

Linking farming communities to larger scale global changes: climate change and commercial agribusiness in the arid Sandveld, western South Africa.

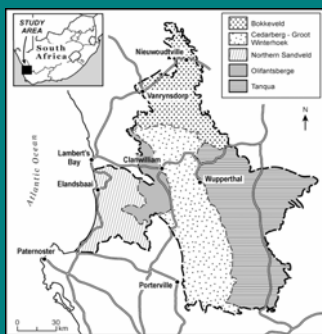
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Background

- Project commissioned by Cape Nature Greater Cederberg Biodiversity Corridor (GCBC project); Potato SA & Rooibos Council – establishing best practice guidelines for intensive commercial farming in a sensitive and biodiverse environment
- **Understanding climate change projections and implications for potato & rooibos farming in the Sandveld**
- Climate change may challenge best practice in the region.

The Greater Cedarberg Biodiversity Corridor (Cape Nature)



- At transition zone between Fynbos & Succulent Karoo
- Northern Sandveld a key lowland biodiversity area
- Yet...

An area of intensive commercial agriculture



Host to intensive potato & rooibos production – key economic activities in this area

Cape Nature:

-over past 15 years, ave 2.7 ha of Sandveld cleared for agriculture per day

i.e. > 50% natural Sandveld habitat already transformed

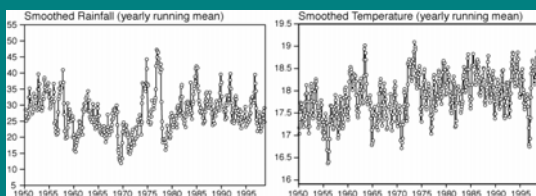
Low rainfall & nutrient poor soils;

Thus commercial agriculture requires

- high groundwater abstraction
- high amts fertilizers

Sandveld climate history

In an already sensitive and pressured environment ...



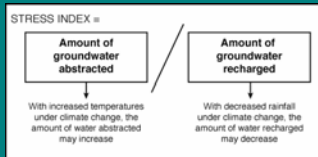
What of the future?

Background to available climate change data

- Typical experience when requesting information on climate change
- Value of bringing the projections data into GIS
- South African Environmental Observation Network (SAEON) project + AWhere/SEI/CSAG/UNEP work (Climate Change Explorer)
- Basic idea – GIS data on climate change ultimately available and downloadable (e.g. for user such as Potato SA – groundwater implications for Sandveld?)
 - More detail →

Information required by users – Potato South Africa

- Initial idea to link yields and climate
- Data not robust enough; alternative →
- Driving a groundwater stress model with climate change



Focus on right hand side in partnership with GEOS;

Hope to focus on left hand side in future (relative humidity, T & wind speed anomalies)

Information required by users – Rooibos

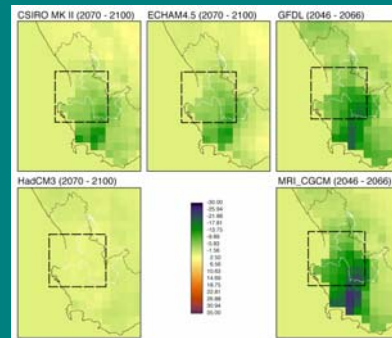
1. Autumn & Winter rainfall (April & Aug - Sep months)
2. Summer rainfall (Dec – Feb)
3. Relative humidity anomalies
4. Wind speed anomalies

- Attempted to drive rooibos area suitability map with scenarios (Eisenburg partnership) – unfeasible
 - » Hope to undertake in future

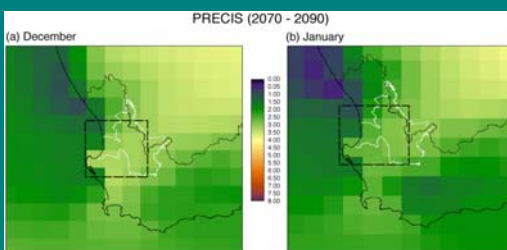
Examples of information provided

- Provided in participatory format; bilingual presentation (always info requested – prev slides);
- GIS data provided + graphics and explanations;
- Limitations (explained to user):
 - Look at change direction, not magnitude
 - Don't average models
 - Don't interpret for one single point
 - Some technical tasks remaining

Winter rainfall anomaly



Projected temperature anomalies



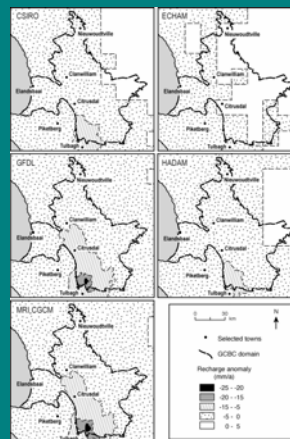
One downscaling as an example, but two used.

Groundwater recharge depth anomaly

Groundwater recharge depth calculated based on rainfall anomaly using 5 downscalings

Three later period downscalings (CSIRO, ECHAM & HADCM3) all indicate increased recharge to the east

Possibly due to increases in summer rainfall?



Example of take home messages for the Sandveld

1. 5 out of 6 models show **reduced April rainfall**
2. 5 out of 6 models show **reduced August rainfall**
3. **warmer** monthly average temperatures, minimum temperatures & maximum temperatures – particularly towards the interior
4. All models show **reduced groundwater recharge** under climate change.
5. Thoughts – what might a combination of increased temperatures, lower rainfall and reduced groundwater recharge mean for this area?



Discussion & research challenges

1. Existing stresses may be exacerbated, perhaps critically
2. Heat and water stress likely to increase

Remaining work:

1. Calculate irrigation requirements (wind speed, temperature)
2. A revised suitability model for rooibos?
3. Decentralizing analysis of climate change data →

One way forward in climate change work:

- Ability of stakeholders at Cape Nature to understand data strengths and limitations
- & to undertake own analysis
- Hugely advantageous
- Allowed study to move beyond a simple generic impact study