# EvIDENz

## Earth Observation based information products for drought risk reduction on the national level

**ZFL**, UNU-EHS, United Nations Platform for Space-based
Information for Disaster Management and Emergency Response (UN-SPIDER), Space
Research Institute of Ukraine & University of the Free State, South Africa

## Drought

- Impact on Economcy, Environment and Livelihoods – direct / indirect
- Most severe hazard with regard to intensity, severity, frequency, spatial extension and impact on livelihoods compared to other events
- Drought events are increasing

## Limitation for Analysis

- Definition
- High number of indicators
- Validation data
- National data accessibility



UN-SPIDER

## EvIDENz

- Measuring drought risk and hazard as well as vulnerability
- Combining national research and disaster risk management
- No reinvention – development of a processing chain to integrate different disciplines to provide successful monitoring

Source: Huffington Post
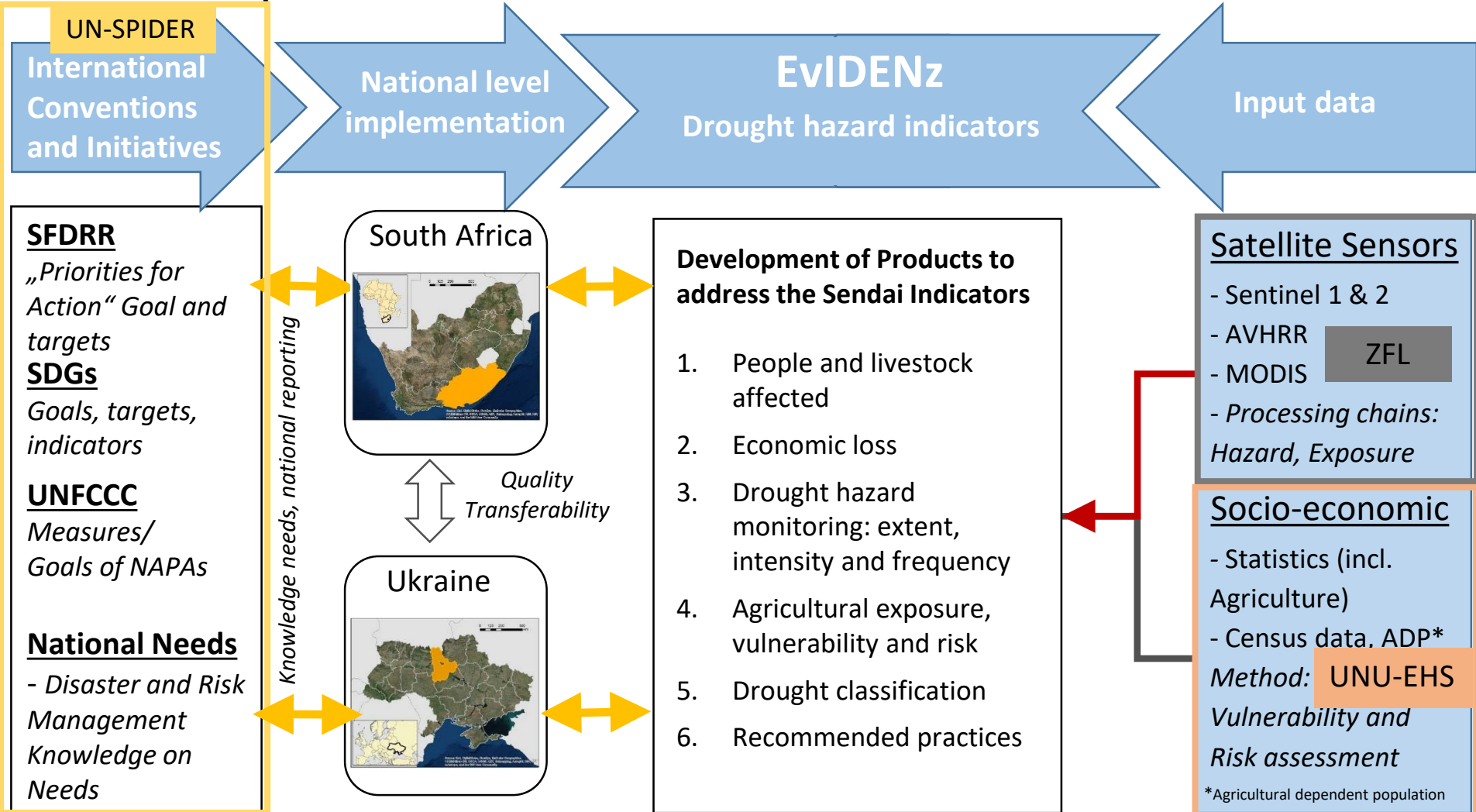
**14-18 March 2015**
**Third UN World Conference on Disaster Risk Reduction**

187 Member States met in Sendai, Japan, to agree on a new global framework for disaster risk reduction for the period 2015-2030 – SFDRR
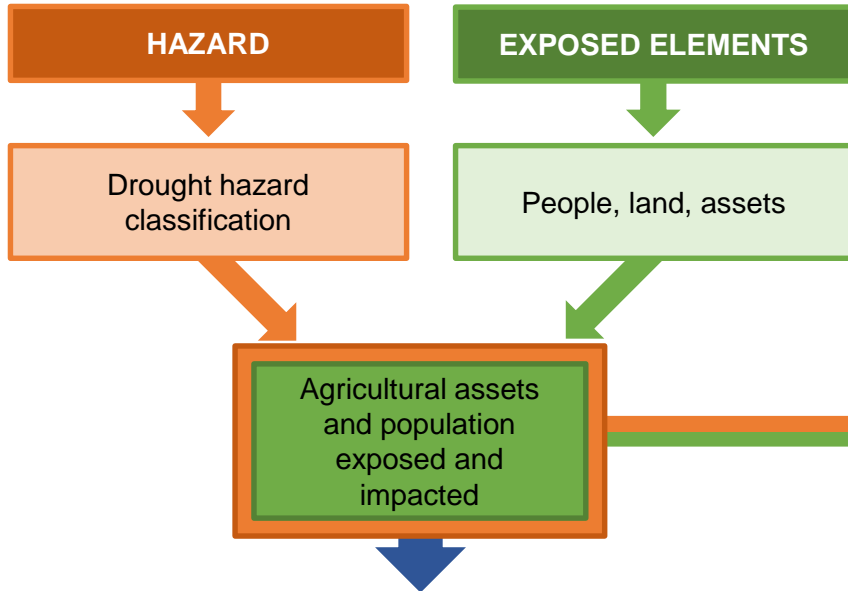
# The EvIDENz-Framework
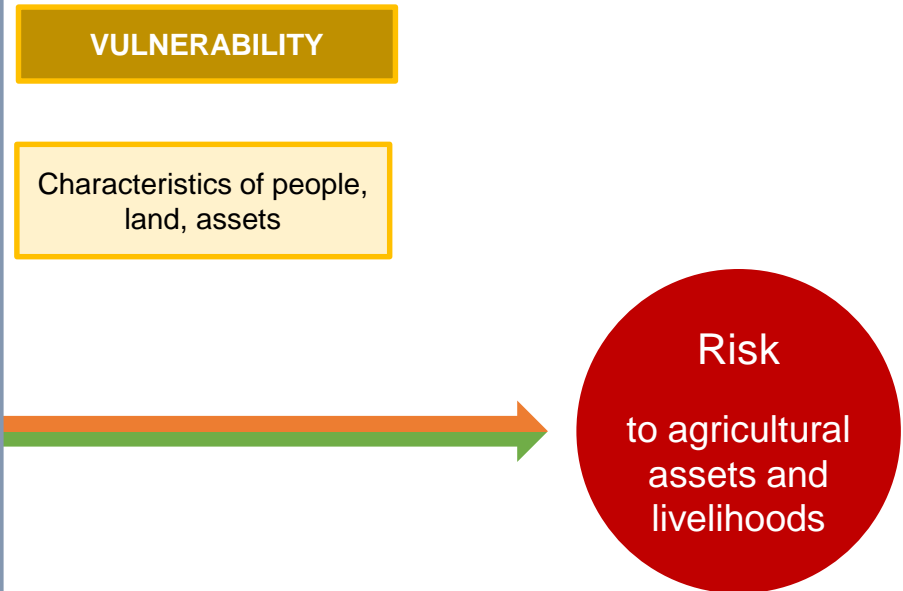
## A: Schematic representation of EvIDENz elements

UN-SPIDER

**International Conventions and Initiatives**

**National level implementation**

**EvIDENz**
**Drought hazard indicators**

**Input data**

**SFDRR**
*„Priorities for Action" Goal and targets*

**SDGs**
*Goals, targets, indicators*

**UNFCCC**
*Measures/ Goals of NAPAs*

**National Needs**
*- Disaster and Risk Management Knowledge on Needs*

*Knowledge needs, national reporting*

South Africa

*Quality Transferability*

Ukraine

**Development of Products to address the Sendai Indicators**

1. People and livestock affected
2. Economic loss
3. Drought hazard monitoring: extent, intensity and frequency
4. Agricultural exposure, vulnerability and risk
5. Drought classification
6. Recommended practices

## Satellite Sensors

- Sentinel 1 & 2
- AVHRR          ZFL
- MODIS
- *Processing chains: Hazard, Exposure*

## Socio-economic

- Statistics (incl. Agriculture)
- Census data, ADP*
*Method:*  UNU-EHS
*Vulnerability and Risk assessment*
*Agricultural dependent population

# EvIDENz approach



Objective II: Assessment of Sendai targets | Objective I: Understanding risk

**HAZARD** → Drought hazard classification

**EXPOSED ELEMENTS** → People, land, assets

**VULNERABILITY** → Characteristics of people, land, assets

Agricultural assets and population exposed and impacted

**Risk** to agricultural assets and livelihoods

*Sendai Framework Targets*

**Affected people/**
global population
2020-2030 Average << 2005-2015 Average

**Economic loss/**
global GDP
2030 Ratio << 2015 Ratio

! Rely on open, accessible data sets that are representative for the national level !

Normal/Non-Drought Year



**Drought classifications South Africa (Eastern Cape) - Season 2011/12**
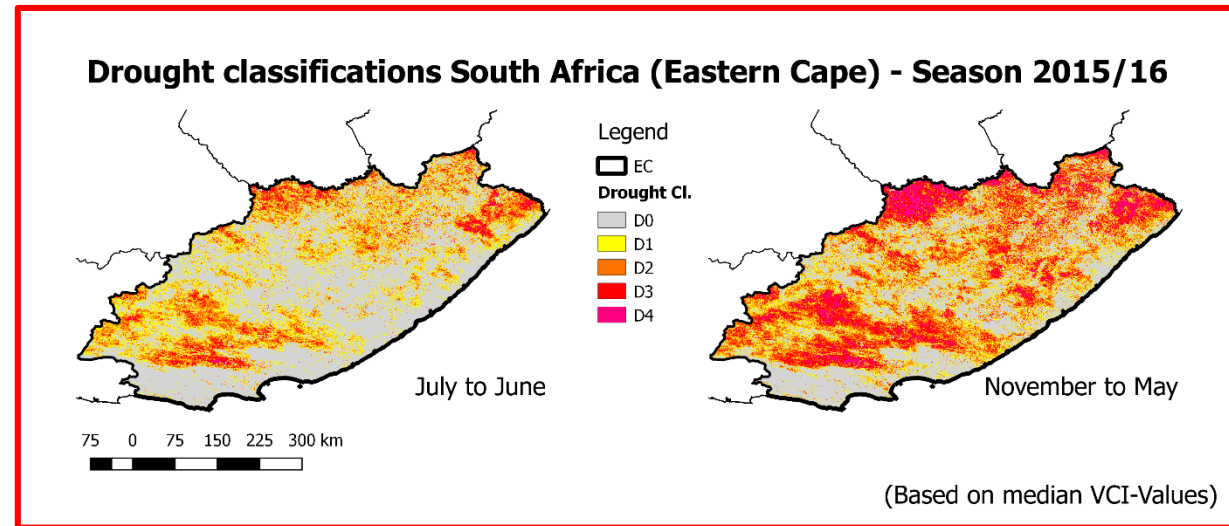
Legend
EC
Drought Cl.
D0
D1
D2
D3
D4

July to June

November to May

75  0  75  150  225  300 km

(Based on median VCI-Values)

Drought Year



**Drought classifications South Africa (Eastern Cape) - Season 2015/16**

Legend
EC
Drought Cl.
D0
D1
D2
D3
D4

July to June

November to May

75  0  75  150  225  300 km

(Based on median VCI-Values)

## Drought classifications South Africa (Eastern Cape) - Season 2015/16



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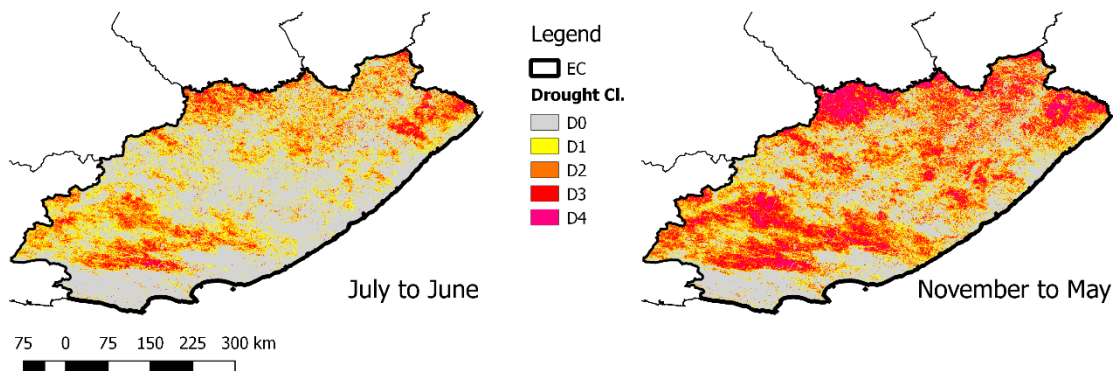
(Based on median VCI-Values)

| Drought Hazard Severity Classes | Value in final output | VCI Values (weighted over season) |
|---|---|---|
| No Drought (D0) | 0 | >40 |
| Mild Drought (D1) | 1 | 30–40 |
| Moderate Drought (D2) | 2 | 20–30 |
| Severe Drought (D3) | 3 | 10–20 |
| Extreme Drought (D4) | 4 | <10 |

## Drought classifications South Africa (Eastern Cape) - Season 2015/16



Legend
EC
Drought Cl.
Not affected
Damaged
Destroyed

July to June

November to May

75  0  75  150  225  300 km
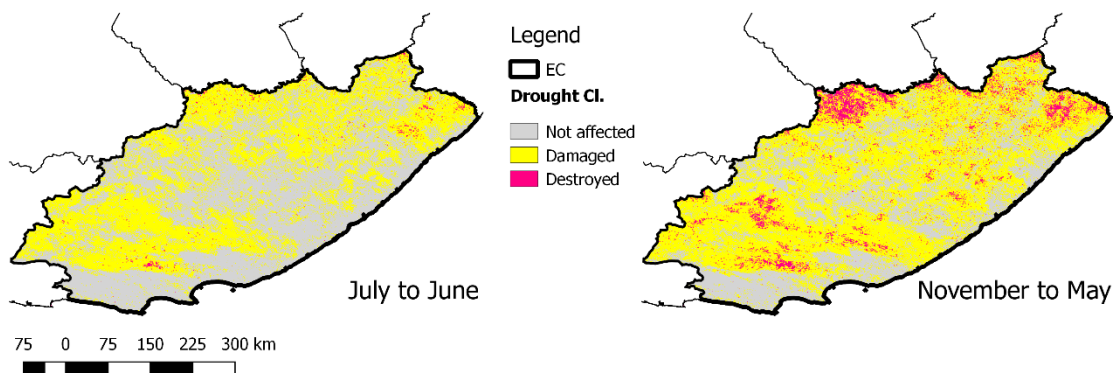
(Based on median VCI-values)

| Vegetation condition | Value in final output | VCI Values (weighted over season) |
|---|---|---|
| Not affected (H0) | 0 | >40 |
| Damaged (H1) | 1 | 10–40 |
| Destroyed (H2) | 2 | <10 |

# Vulnerability indicators measured at local municipality level

| Susceptibility indicator | Measure | Data source |
|---|---|---|
| **Education** | **% of HH without formal education (+)** | **StatSA 2011a** |
| **Social dependency** | **Rate of population at the age of 0-14 and >65 in % (+)** | **StatSA 2011b** |
| Stock theft | Number of stock thefts per 1000 HH (+) | ECSECC Database 2016 |
| Age | % of HH between the age of 15 and 55 (-) | StatSA 2011a |
| Income | Share of HH living from less than R9600/year (+) | StatSA 2011b |
| Gender | gender parity (% unempl female/% unempl male) (+) | StatSA 2014 |
| Unemployment | Unemployment rate in % (+) | StatSA 2011b |
| **Access to infrastructure** | **Infrastructure index (+)** | **ECCSEC 2012** |
| **Land degradation** | **Soil erosion index (+)** | **UCT 2000** |

| Capacity indicator | Measure | Data source |
|---|---|---|
| Access to information | % of HH with access to internet (+) | StatSA 2011b |
| **Alternative on- farm income** | **% of agricultural HH in other agricultural activities (+)** | **StatSA 2011a** |
| Soil fertility | clay content and base status of the soil index (+) | UCT 2000 |
| **Surface water** | **Surface water/agricultural land ratio (+)** | **DEA 2015** |

# Crop-dependent population affected (B-5a)

## B-5a: Number of workers in agriculture with crops damaged or destroyed



**Households involved in crop production** X **Number of people per household** = **Number of crop-dependent people**

**Number of crop-dependent people** ÷ **Hectares of cropland** = **Density of crop-dependent population per hectare of cropland**

**Density of crop-dependent population per hectare of cropland** X **Hectares of cropland in hazard classes (from C2-2a)** =

*Data from* — Statistics South Africa — your leading partner in quality statistics

*Data from* — EvIDENz

*Data from* — environmental affairs, Department: Environmental Affairs, REPUBLIC OF SOUTH AFRICA — GEOTERRA IMAGE

Crop dependent population affected by drought hazard, by local municipality in 2015/2016

**affected crop farmers (total)**
- 25,800 - 57,100
- 19,000 - 25,800
- 6,600 - 19,000
- 1,800 - 6,600
- 450 - 1,800

**affected crop farmers (%)**
- not affected
- damaged
- destroyed

N

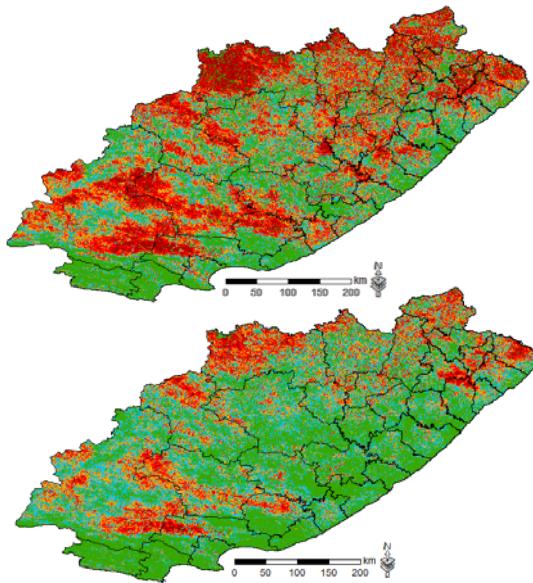0  25  50    100    150    200  Kilometers

# Assessment of agricultural drought risk

**Agricultural drought risk**

| Hazard | Exposed elements | Vulnerability |
|---|---|---|



Exposed elements legend:
- Very low
- Low
- Moderate
- High
- Very high
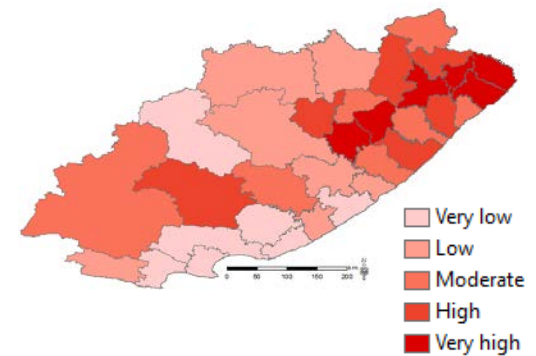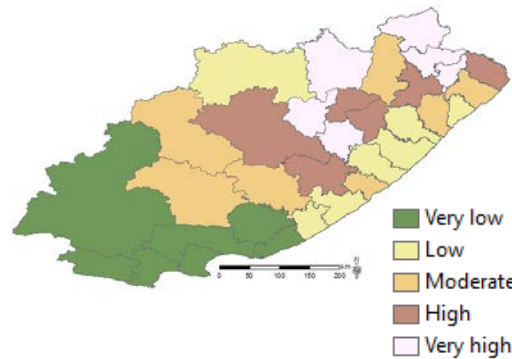
Vulnerability legend:
- Very low
- Low
- Moderate
- High
- Very high

Hazard legend:
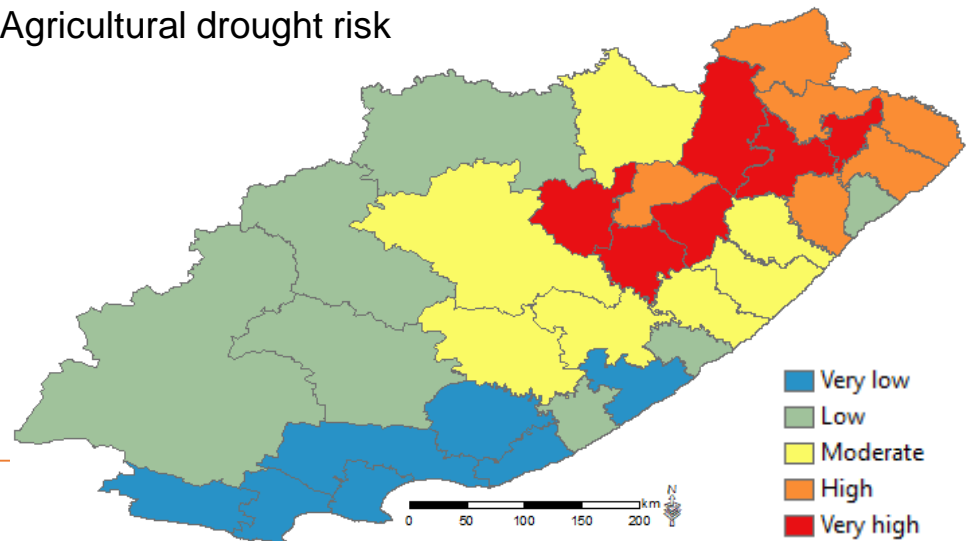- ☐ D0 (VCI > 40)
- ☐ D1 (VCI 40 to >30)
- ☐ D2 (VCI 30 to >20)
- ☐ D3 (VCI 20 to >10)
- ☐ D4 (VCI <=10)

Agricultural drought risk

Agricultural drought risk legend:
- Very low
- Low
- Moderate
- High
- Very high

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## Strengths

- Rely on free and open data
- simple index calculation
- get information on the actual risk instead of only the hazard
- Get relevant acteurs to the table
- Inter-/Transdisciplinarity

## Weaknesses

- Validation missing – drought event database
- Drought characteristics – move away from global approaches but locally applied ones needed – time intensive!
- Inter-/Transdisciplinarity

# Thank you very much for your attention!

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