Indicators of land degradation: a southern African perspective

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Workshop on Land Productivity Indicators for Drylands - Agenda

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Intro of Patrik Klintenberg

- Worked in Namibia at the **Desert Research Foundation of Namibia** 1997-2012
  - **Research coordinator** for Namibia's programme to combat desertification (NAPCOD) and later for the organisation
    - Developed **national land degradation risk monitoring** system
    - Contributed to development and implementation of **local level monitoring** systems for farmers
  - Coordinated the **training of SADC focal points for PRAIS** reporting
    - Conducted **assessment of indicators** used for reporting to UNCCD by parties in SADC (AID-CCD 2005)
- Currently at **Mälardalen University**, Sweden
  - Member of the **editorial board of World Atlas of Desertification**
  - Researcher and lecturer in **environmental engineering** (towards physical geography)
  - Director of **IDELAB**

Outline

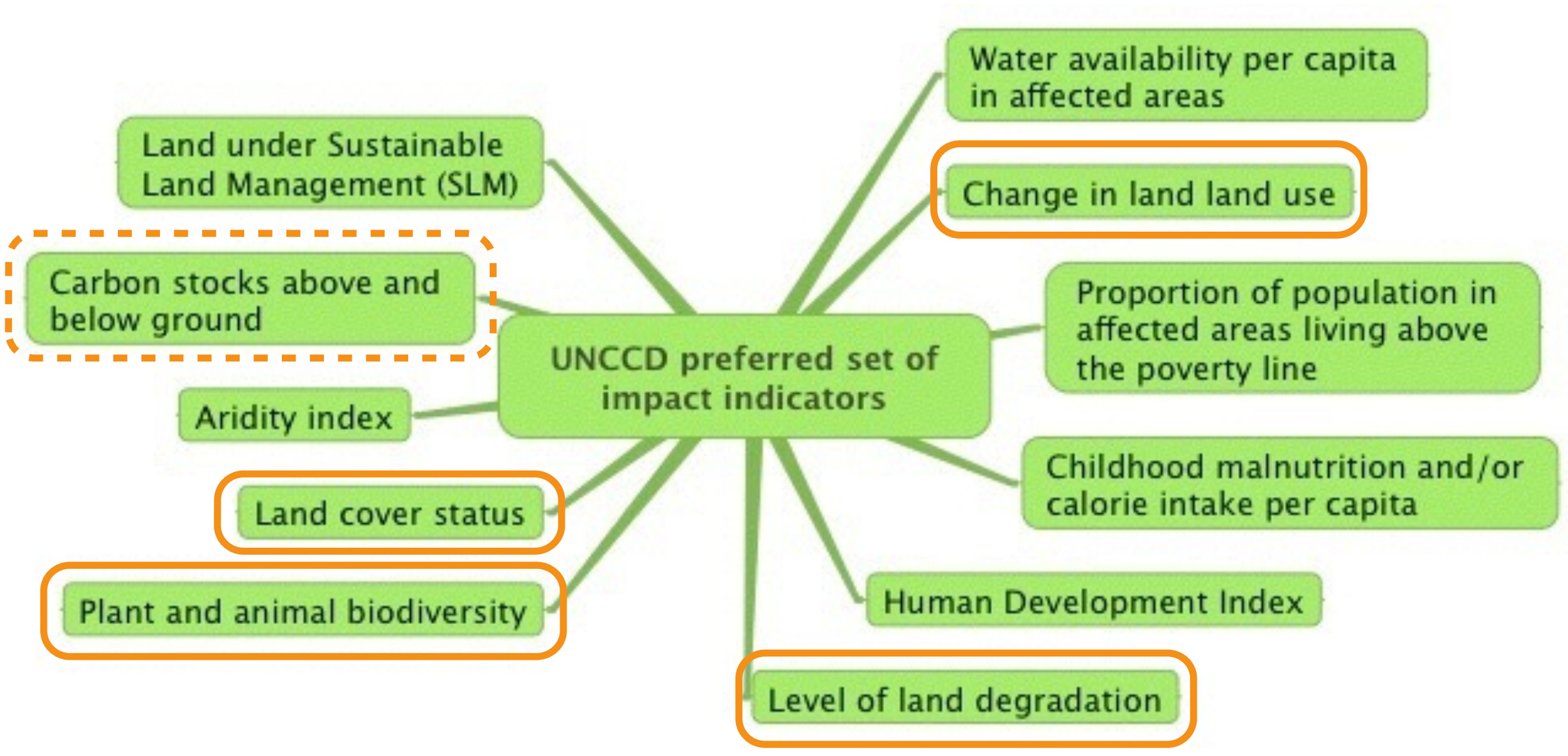
- Why monitor land degradation?
- Requirements of land degradation indicators
- Indicators and benchmarks: an assessment in southern Africa
- Case I: national level monitoring in Namibia
- Case II: Changing livelihoods in Aroab, southern Namibia
- How do we make best use of our remote sensing techniques to support the monitoring and evaluation of land degradation?

Why monitor land degradation?

- Determine current and past states of the environment (focus on aspects that influence livelihoods of rural and urban dwellers)
- Evaluate effects of our actions over time (both positive and negative)
- To inform decision-makers on all levels
- To guide policy development
- To regulate resource utilisation
- Scientific curiosity
- …and many more…

What indicators to monitor?

- Preferred indicators defined by UNCCD



Requirements of land degradation indicators

To be useful land degradation indicators should:

- Provide relevant information related to the issue at hand
- Be based on commonly accepted scientific theories
- Have well defined thresholds/benchmarks

Required data should be:

- Easy to collect
- Collected regularly (population census every 10th year, enough?)
- Recorded accurately and consistently
- Collected for as long time as possible, long time series
- Collected in ‘all’ countries (maybe…)

Analysis of indicators should:

- Be quick, real time delivery of results should be the goal!
- Results should be understandable and useful to decision-makers as well as scientists

Assessment of UNCCD indicators and benchmarks used in SADC

A report compiled 2005 as part of the AID-CCD project

AIDCCD

Approach

- Aid-CCD was an EU funded project aimed at investigating state of the art related to indicators and benchmarks for desertification monitoring
- Questionnaire was sent to key representatives in each annex
- Analysis of country reports to the UNCCD pre-PRAIS

Key findings

Country	Biophysical	Socio-economic
Angola	0	0
Botswana	2	0
Lesotho	13	16
Malawi	17	18
Mozambique	0	0
Namibia	21	6
South Africa	54	42
Swaziland	0	0
Tanzania	0	0
Zambia	7	8
Zimbabwe	0	0
TOTAL	**114**	**90**

Country	Local	National
Botswana	1	1
Lesotho	11	18
Malawi	2	33
Namibia	15	12
South Africa	52	44
Tanzania	0	18
Zambia	2	52
TOTAL	**83**	**178**

Source: Klintenberg, P. and Seely, M., 2005. State of the art on existing indicators and their use for desertification monitoring and CCD implementation in southern Africa. In: G. Enne and M. Yeroyanni (Editors), AIDCCD active exchange of experience on indicators and development of perspectives in the context of UNCCD: Report on the state of art on existing indicators and CCD implementation in the UNCCD Annexes. Centro Interdipartimentale di Ateneo, Nucleo di Ricerca sulla Desertificazione, Universita degli Studi di Sassari, Sassari. 95-139

Key findings

- National indicators were commonly developed by national **group of experts**
- Review identified **225 unique indicators** used in the SADC countries to report on their status of land degradation and progress of NAP implementation
- **Only 34** of these indicators had some kind of **thresholds or benchmarks**
- **Seldom** is a specific indicator **used in more than one country**
- Monitoring of various aspects of **rainfall and soil properties** most common
- Most **indicators not monitored** regularly (wish lists)
- Issues found to be of importance to desertification differs between each country -> suggests that it is **difficult to develop an universal core set of land degradation indicators**

Case I: National level land degradation monitoring in Namibia

A huge compromise

Approach

The task:

- To produce a map showing **extent of desertification in Namibia**
- **Consultative process** involving all key stakeholders
- Development of large set of **potential indicators**
- **Scientific assessment** of each proposed indicator
- Assess **data availability and reliability**
- **Develop a national level monitoring system** based on selected viable indicators

Key findings

Potential indicators identified by Namibian stakeholders:

- Population pressure
- Land cover change
- Total grazing pressure
- Soil erosion
- Human poverty index
- Rainfall index
- NDVI
- Water consumption by resource type
- Routine monitoring of water levels in non-strategic regional aquifers
- Value added to water
- Water quality within water resources
- Economic diversification
- GDP spent on environmental resources research
- Capacity to do regional and local land use planning

Key findings

Development of viable indicators based on:

- Scientific relevance
- Data availability
- Accuracy/sensitivity
- Availability of historical data/time series
- Defined thresholds/benchmarks

Resulted in four indicators

- Population pressure
- Total grazing pressure
- Soil erosion
- Rainfall index
- NDVI (was excluded due to issues with bush encroachment)

Key findings

Four indicators combined into an index (land degradation risk index

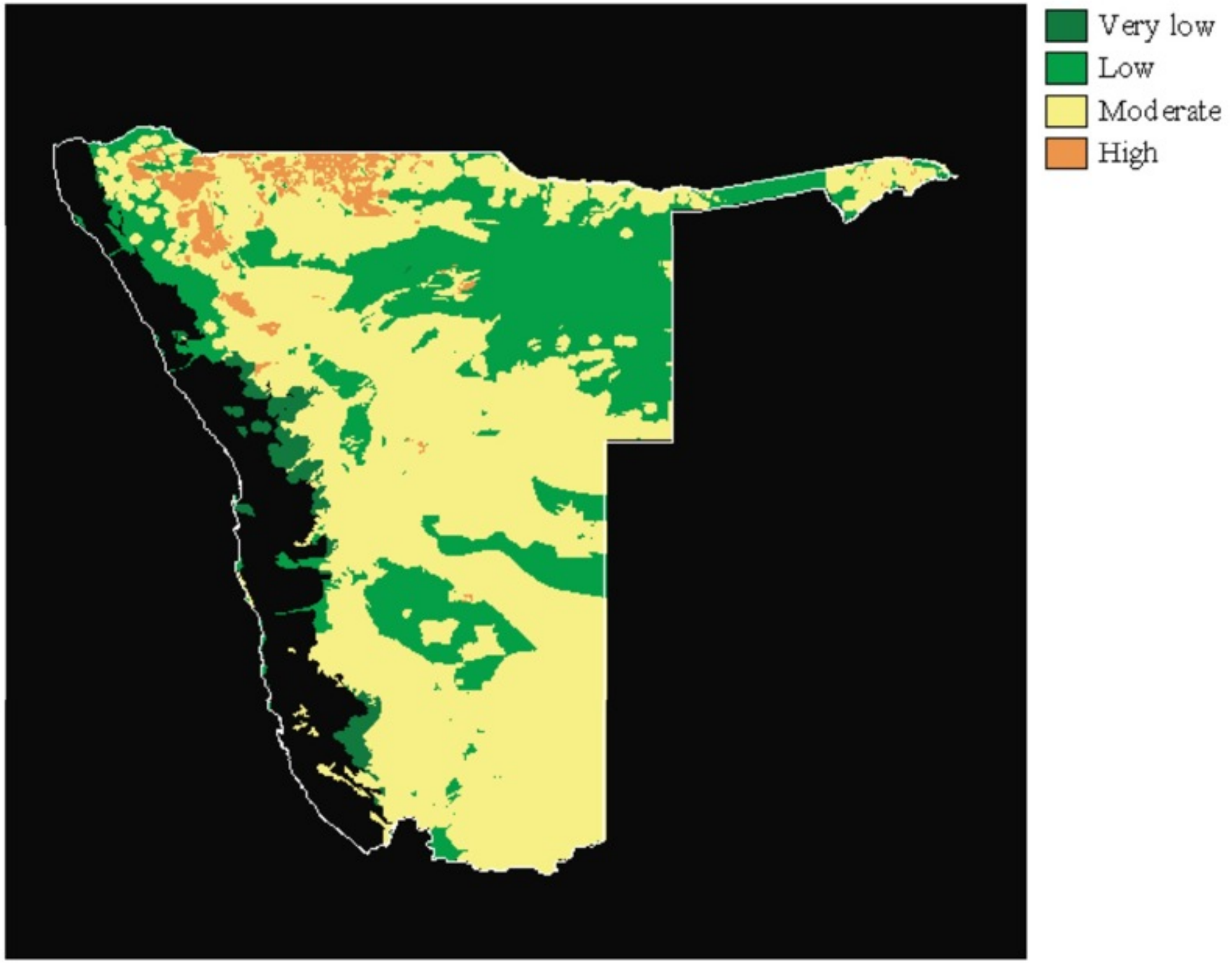
TABLE V

The relationship between individual indicators and the resulting land degradation risk map. For each class, very low = 1, low = 2, moderate = 3, high = 4 and very high = 5

Degradation risk class	Population	Livestock	Rainfall	Erosion	Range
Very low	1	1	1	1	1–4
Low	1	2	2	2	5–7
Moderate	3	3	3	3	8–12
High	5	4	4	4	13–17
Very high	5	5	5	5	18–20

Source: Klintenberg, P. and Seely, M.K., 2004. Land Degradation Monitoring in Namibia: A First Approximation. Environmental Monitoring and Assessment, 99: 5-21.

Key findings



Source: Klintenberg, P. and Seely, M.K., 2004. Land Degradation Monitoring in Namibia: A First Approximation. Environmental Monitoring and Assessment, 99: 5-21.

Key findings

1. Accessibility of data is essential

Many indicators proposed by Namibian stakeholders were inappropriate as data were not collected or could not be collected due to lack of funding, manpower and inflexible sectoral programmes

2. Namibian experience underlines the importance of developing specific indicators applicable on country level, as:

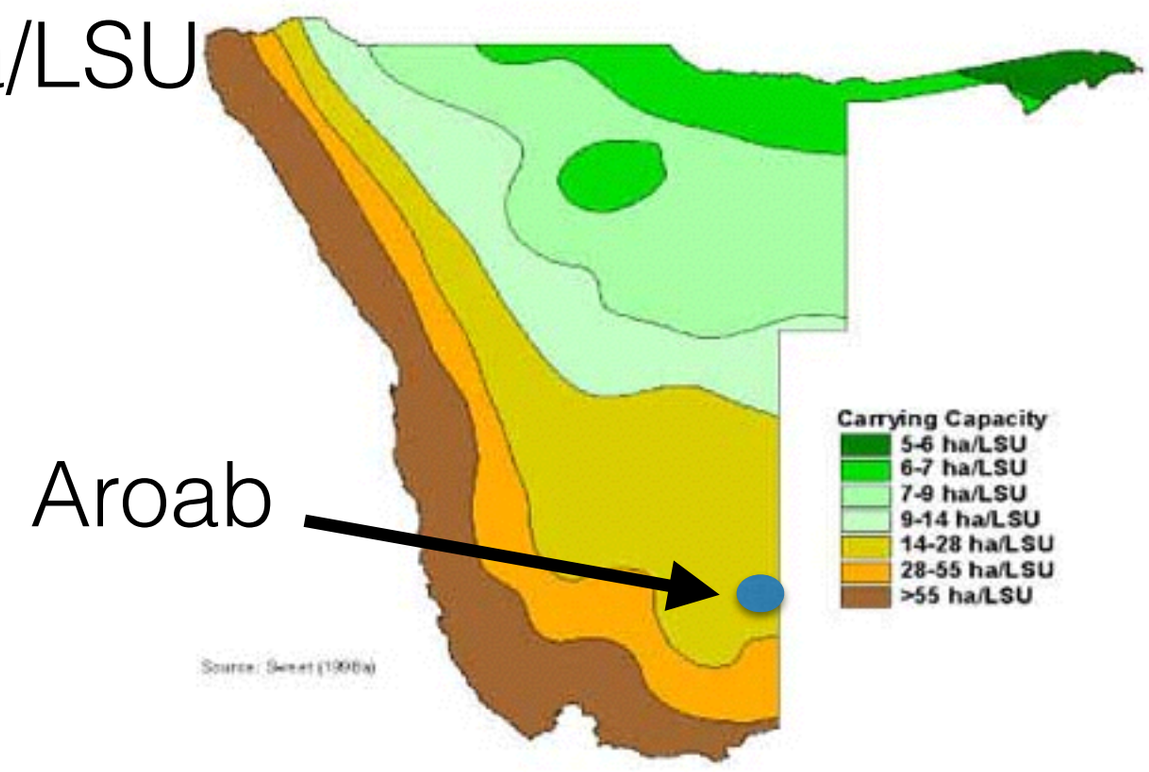
- There are no universal causes or effects of land degradation.
- The participatory approach gave stakeholders ownership of the process and led to an increased understanding of the concept of environmental monitoring
- A common platform was established for stakeholders from various sectors, leading to an increased interaction between sectors

Case II: Changing climate and changing livelihoods in Aroab, southern Namibia

A report from the field

The study area

- Aroab, in southern Namibia, close to Mier in South Africa (700 km from Windhoek)
- Semi-arid environment, ca. 300 mm/year
- Livestock farming in dunes and ‘hardveld’
- Commercial farming, mainly small stock but also cattle and game
- Farm sizes range from 8,000-20,000ha
- Carrying capacity ca. 14 - 28ha/LSU



Findings

Dune fields

Hardveld

The project

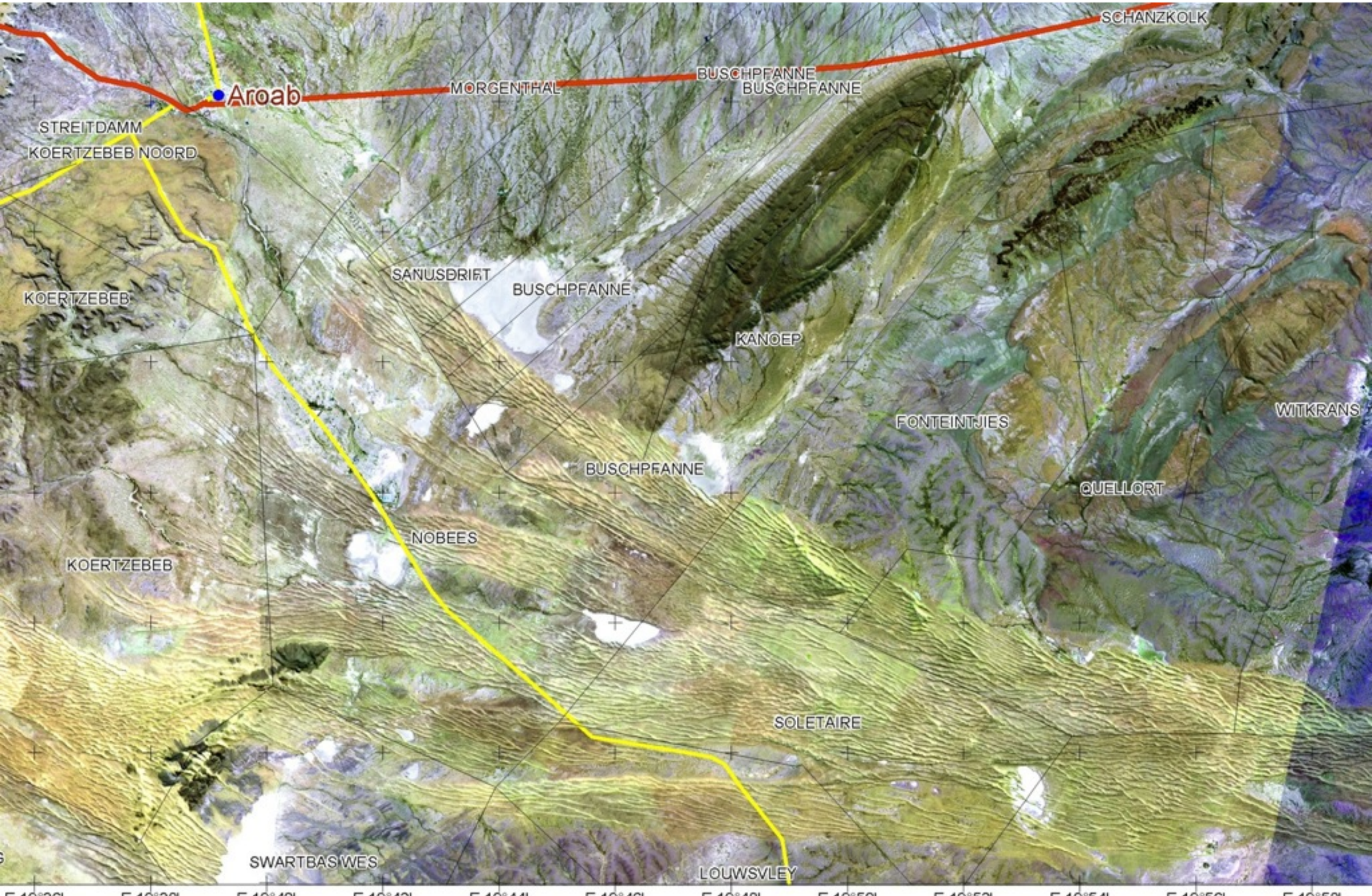
Expected outcomes

- Better understanding of environmental changes and their impacts on livelihoods in study area
- New knowledge about strategies to farm in a changing environment
- Provide information that contributes to improved decision making

Approach

Interviews with farmers

- Questions related to climate, land use, state of the environment and policy
- Individual interviews at farms
  - Supported by recent satellite image
- Facilitated workshop - round table discussion
- Field observations
- Climate records
- Policy analysis


SCHANZKOLK
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Aroab
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KOERTZEBEB
KANOEP
FONTEINTJIES
WITKRANS
BUSCHPFANNE
QUELLORT
NOBEES
KOERTZEBEB
SOLETAIRE
SWARTBAS WES
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E 19°36'
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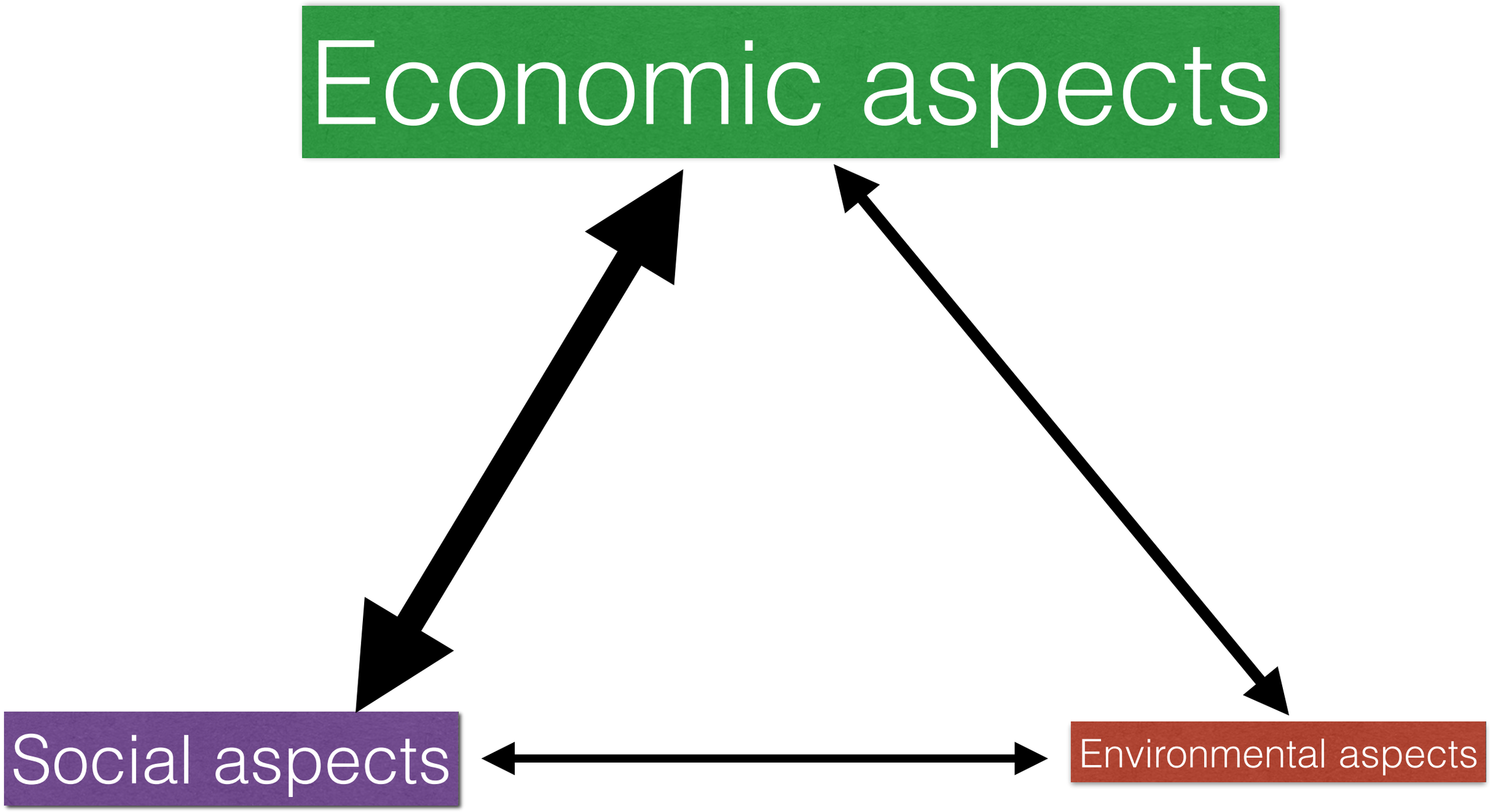
E 19°42'
E 19°44'
E 19°46'
E 19°48'
E 19°50'
E 19°52'
E 19°54'
E 19°56'
E 19°58'

Findings

- Many farmers have changed from Karakul to Dorper sheep
  - Dorper more aggressive browsers
  - Eat the roots -> dunes become mobile
- Since 2000, rainy season starts later
    - Rainfall more scattered
    - More intense
    - Much higher frequency of veld fires
    - Less productive rangeland -> erosion and less grass production
    - Lambing season shifted as much as 6 months -> higher pressure on the grass resources
    - Farmers aware of risks of land degradation and adapt land management to be as sustainable as possible, BUT, money comes first!

Findings



How do we make best use of our remote sensing resources to support the monitoring and evaluation of land degradation?