

Experience from South Africa in mapping land degradation

Workshop on Land Productivity Indicators for Drylands

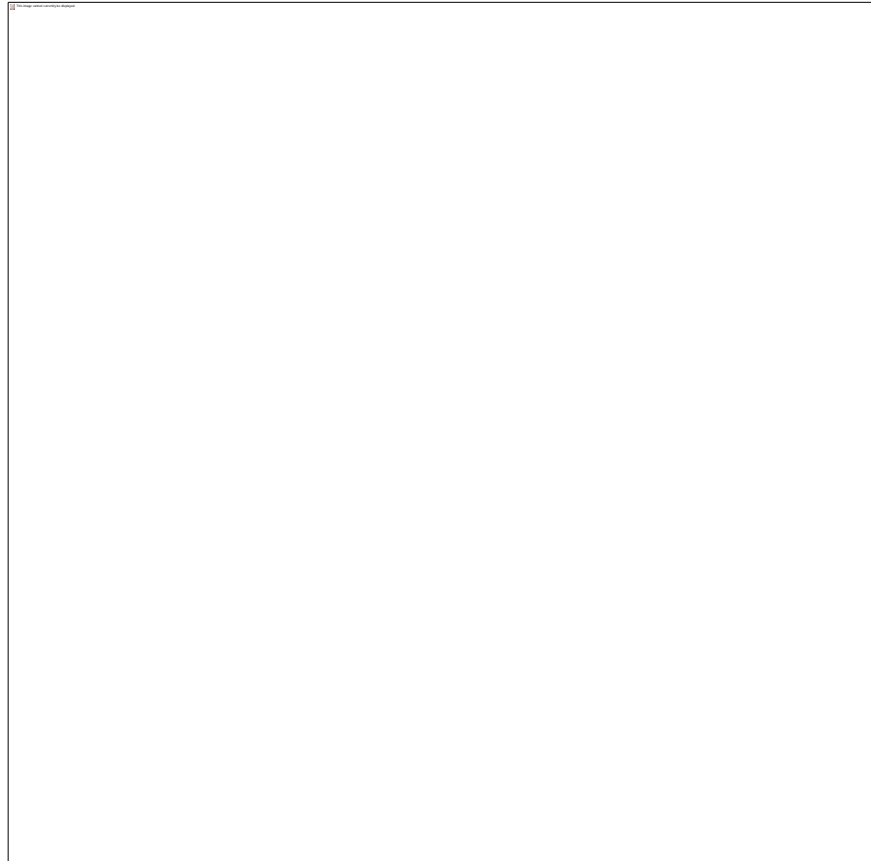
Hosted by UNCCD secretariat 7-9 July 2014

Graham von Maltitz CSIR

Chasing the holy grail of land condition mapping

- Spatial coverage of the level of degradation of each degradation type
- Ability to track change
- Scalability
- Cost effective
- Covers both natural vegetation and agriculture

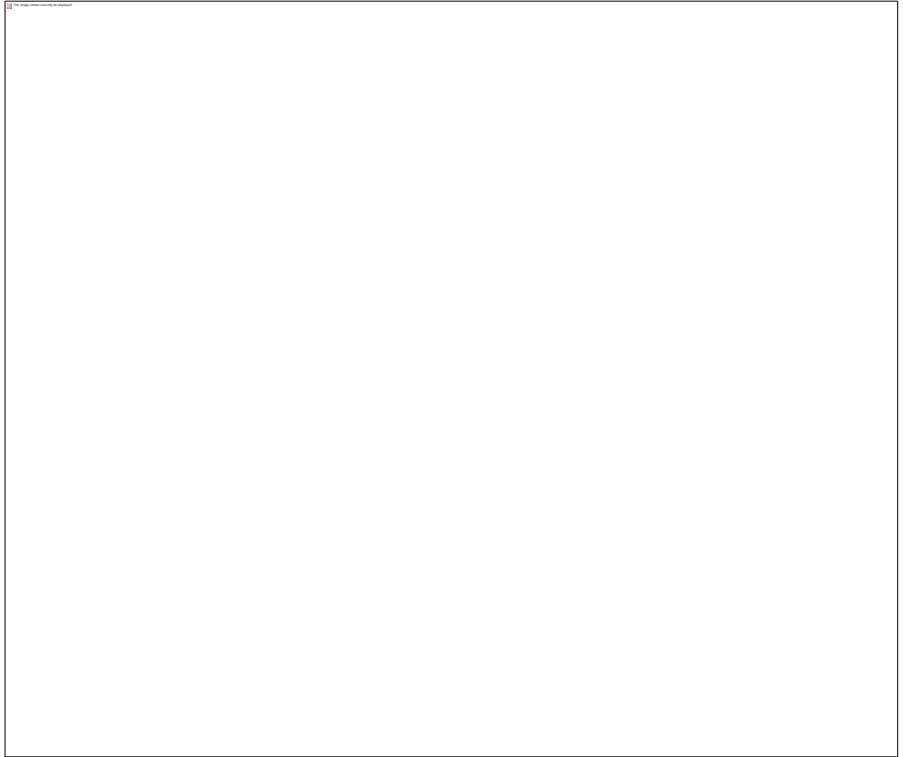
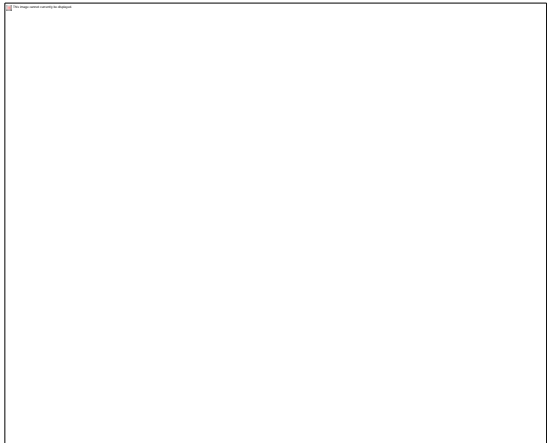
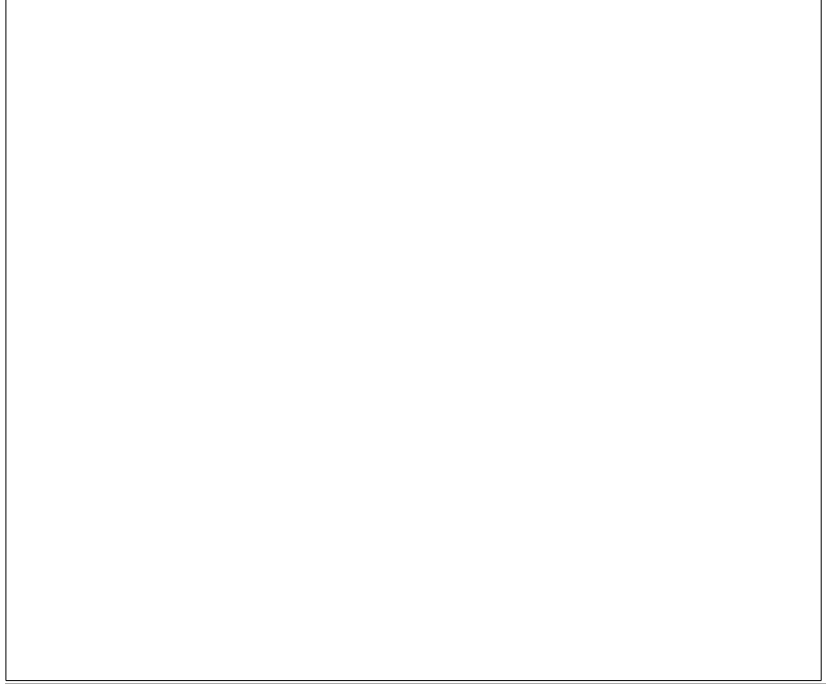
Early perspective – land degradation Acocks' theory of the expanding Karoo



John Acocks 1953

The first systematic mapping of desertification – Hoffman et al 2001





LADA case study

- Repeats Hoffman et al method, but with modifications
- Based on perceptions
- New districts
- Stratifies by land type/vegetation type
- Not specially explicit

Land cover products 2000 2010

Spatial accuracy
Temporal inaccuracy
Poor measure of change in
veld condition

Hoffman vs land cover 2000

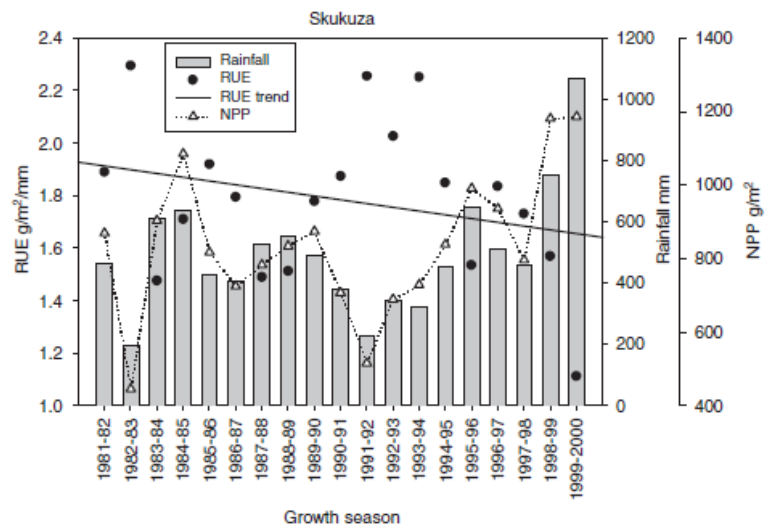


Fig. 6. NPP-RUE profile for Skukuza, Kruger National Park, showing a negative trend as a result of very high rainfall towards the end of the time-series.

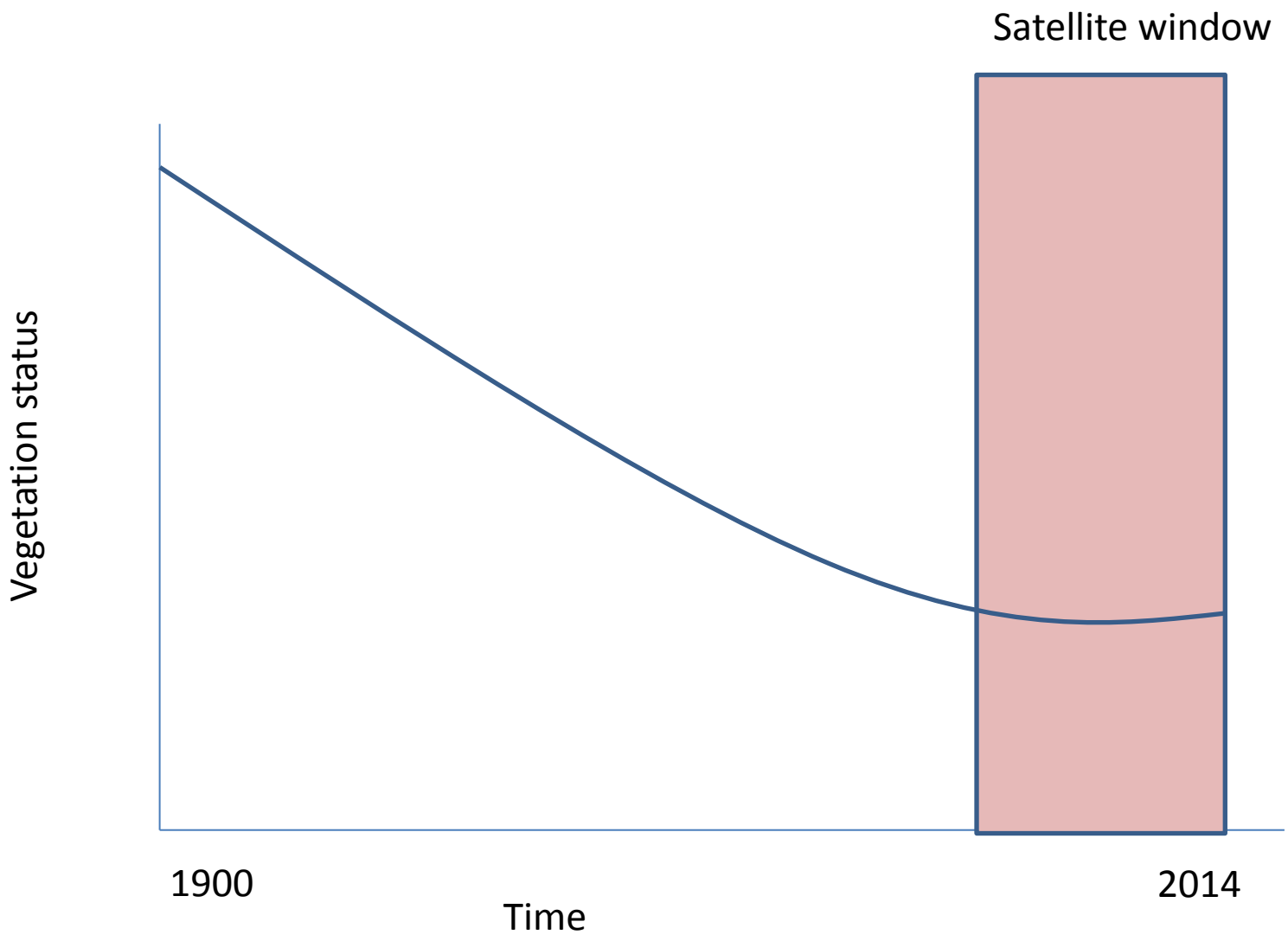
Can human-induced land degradation be distinguished from the effects of rainfall variability?
A case study in South Africa. Wessels et al 2007

ΣNDVI

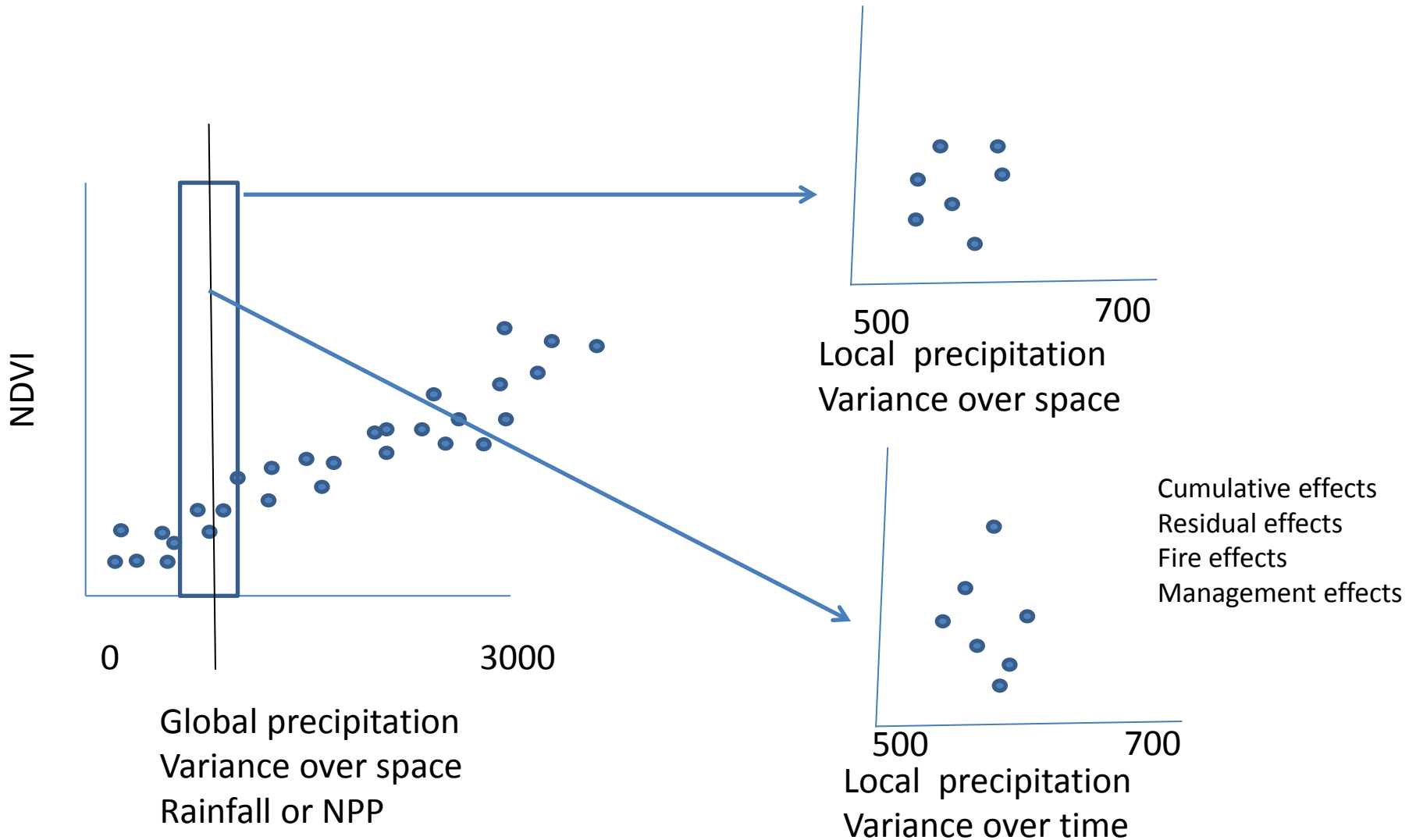
RESTREND

Validation of the Bai et al. 2008 product

- Wessels and Pretorius tried to ground truth with poor results
- Remember southern hemisphere seasons are not years
- Need to separate out agric from natural veg
- Drivers of NPP differ in arid and humid areas



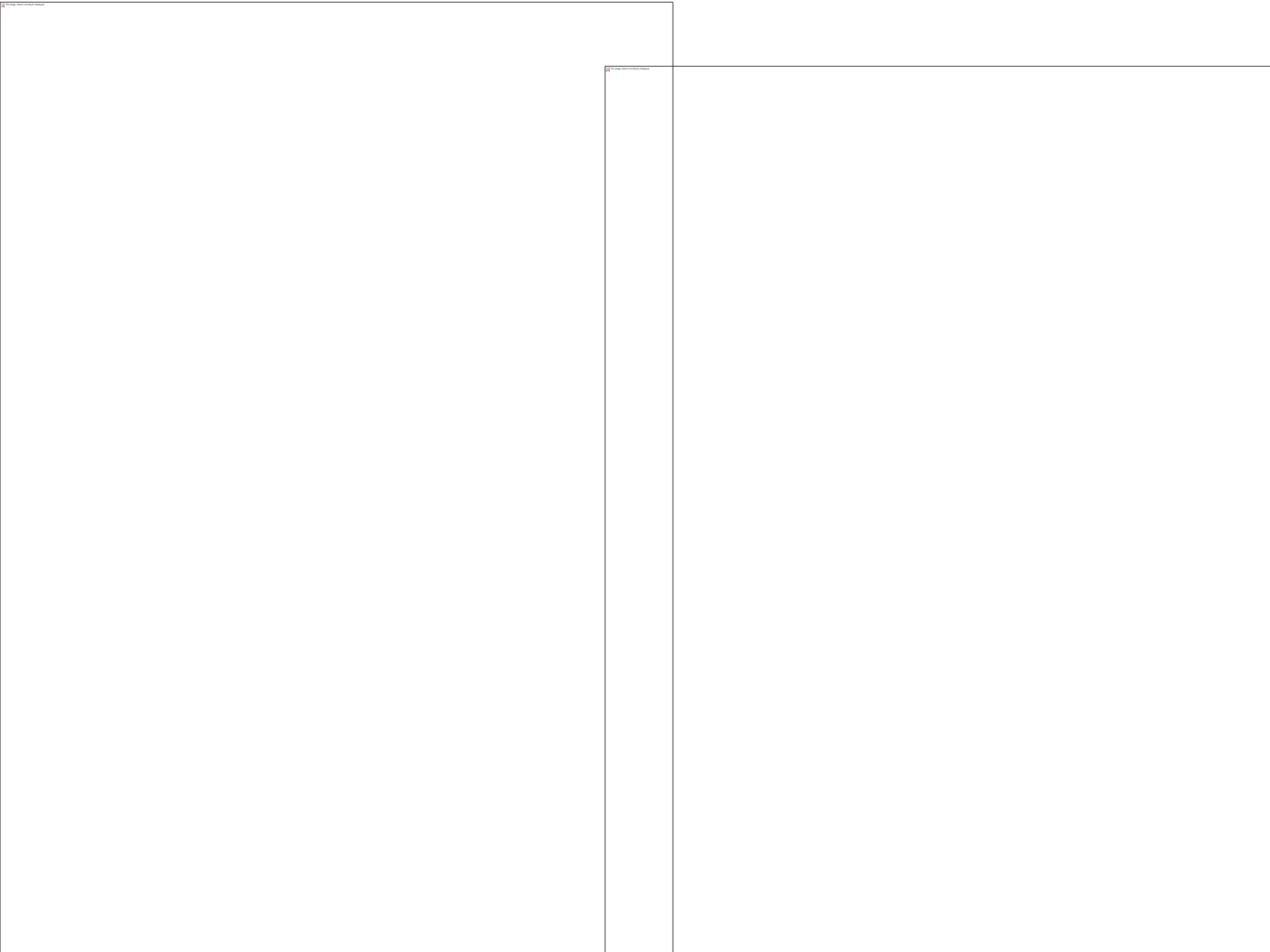
Need alternative to NDVI



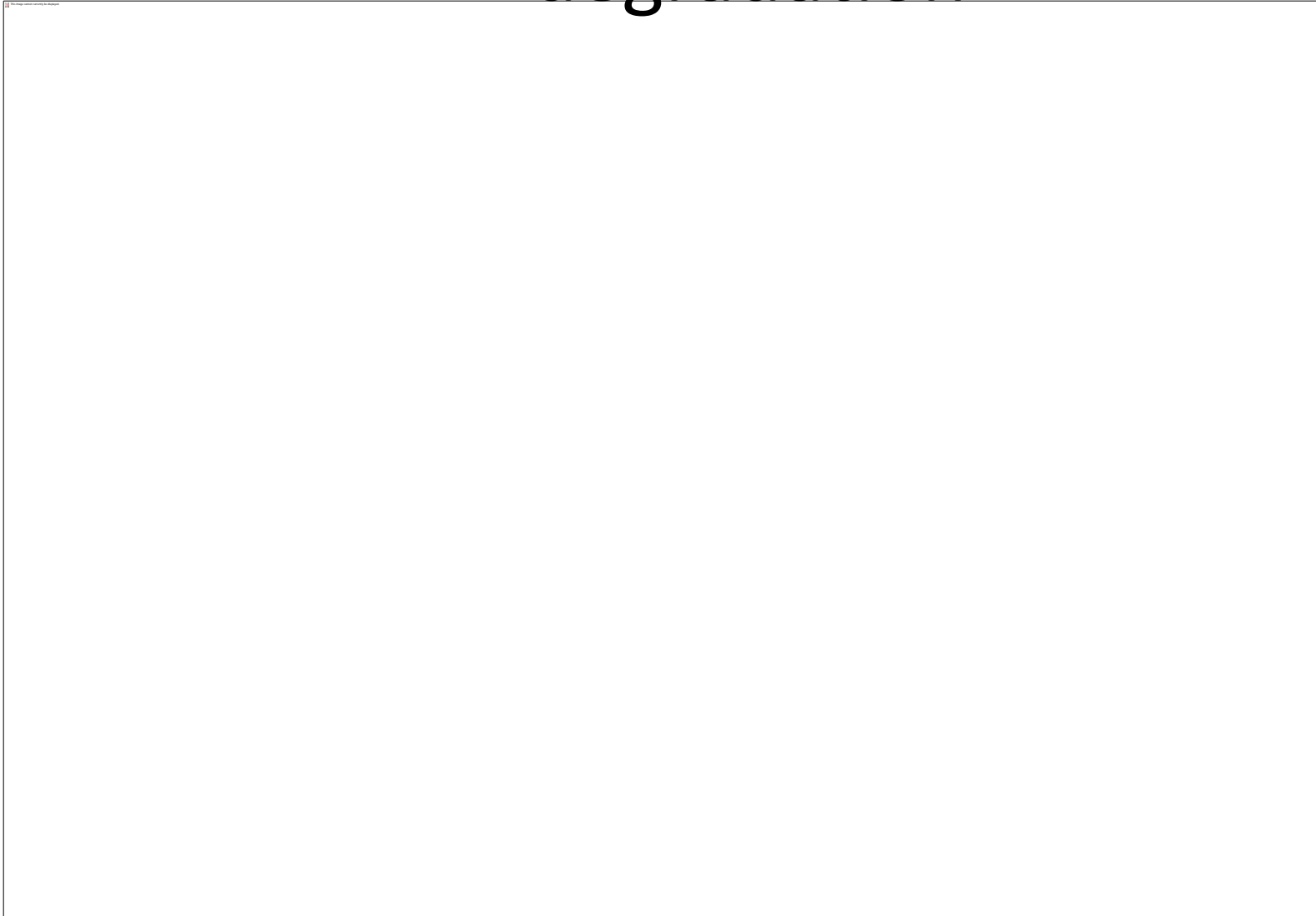
Ten-day, 1 km, NDVI AVHRR were analysed
for the period 1985 to 2000

Great for classification – could not find reliable
degradation index

Konrad Wessels, Karen Steenkamp, Graham von Maltitz
& Sally Archibald - Applied Vegetation Science 14: 49-
66. 2011



Alien vegetation invasion – one of the biggest threats to biodiversity and land degradation



Bush encroachment – no reliable maps exist



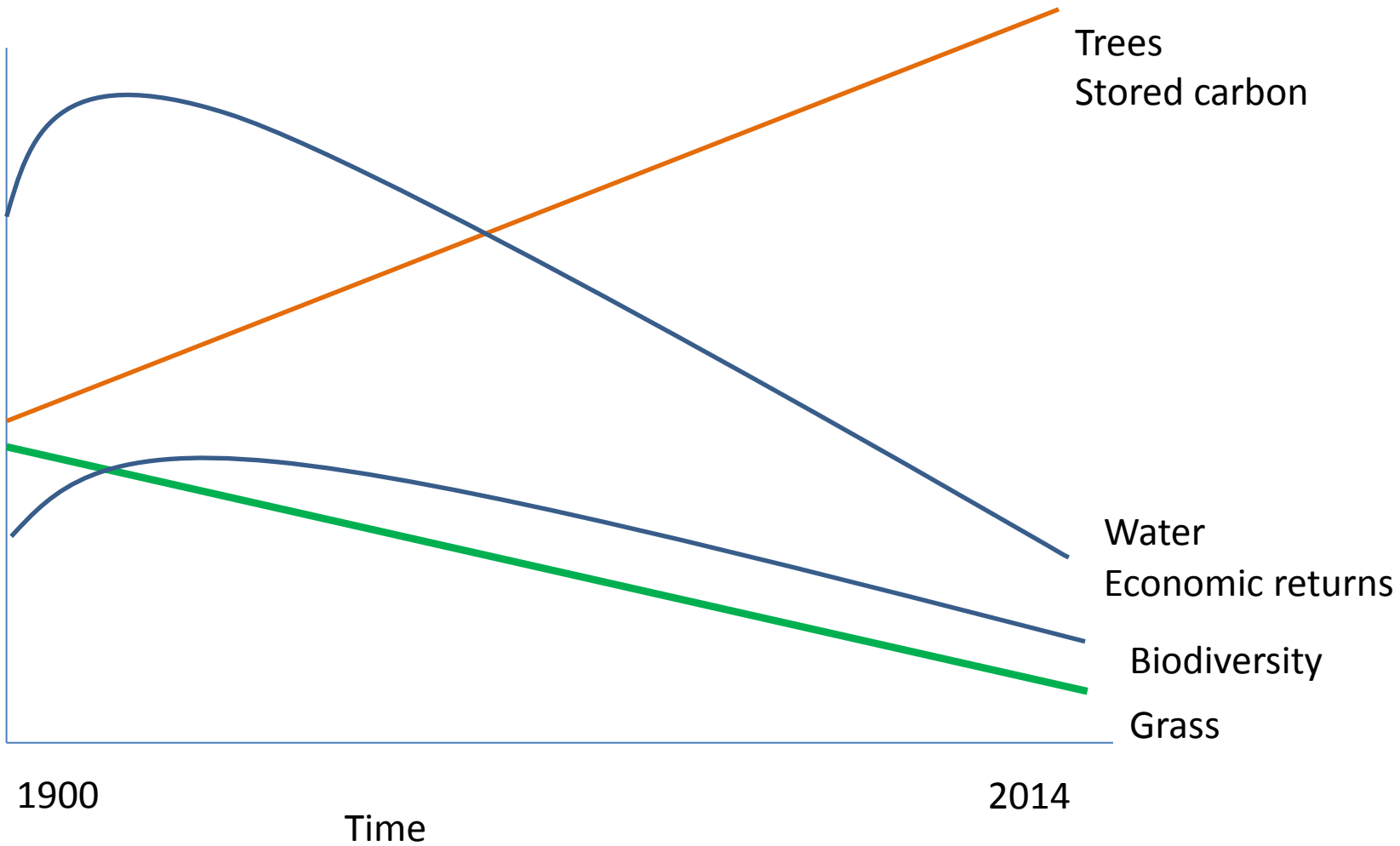
A BUSH ENCROACHED EAST

1955

Rate of increase in woody plant thickening has been substantial especially in last 20 years as small scale farmers have abandoned cultivated fields

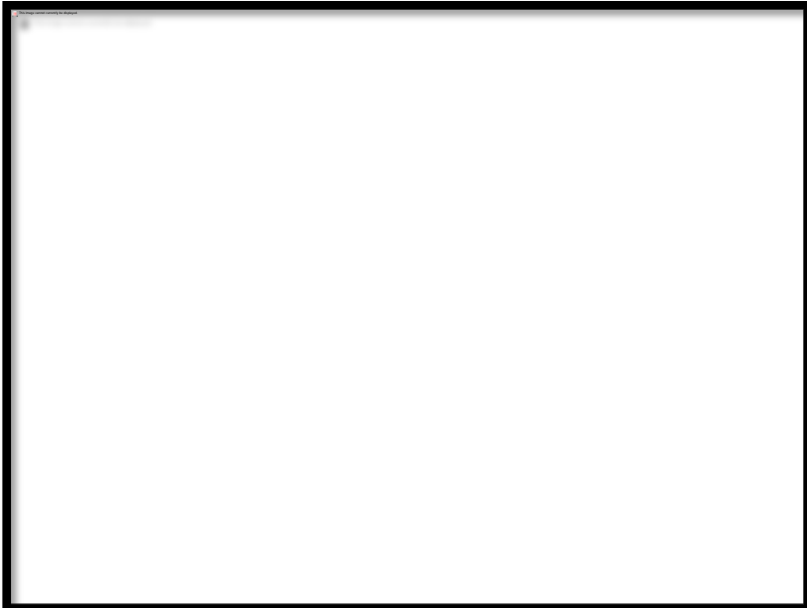
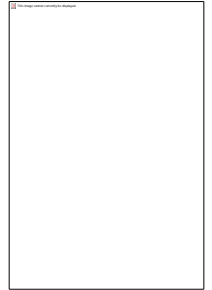
1993

2011



Soil Degradation in SA

- 3 recent studies (2009-2011)
 - Land Degradation Assessment in Drylands
 - Soil Protection Strategy (SPS)
 - Erosion modeling
 - Predicted soil loss rate for SA = 12.6t/ha.yr^{-1}



New innovative products from the Earth Observation Group, CSIR

Contacts

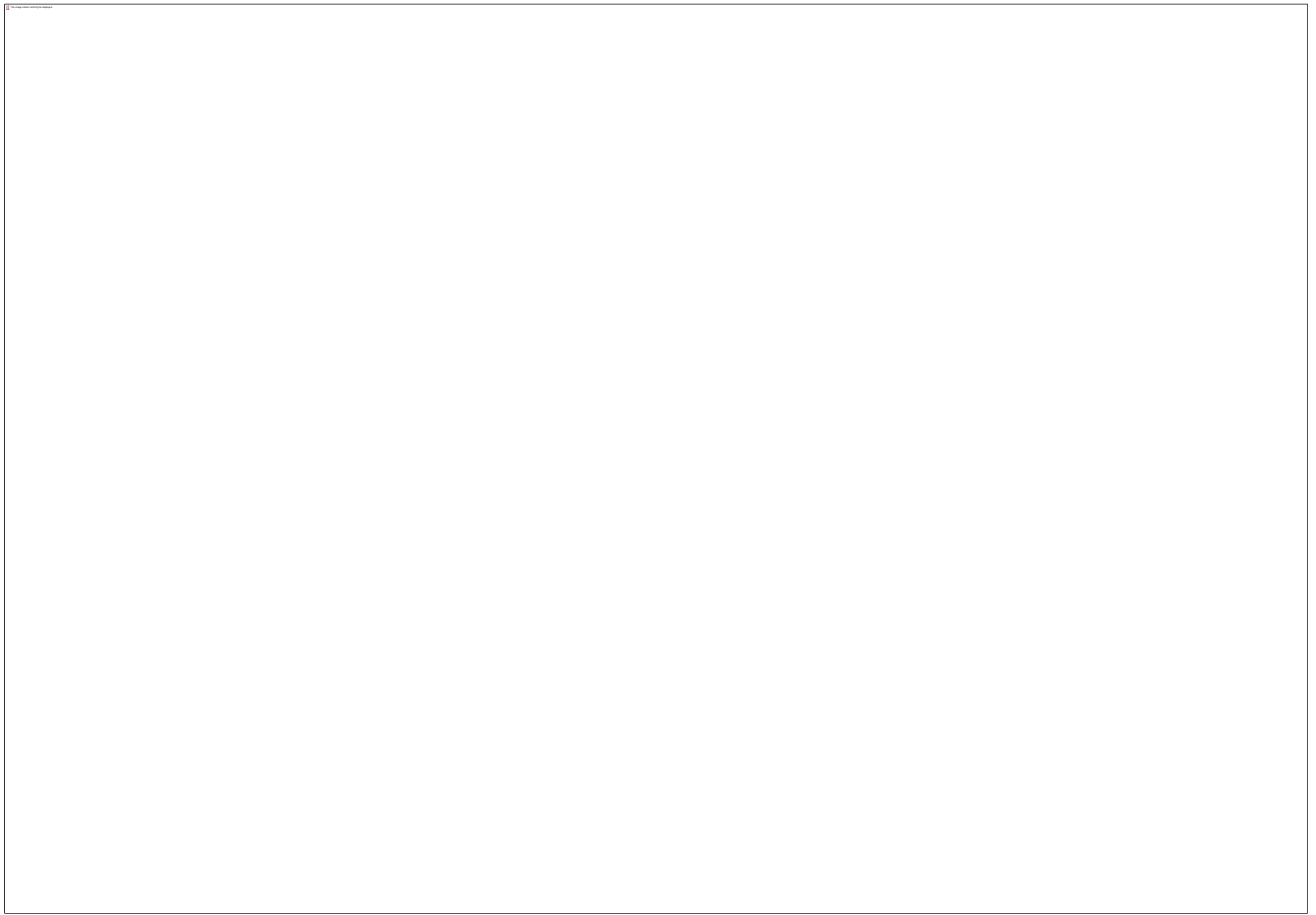
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Impacts of maps of leaf N and grass biomass



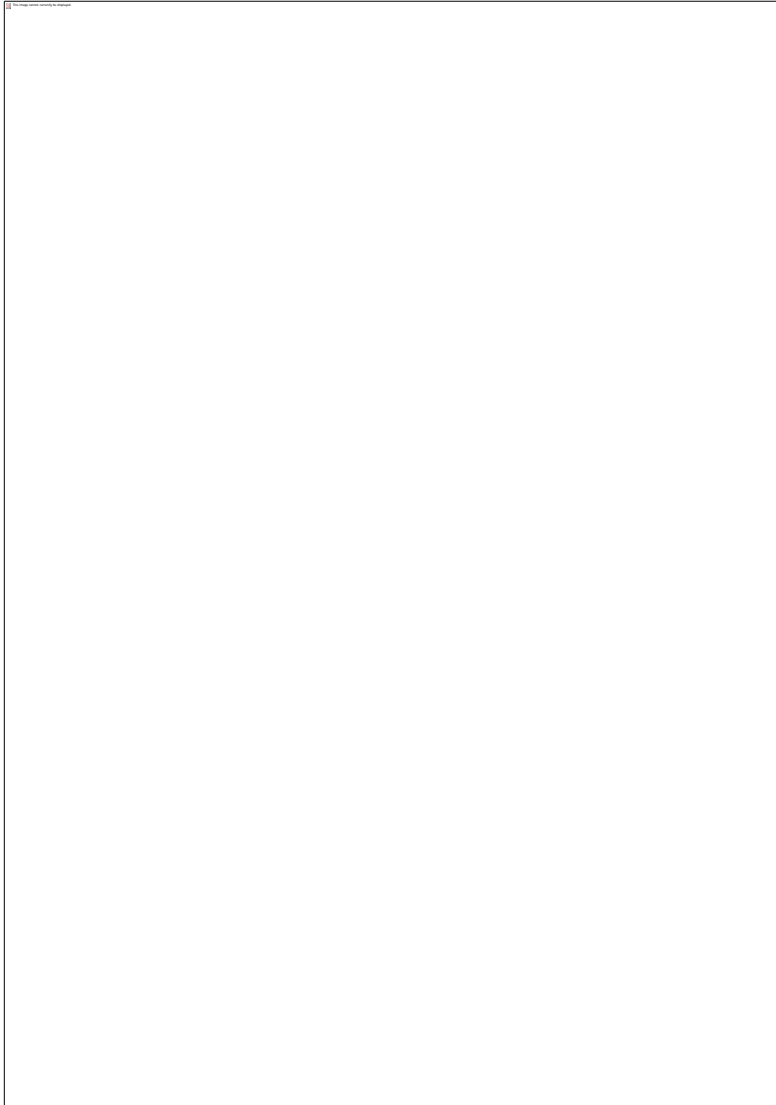


Impact pathway: Our concept of implementing EO for enhancing rural development

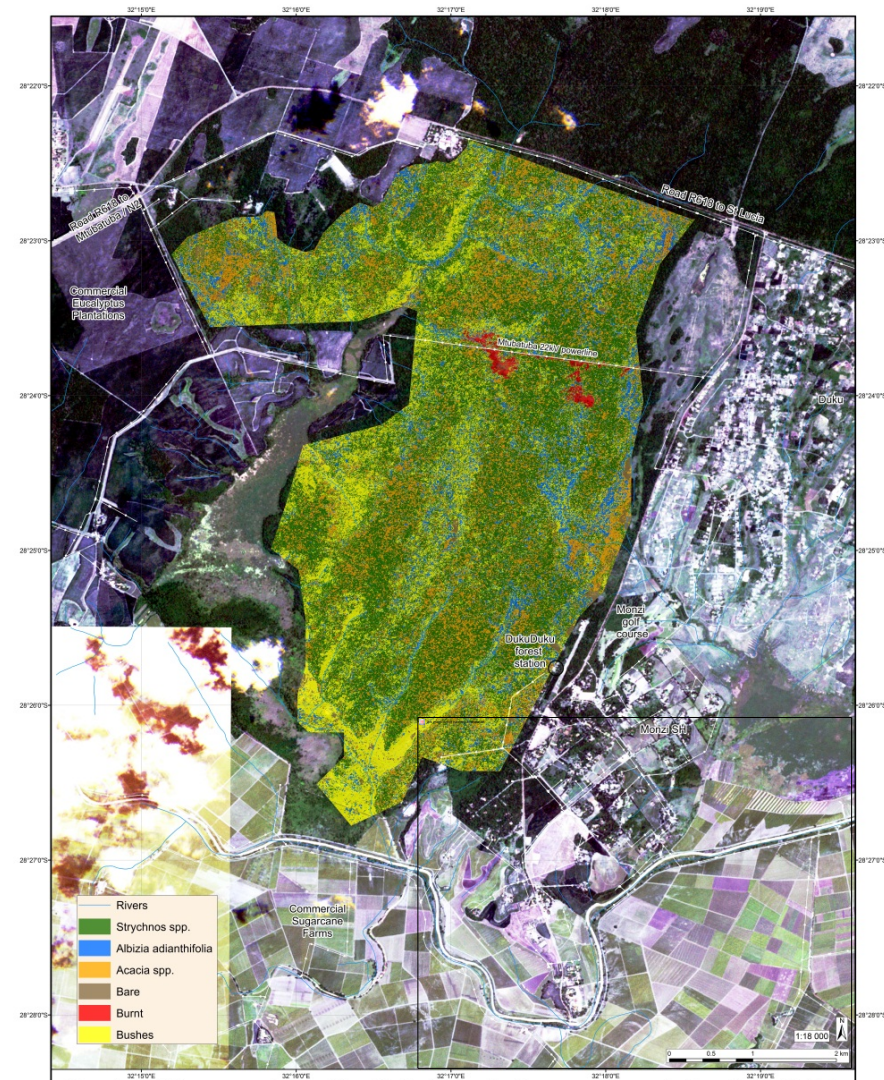


The case study illustrates how EO can be implemented in the management of rangelands. The objective is to assess rangeland condition at the national or sub-national level and to identify local hotspots for comprehensive assessment and management. Leaf area index (LAI), an indicator of vegetation productivity is used to demonstrate national to local scale and vice versa flow of Geoinformation.

Invasive species



Dominant species



Dominant tree species in the DukuDuku indigenous forest, KwaZulu Natal 2011

- Strychnos spp. (Coast Monkey Orange, fruit eaten by people, monkeys and antelopes) found in pristine areas.
- Albizia found in margins of forest (close to river and roads) and also colonises disturbed areas.