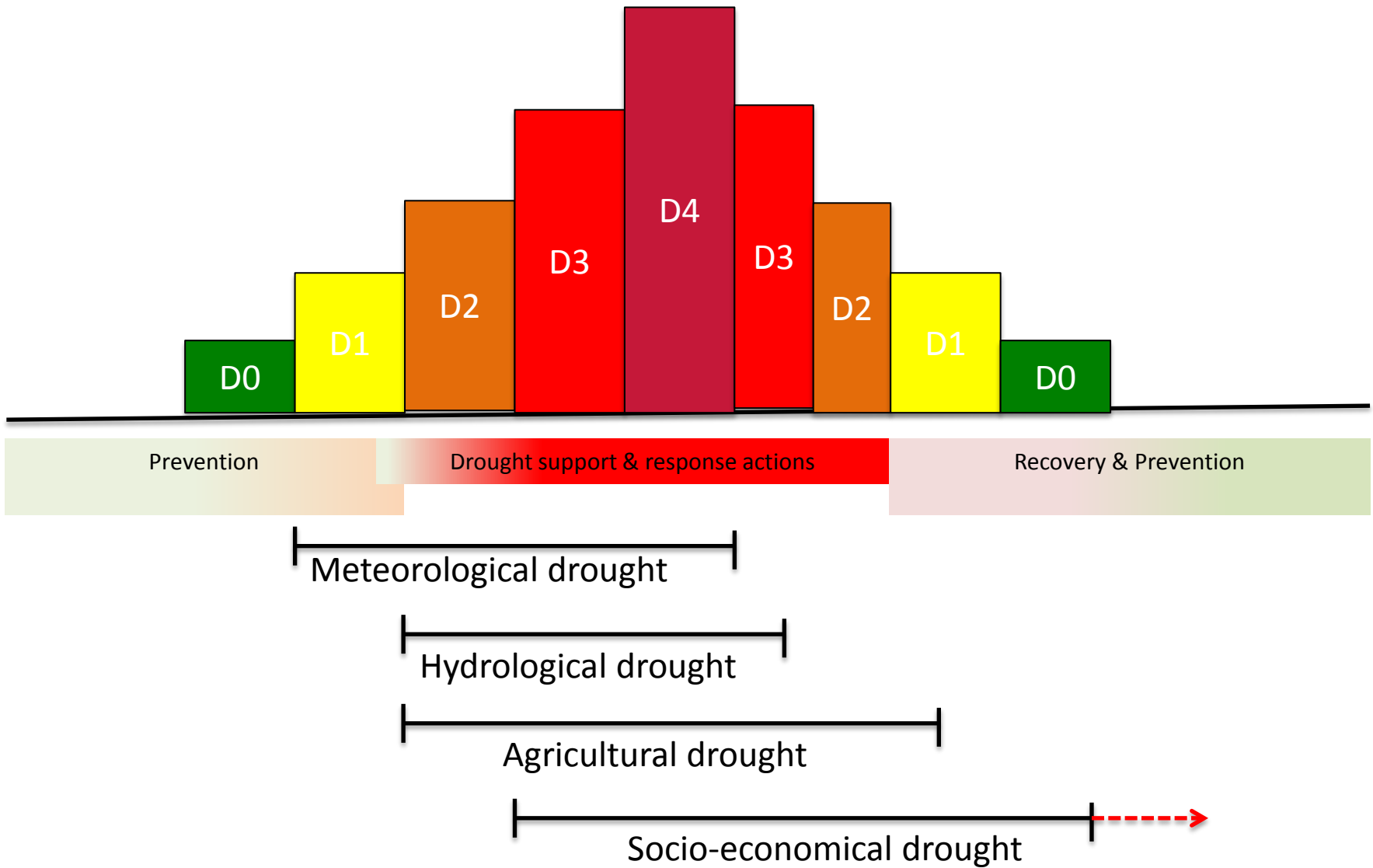
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# DIFFERENT TYPES OF DROUGHT AND STAGES OF DROUGHT



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# DROUGHT INDICATORS PROPOSED FOR SA

- **Meteorological (SAWS – Met data)**
  - SPI
  - SPEI
  - % of normal precipitation
- **Hydrological (DWAS – gauging real time)**
  - Dam levels
  - Stream flow
  - Groundwater levels
- **Agricultural (SANSA & other - Remote sensing)**
  - Soil moisture content
  - NDVI
  - %VCI
  - PSAG



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# SECONDARY INDICATORS

- Farm level indicators
  - Grazing conditions
  - Water availability
  - Actual soil moisture
  - Crop and planting conditions
- Socio-economic indicators
  - Financial impact
  - Economic impact
  - Social impact
  - Food security
  - Markets



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# GUIDELINES FOR DROUGHT CLASSIFICATION IN SA

				Meteorological		Agricultural/Vegetation					Hydrological		
Cat	Description	Possible Impacts & actions	Freq	Pcent of normal precip	SPI	CPC Soil moisture module %	NDVI	1 month VCI	PASG	Satellite vegetation on health index	Ground water levels %	Weekly stream flow %	Dam levels %
<b>D0</b>	Dry	Dry period: Short term dryness slowing plant growth of crops and pastures; fire risk above average: some lingering water deficiencies: pastures and crops not fully recovered	1/3 yr	<75% for 30 days	-0,5 to -0,7	21-30		<90%	3 month <90%	36-45	60-100	50-70	80-100 Mod low
<b>D1</b>	Moderate drought	Some damage to crops & pastures: fire risk is high: Levels of streams, reservoirs or wells are low: Some water shortages are imminent and developing: voluntary water restrictions requested: Early warning	1/5 yr	<70% for 30 days	-0,8 tp -1,2	11-20		<80%	6 month <90%	26-35	40-60	31-50	60-80 Low
	Severe drought	Crop and pasture losses likely: Fire risk very high: Water shortages common: Water restrictions imposed: drought warning messages: Institutions to prepare for response mechanisms.	1/10 yr	<65% for 180 days	-1,3 tp -1,5	6-10		<70%	12 month <90%	16-25	30-40	21-30	40-60 Very low
	Extreme drought	Major crop and pasture losses: Extreme fire danger: Widespread water shortages and restrictions compulsory: Extended duration with critical impact: Warning messages must be adhered to: disaster drought declaration: Institutions to implement active response actions.	1/20 yr	<60% for 180 days	-1,6 to -1,9	3-5		<60%	12-24 month 80%-90%	6-15	15-30	10-20	20-40 Below absolute minimum
<b>D4</b>	Exceptional drought	Exceptional and widespread crop & pasture losses: Exceptional high fire risk: shortages of water in reservoirs, streams and wells: creating water emergencies. Potential food insecurity. Water restrictions compulsory: Warning messages must be adhered to: Active response mechanisms: Impacts critical to larger economy	1/30 yr	<65% for 360 days	-2 or less	0-2		<50%	12-24 month <80%	1-5	00-15	0-10	0-20 Dam dry

# SOCIO ECONOMIC INDICATORS



- Regional economic impact – rural business and towns affected
- Financial impact on farmers - % of farmers not able to continue with production
- Impact on specific sector as such that it harm sustainability
- Impact on market, eg. loss in export contracts
- Official crop estimates
- Food security index (regional, national)
- Macro-economic impacts



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# DIFFERENT FARMING SYSTEMS

- Commercial farming
- Communal farming
- Dryland crop production
- Irrigation
- Extensive livestock

**Dry period for one sector might be an extreme drought for another**



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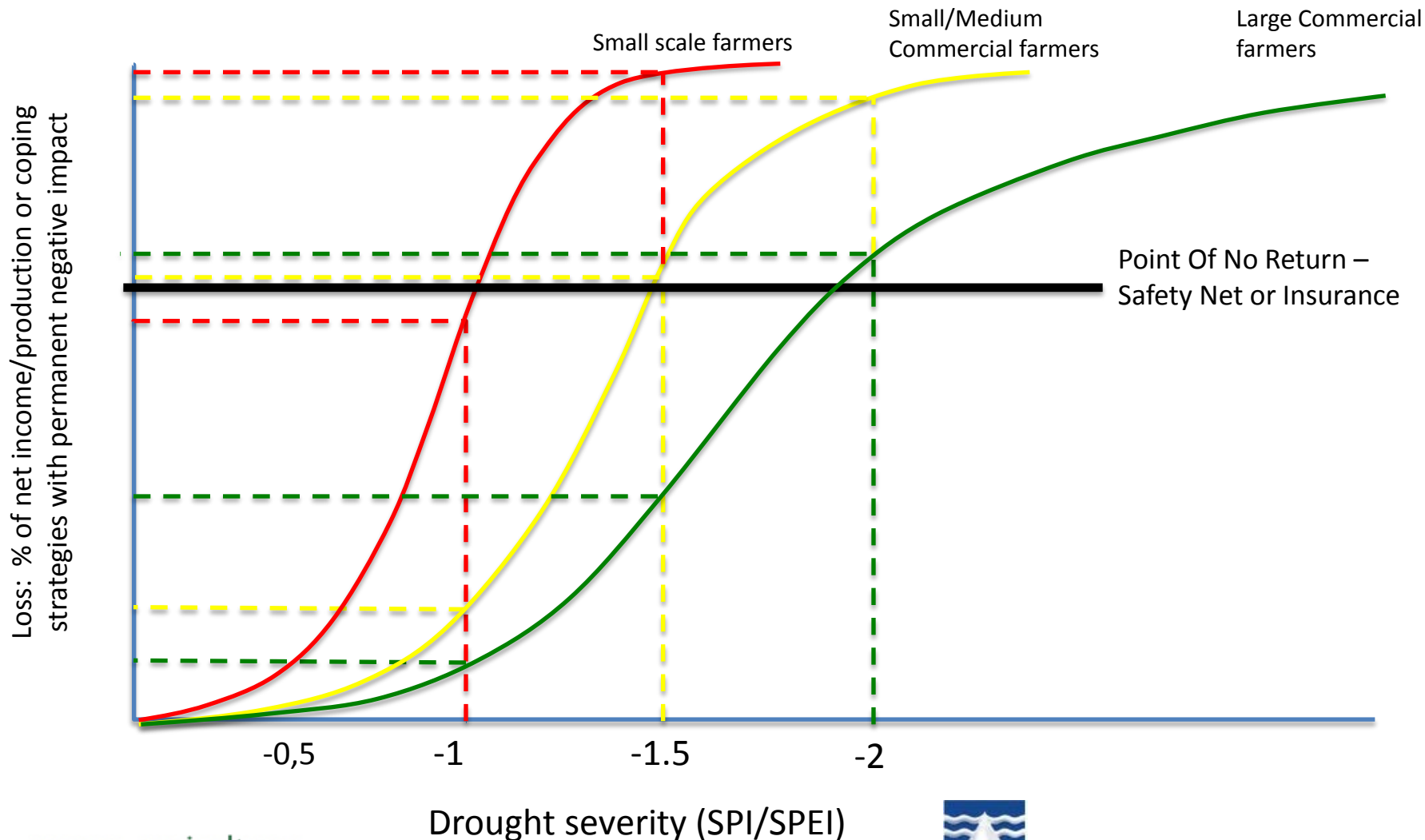
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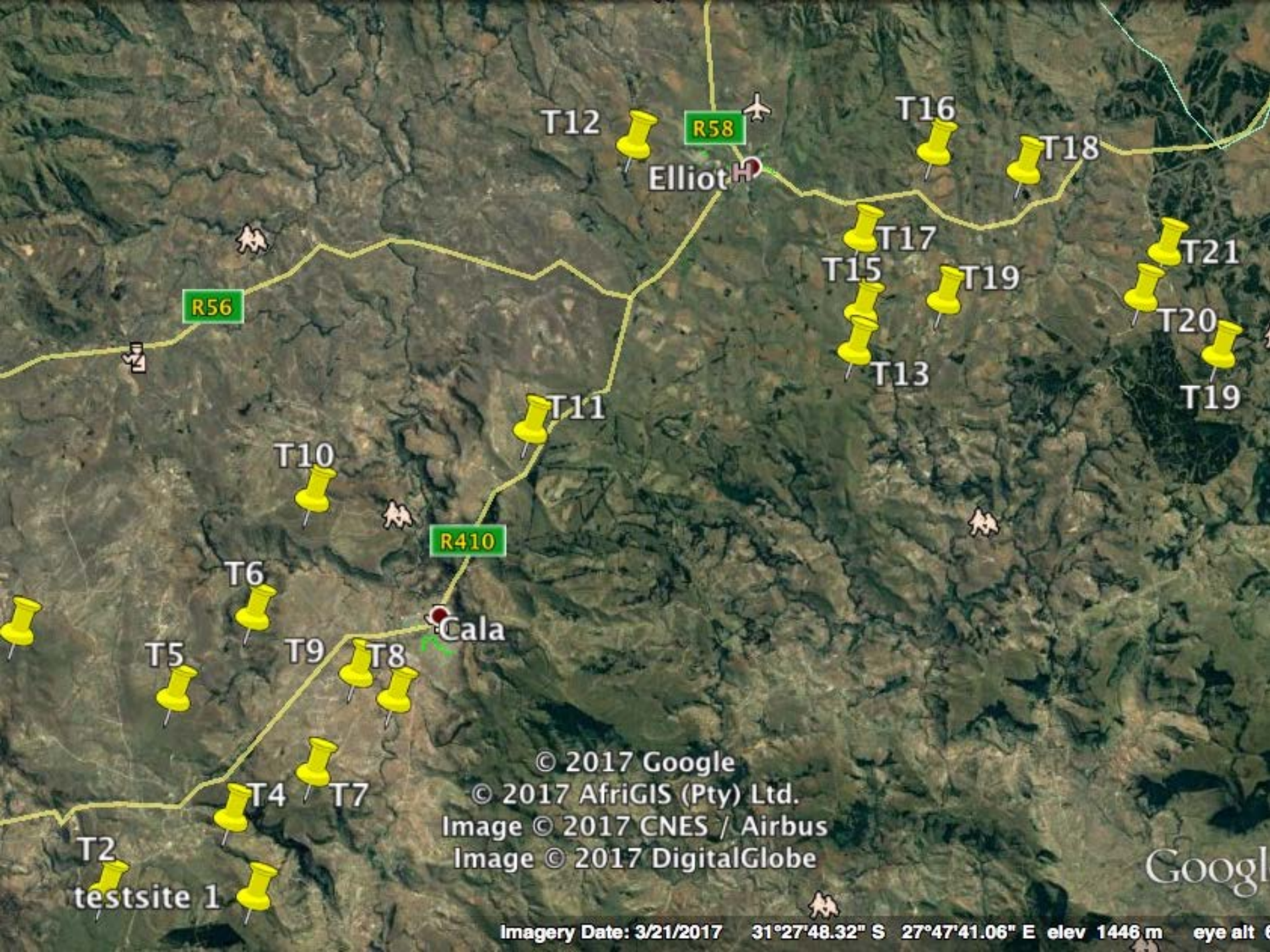
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# USE OF LOSS FUNCTIONS TO DETERMINE DROUGHT IMPACT – NOT THE SAME FOR ALL FARMERS/SYSTEMS





T12

R58

Elliot

T16

T18

R56

T15

T17

T19

T21

T20

T19

T11

T10

R410

Cala

T6

T5

T9

T8

T4

T7

T2

testsite 1

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Imagery Date: 3/21/2017 31°27'48.32" S 27°47'41.06" E elev 1446 m eye alt 0

# DIFFERENCE IS IN DROUGHT RESILIENCE / VULNERABILITY

1. Human capital
2. Social capital
3. Cultural capital
4. Economic/financial capital
5. Natural resource capital
6. Infrastructure capital
7. Institutional capital
8. Political capital

Resilience to  
drought hazard



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**RESILIENCY TO DROUGHT**

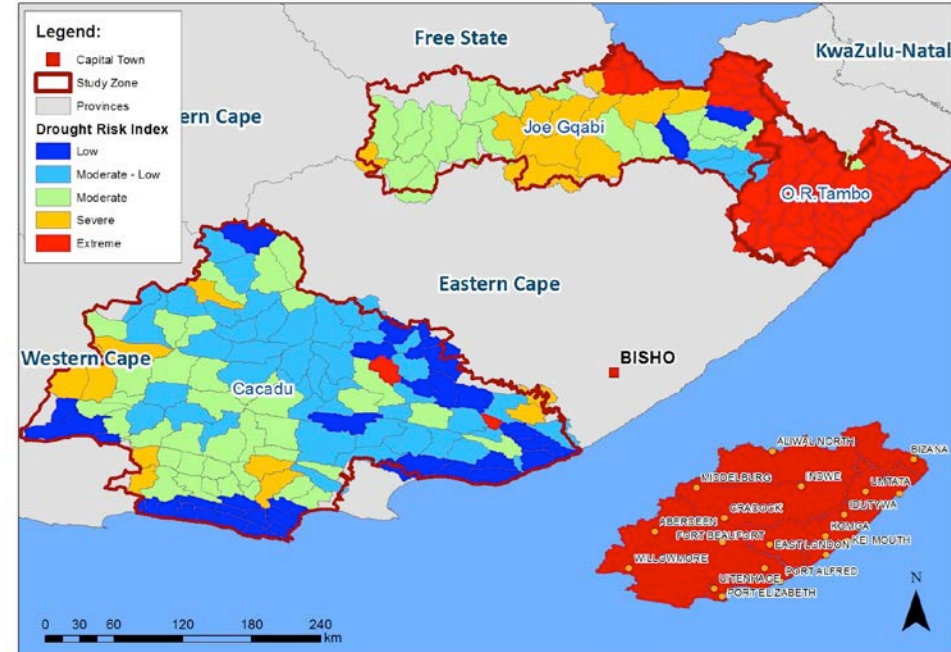
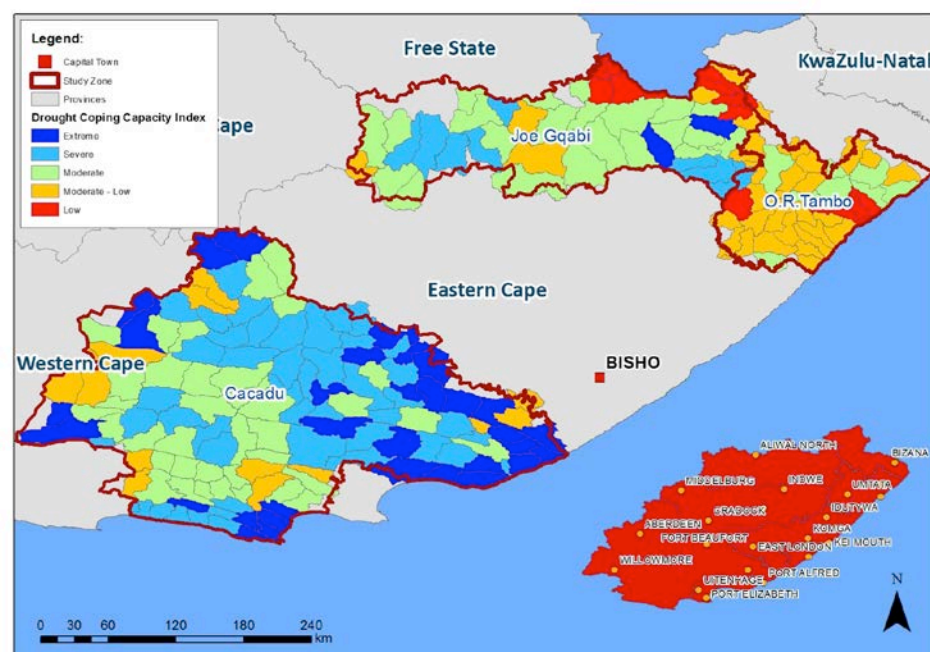
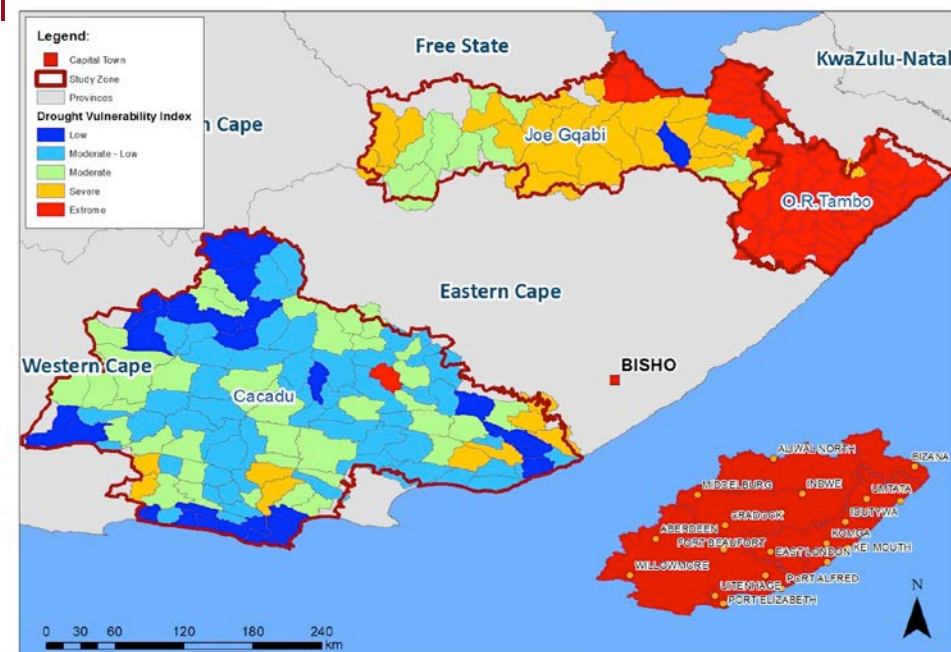
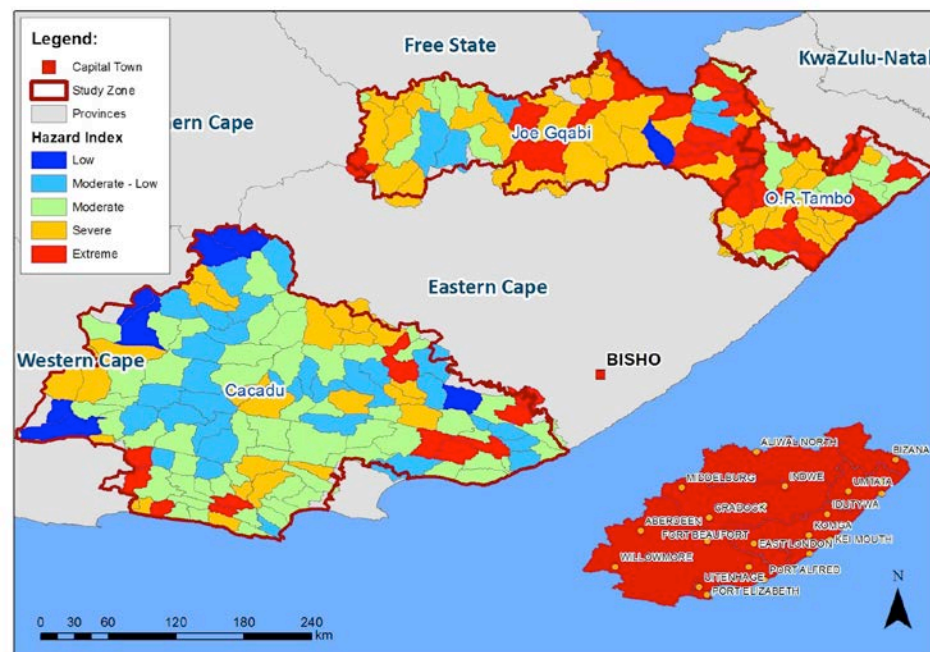
		LOW					HIGH						
		1	2	3	4	5	Weight	INDICATOR	C	Weight			
1								EDUCATION	HUMAN				
								HEALTH					
								AGE					
								EXPERIENCE					
								GENDER					
								MANAGEMENT SKILLS					
2								CHURCH	SOCIAL				
								MENTORSHIP SUPPORT					
								INFORMAL NETWORKS					
								FAMILY SUPPORT					
3								PERCEVERANCE	CULTURAL				
								WORK ETHICS					
								INNOVATIVE THINKING					
								RELIGIOUS/CULTURAL BELIEFS					
								EARLY WARNING RESPONSE					
4								CAPITAL RESERVES	ECONOMIC				
								ALTERNATIVE INCOME SOURCES					
								FARM DIVERSIFICATION					
								INSURANCE					
5								ACCESS TO INFORMATION	INFRASTRUCTURE				
								WATER ARTICULATION SYSTEM					
								CAMPING SYSTEM - FENCING					
								ACCESS ROADS					
								LIVESTOCK HANDLING FACILITIES					
6								SHEDS	NATURAL				
								WATER STORAGE					
								POTABLE WATER					
								GROUND WATER					
								QUALITY GRAZING					
								IRRIGATION LAND					
								CONSERVATIVE GRAZING CAPACITY					
7								ALTERNATIVE GRAZING	POLITICAL				
								GRAZING DIVERSITY					
								POLITICAL STABILITY					
								GOV DROUGHT SCHEME					
8								GOV SUPPORT	INSTITUTIONAL				
								PROTECTIONIST POLICY					
								FARMERS ASSOCIATION					
								COMMODITY ORGANIZATION					
								STUDY GROUPS					
								EXTENSION SERVICES					
								AGRI BUSINESSES					

**CAPITALS QUESTIONNAIRE**

- Weightings different for different groups
- Commercial farmers add larger weight to human & cultural capital
- Communal farmers more weight to economic & political capital
- Scientists more weight to natural capital



# RESULTS MAPS



# EXAMPLE: WOOL PRODUCTION AS A DROUGHT ADAPTED SYSTEM



15-19 August 2016  
Windhoek · Namibia

- Development of drought loss functions
- Pearson correlation test
- Total wool production and precipitation (CORREL = -0.10608)
- Wool production per SSU and precipitation (CORREL = 0,04358)
- Lag of production of wool and precipitation (CORREL = -0.08936)
- 12-month SPI and wool production (CORREL = -0.10608)
- 12-month SPI and lag of wool production (CORREL = -0.08936)
- 10 driest years for 100 yr data produce above average yields

**Wool system is well adapted to droughts - Australia is an example. Ausie farmers & Karoo farmers in SA realise the resilience of wool sheep systems – Cattle more vulnerable to droughts yet it remains the preferable system in Africa**

# NEED MORE RESEARCH.....



15-19 August 2016  
Windhoek • Namibia

- Thresholds for drought declaration for different agric systems
- Hydrological thresholds for different dams, streams at different stages of season
- Agricultural systems & methods adapted to dry periods
- Drought resilience building more than adaptation strategies...
- Calculating total drought impact –Direct, downstream and upstream impacts. Impact on total economy.
- Developing of drought loss functions
- Dependency and drought response mechanisms
- Etcetera...



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Thank You



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