Restoration planning and techniques for Savannah and Woodlands

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Environmental Programmes

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

EXPANDED PUBLIC WORKS PROGRAMME

Definition of savannah

- A savanna or savannah is a **mixed woodland grassland ecosystem c**haracterised by the trees being sufficiently widely spaced so that the **canopy does not close**. The **open canopy** allows **sufficient light** to reach the ground to support an unbroken herbaceous layer consisting primarily of **grasses**

Definition of woodlands

- Woodland is a **low-density forest forming open habitats** with plenty of sunlight and limited shade. Woodlands may **support an understory of shrubs and herbaceous plants including grasses**. Woodland may form a transition to shrubland under drier conditions or during early stages of primary or secondary succession. Higher density areas of trees with a largely closed canopy that provides extensive and nearly continuous shade are referred to as **forests**

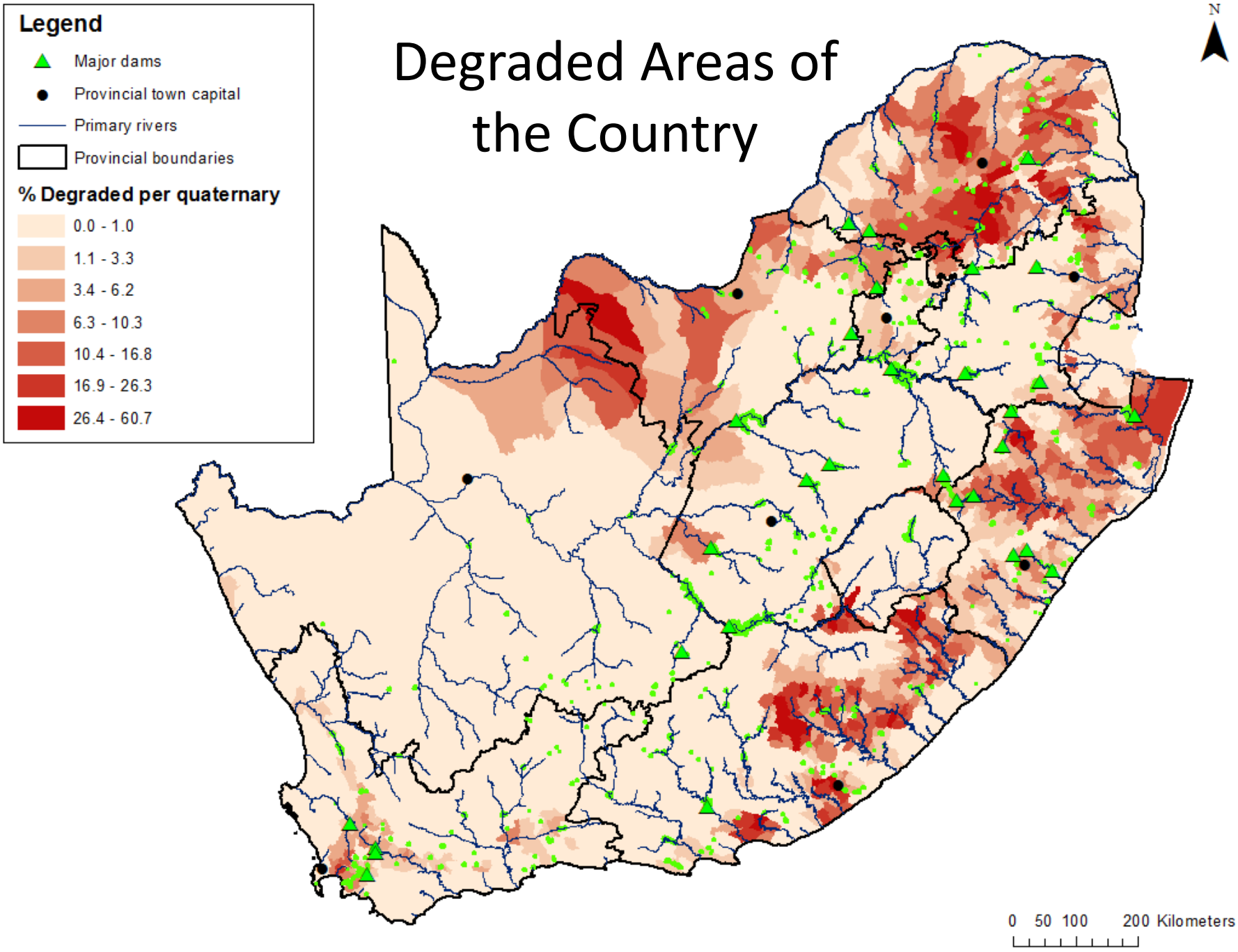
Afro-tropic ecozone: woodland types

- **Miombo woodlands**
- **Mopane woodlands**
- **Kalahari Acacia-Baikiaea woodlands (Botswana, Namibia, South Africa, Zimbabwe)**
- **Baikiaea woodlands (Angola, Botswana, Namibia, Zambia, Zimbabwe)**

Degradation problems in Savannah and woodlands

- Ongoing competition between the tree and grass layer components
- Climate change promote tree root development.
- Overgrazing of grass layer and/or tree layer
- Result in Bush encroachment – bush thickening or open denuded sometimes treeless areas
- Capped soils resulting in sheet and gully erosion
- Role of fire – natural driver of ecosystem

Degraded Areas of the Country



Research by Dr Barney Kgope, Dr Guy Midgley and a visibly concerned Professor William Bond (below) confirmed a potentially catastrophic link between climate change and habitat modification – and one that will be exacerbated by woody invasive alien plants.

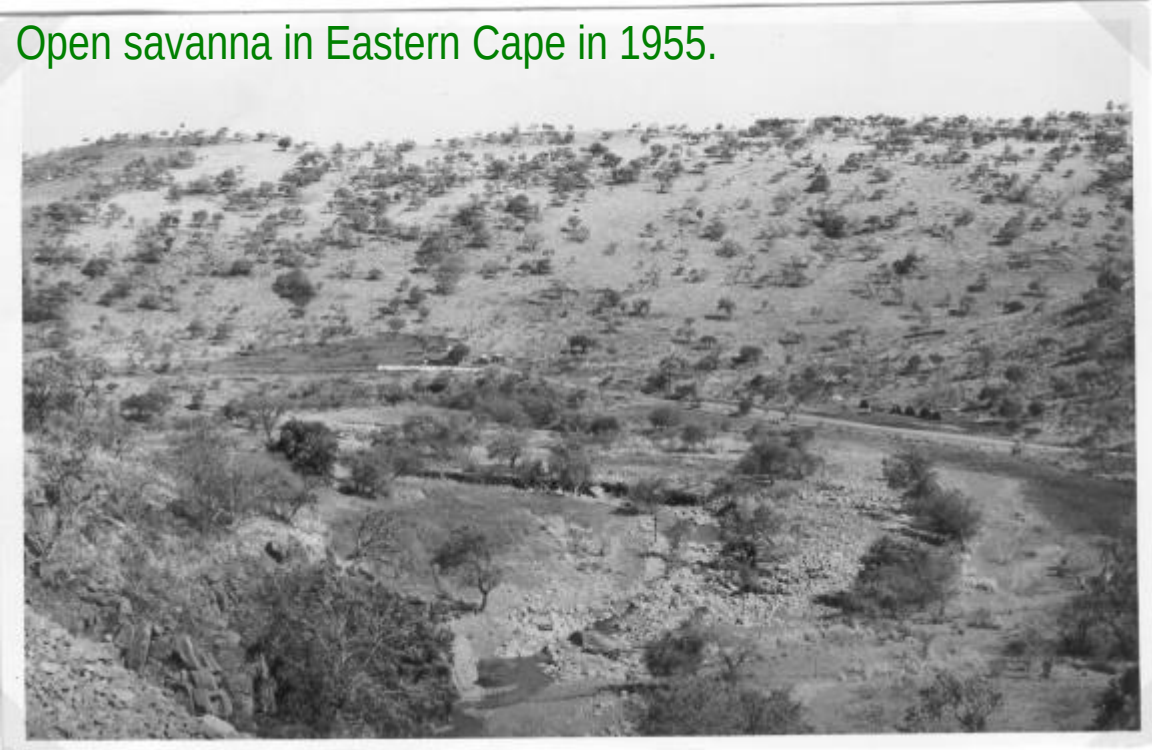
Root and shoot growth of sweet thorn (*Acacia Karroo*) at different parts-per-million of atmospheric carbon dioxide (CO_2).

This will lead to massive impacts on a productive use of land, water security, wild fires, biological diversity, and more.

(Professor Guy Midgley)

The already problematic mesquite (*Prosopis* species) in the Northern Cape are well-adapted to take advantage of climate change, with disastrous implications for rivers, keystone ecological species, groundwater and human livelihoods.

Open savanna in Eastern Cape in 1955.



The same site in 1998.

Bush Encroachment

Trees have increased world-wide in the savannas, which is thought to be linked to differences in pre-industrial to current CO_2 levels.

It has been exacerbated by poor farming (notably over-grazing) in certain areas, and by suppression of wild fires.

The implications of this spread and growth of our indigenous tree species (and compounded by a similar spread and growth of invasive alien tree species) are once again disastrous for the ecological functioning of natural systems, biological diversity, water security, wild fires, soil erosion, siltation, grazing, the productive use of land, and the economy.

(Professor Timm Hoffman, University of Cape Town)

Planning for rehabilitation

- Understand the problem first. Lack of fires, over grazing, drought, local geology, soil and climate
- The use of Google Earth maps to get an overall view of the area
- **Approach:** Address the drivers of degradation first. Decide on the most appropriate method. Tackle the easy medium degraded areas first.

Gully slopping 4
Headcut 7
Headcut 8
Gully slopping 3
Headcut 6
Headcut 5
Gully slopping 1
Worse + spekboom planting 1
Worse + spekboom plant 2
Headcut
Headcuts 1
Gully slopping 2
Headcut 2
Headcut 3
Headcut 4
© 2015 Google
Image © 2015 CNES / Astrium
© 2015 AfriGIS (Pty) Ltd
Google earth
2003
Imagery Date: 9/6/2013 33°34'40.76" S 24°01'57.92" E elev 547 m eye alt 2.13 km

Potlake Nature Reserve
Google Earth

Dealing with bush encroachment

Dichrostachys cinerea - Sickle bush encroachment in SA

Mechanical Bush encroachment control in Namibia – Acacia mellifera

Using manual labour to do clearing of bush encroachment and brush packing

Removal of small trees and used for Brush packing on ponds - Limpopo

Fire as a tool to control bush encroachment

Veld condition surveys – bush thickening control

- Know what the condition of the vegetation is before using fire as a tool.
- Is there enough fine fuel (grass biomass) to carry a fire.
- Weed/bush density. Different tree layers – kill small trees but keep larger/adult tall trees.
- Indication of underlying problem: E.g. overgrazing, too frequent fires or suppression of wild fires.
- Use in combination with other techniques – integrated approach to restore natural veld

Condition and amount of fuel

Successes: Erosion rehabilitation methods - NRM

- DEA:NRM projects have done dryland rehabilitation work with some tested methodologies and are currently trying some new methods to improve the success rate
- Projects include work done in the Baviaanskloof, Little Karoo, Ntabelanga and Mt Fletcher dam catchments, Marakele National Park, Golden Gate NP
- **Methods** include: Re-sloping of gullies, silt fences, ponding and brush packing, use of soil blankets and soil sausages – addressing capped soils

What is soil capping (crusting), surface hardening, seal effect?

- Any **exposed soil** (absence of good protective vegetation or basal cover) is subjected to the **impact of raindrops**. On impact the raindrops force the air out between soil particles and cause the **top layer** of exposed soil to **become compact** or denser – known as capping – cement like feeling of the exposed soil.

What is soil capping, surface hardening, seal effect?

- Capped soils do not allow the water to infiltrate which will result in the increase of the runoff water, increase in velocity of runoff water, increase in erodibility
- Result in erosion of the terrain.

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Ponding with brush packing + regrassing

Ponding in the Karoo

Silt fencing around Gully erosion system – using Grassfence product

Gully re-sloping: Next - grass seed + soil blanket

Installation of soil blankets: overlapping

Applying of mulch after re-sloping of gullies

Training of teams to use the appropriate methodology for erosion control

Silt fencing, brush packing and re-grassing

Installation of soil blankets and soil rolls/sausages and ponding

Re-sloping gullies, install soil blankets,
install silt fence & brush packing

Installation of Soil rolls/sausages

Rock packing

Case study to Thicket restoration approach

The good - 300,000 ha

Semiarid solid thicket (characterized by a dense canopy of tall shrubs and a *Portulacaria afra* Jacq. component) - protect

Courtesy Mills et al

The bad - 600,000 ha

Moderately degraded by injudicious goat-farming - restore

Courtesy Mills et al

The ugly - 800,000 ha

Severely degraded by injudicious goat-farming – leave first

Western

RT ELIZABETH

100 0 100 200 Kilometers

Courtesy Mills et al

Spekboom planting on the contours

Thank You!!