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PES in South Africa: Case Studies and Early Lessons

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C.A.P.E. Resource Economic Co-ordinator
&
Independent Economic Researchers

Introduction

- **Case studies**
  1. Maloti-Drakensberg PES (water and carbon)
  2. Carbon sequestration through Spekboom restoration
  3. Baviaanskloof PES (water and carbon)
  4. WWF water neutral project
- **Lessons from the South Africa experience thus far**

Case Study 1:
Payment for Ecosystem Services in the Maloti Drakensberg, South Africa

With thanks to Myles Mander, Golder and Associates

Maloti Drakensberg Transfrontier Project

DBSA
Development Bank of Southern Africa

Working for Water
Patron in Chief Nelson Mandela

Institute of Natural Resources

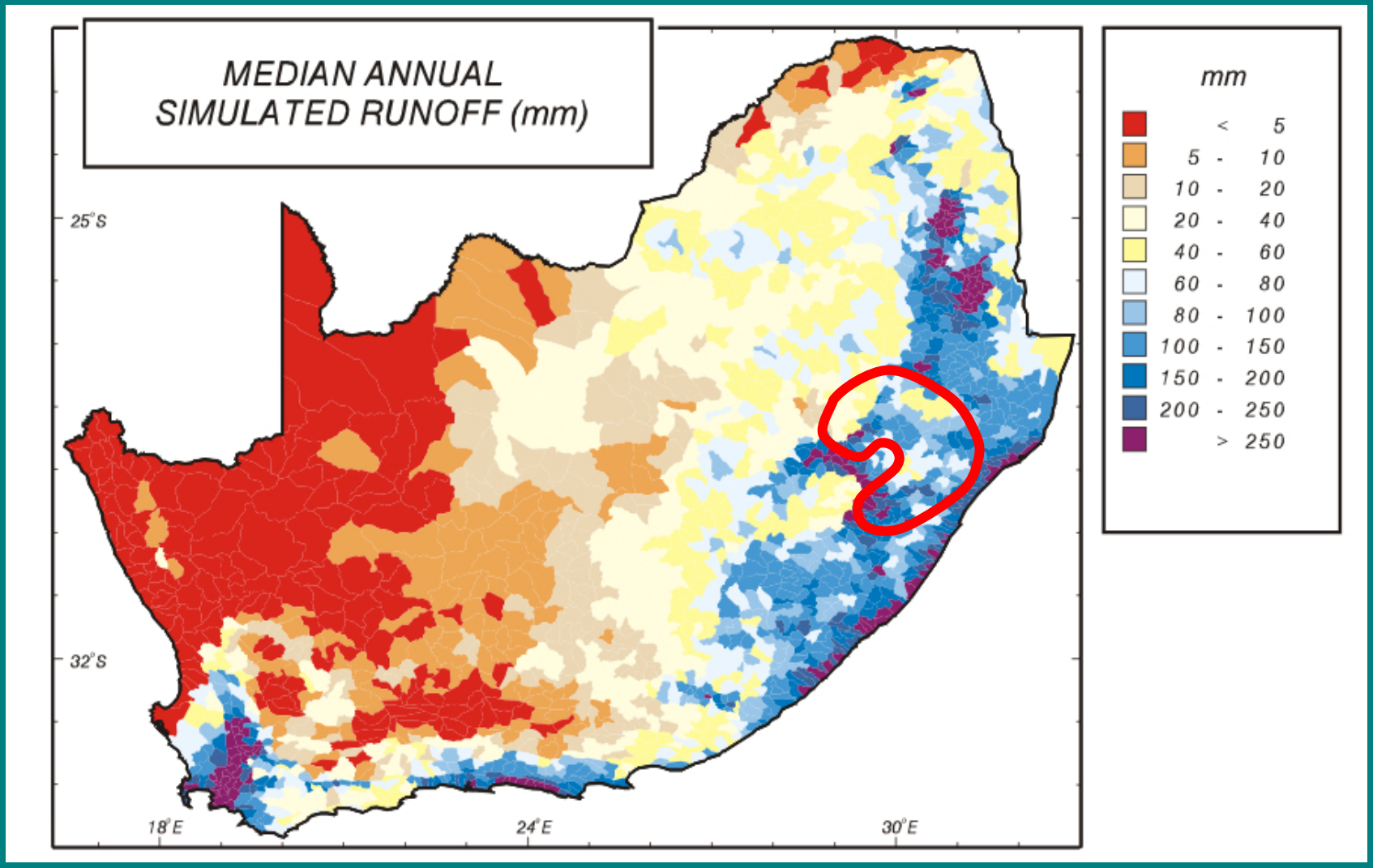
School of Bioresources Engineering & Environmental Hydrology

EZEMVELO KZN WILDLIFE

Jabenzi
Making economic development work for people in Africa

futureWORKS!

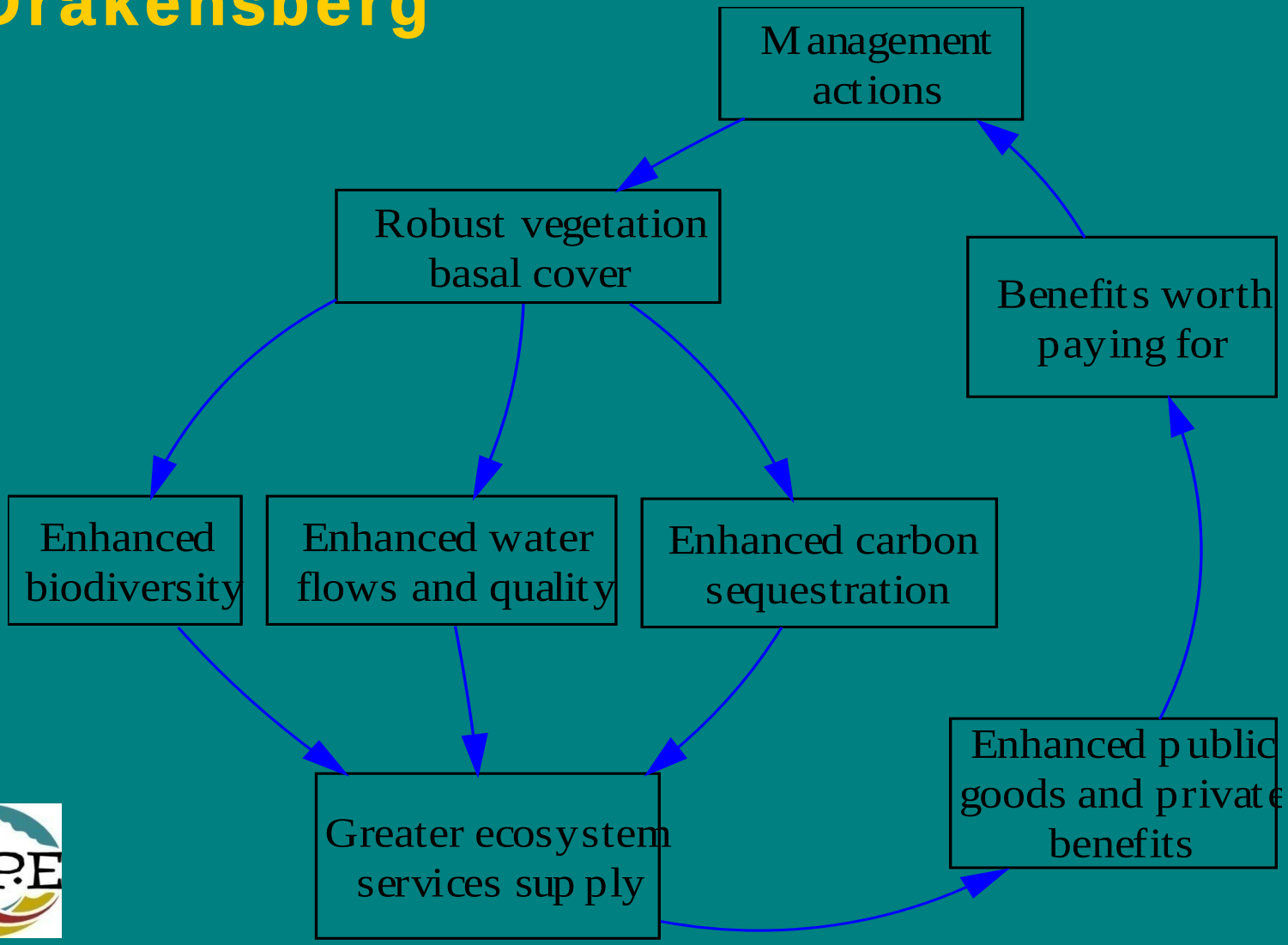
Maloti Drakensberg is strategic - 25% of South Africa's water originates in this area



The strongly flowing Little Thukela river benefiting from good management in the catchment

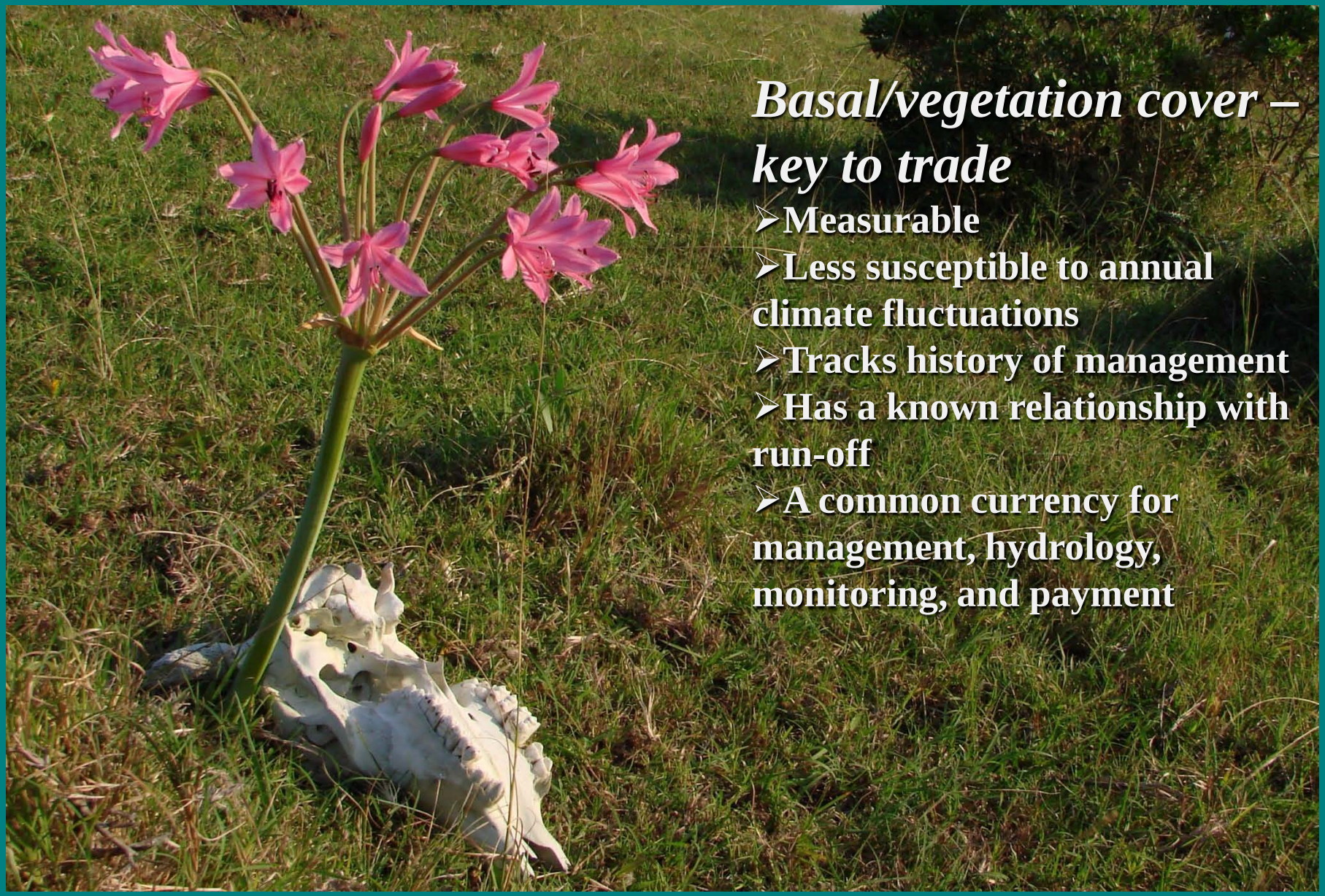
The silted, slow-flowing Umzimvubu river that is being degraded by poor land use practices in the catchment

A proposed PES system in the Drakensberg




From this!

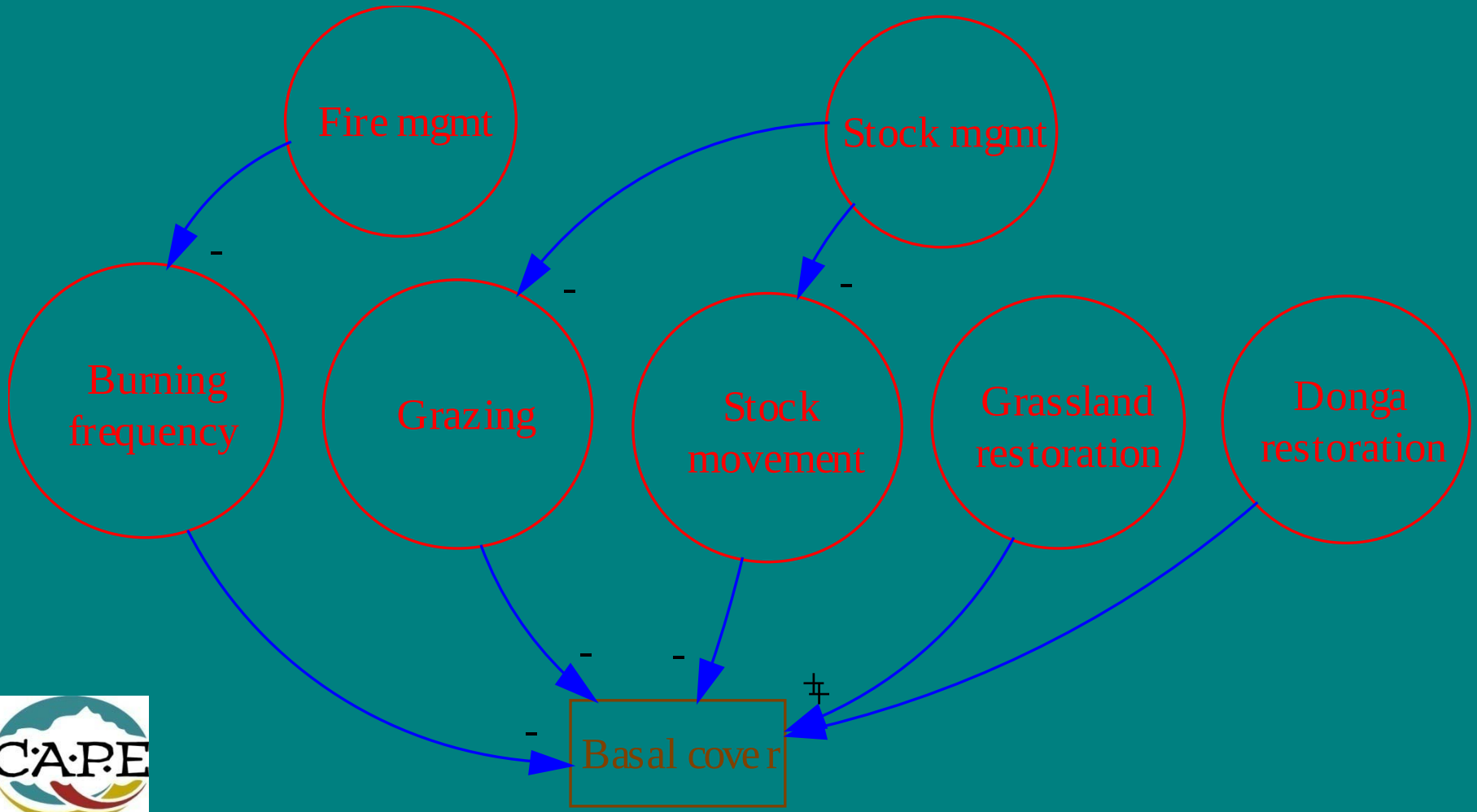
To This!



Basal/vegetation cover – key to trade

- Measurable
- Less susceptible to annual climate fluctuations
- Tracks history of management
- Has a known relationship with run-off
- A common currency for management, hydrology, monitoring, and payment

Management for Basal cover



Key ecosystem services assessed

- Increased base flow in rivers
- Reduced storm flow off the land
- Reduced sediment yields in runoff
- Increased Carbon sequestration in grasslands

Key Results

Quantities of services supplied in the Two Catchments		
	upper-Thukela	upper-Umzimvubu
Total additional baseflow: m^3	12 869 204	3 936 842
Sediment reduction: t/y (weight)	1 884 379	7 381 437
Sediment reduction: m^3/y (storage space)	1 256 252	4 920 958
Carbon sequestration: t/y	*134 352*	*337 718*

Economic Feasibility of PES - Summary of Key Results

	upper-Thukela	upper-Umzimvubu
Initial restoration cost (R/ha over 7 yrs)	R170.27	R655.28
Ongoing management cost (R/ha/yr)	R20.23	R23.14
Value of additional water sales (R/ha/yr)	R20.12	R8.06
Value of all ongoing benefits (additional water, decreased sedimentation, carbon sequestration) in R/ha/y	R97.57	R123.82
Net present value *including only additional water sales* (R/ha over 50 yrs)	-R185.33	-R820.50
Net present value *including all benefits* (R/ha over 50 yrs)	R1 035.50	R1 004.18
Number of jobs:		
During restoration (7 years)	*279*	*1 548*
During ongoing maintenance	*127*	*307*

Key findings

- **Key benefits for Thukela focused on additional water yield:**

  For the whole Thukela basin – with a surplus of 38 million m3 - the additional water is a 23% increase in allocable water at a low cost

- **Key benefits for Umzimvubu focused on baseflow and sediment reduction**

  Increase winter baseflows by 3.9 million m^3. Important as there are no large dams on the system resulting in urban and rural users relying on river use and small impoundments.

  4.9 million m^3 per year reduction in sediment loads to rivers and associated water infrastructure – rivers, small dams and weirs benefit significantly.

  Restoration could result in a major reduction in runoff – but restoration turns ‘blue’ water to ‘green’ water – plant biomass for people and biodiversity.

Institutional and legal feasibility

- The South African water pricing policy allows for the charging of water users for the clearing of alien invasive plants – should be possible to widen actions that are 'officially' chargable under the policy to land use management given their clear benefits
- There are institutions and institutional linkages to enable the trade, with effective implementing agents like Working for Water and EKZN Wildlife (the provincial conservation agency in the area)
- The challenge will be the integration of key role players in implementation – Department of Water Affairs, Working for Water, conservation agencies, communities, tribal authorities, commercial and subsistence farmers, Department of Agriculture, Department of Environmental Affairs and Tourism, Water Utilities – to make a new market chain

CONCLUSIONS

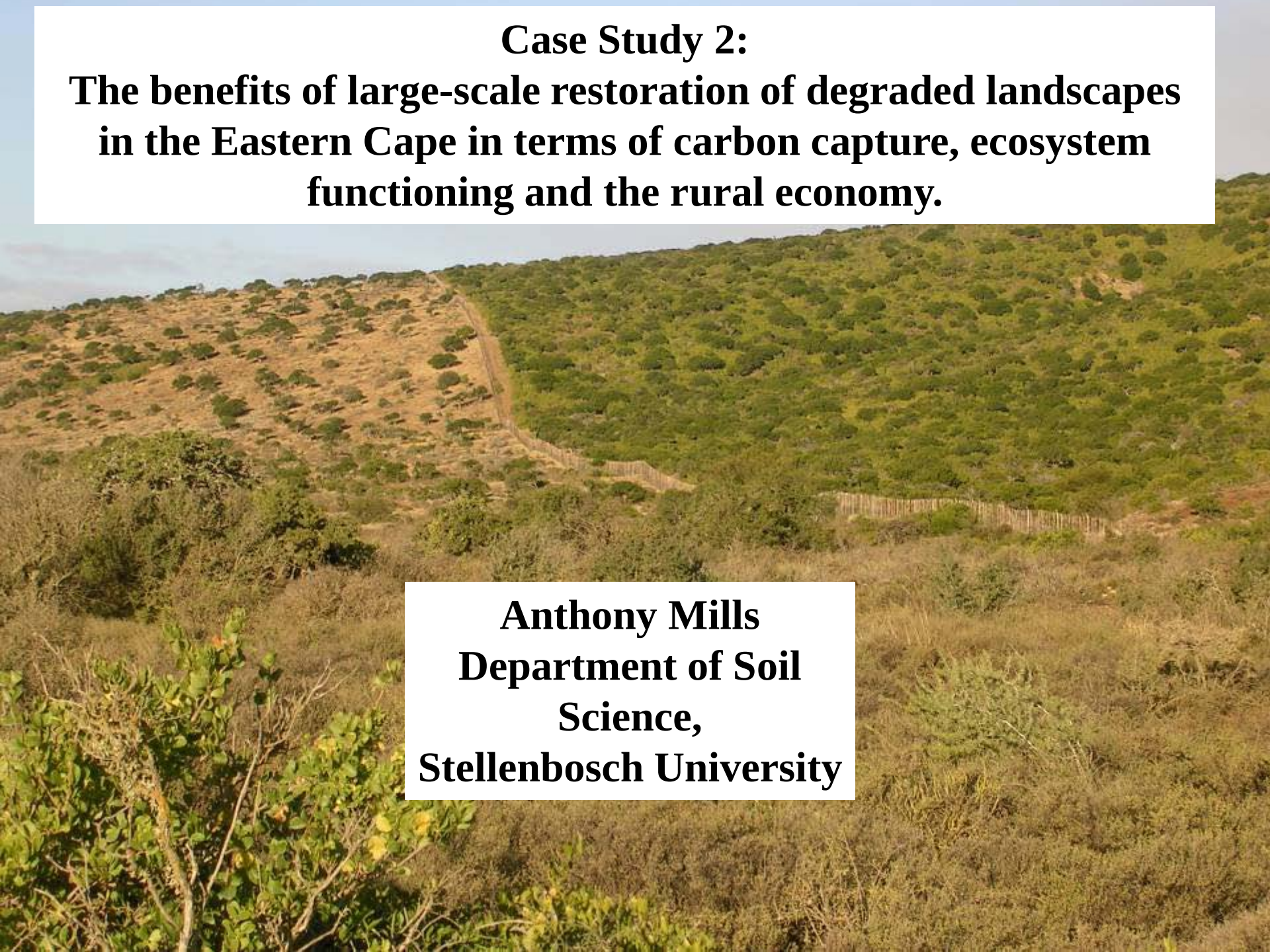
- Research confirmed that biennial spring burning, grazing at recommended stocking rates, and restoration of degraded grasslands can make significant impacts in reducing run-off, increasing infiltration, reducing summer storm flows, increasing winter base flows and maintenance of the ecological reserve in rivers
- Improved management can shift destructive summer flows in periods of water abundance or excess, to the winter months when water is scarce and when value can be added
- Management results in significant reductions in soil erosion, reducing the sedimentation of water infrastructure, improving productivity and increasing carbon sequestration

CONCLUSIONS (2)

- Management costs vary - some sub-catchments showing that restoration and management is financially feasible with only baseflow enhancement being marketed, while other catchments required more services to be traded before management will be financially feasible
- Catchment management becomes increasingly feasible when more than one of the services is traded
- Subsistence and commercial farmers can farm water
- Document available:

www.futureworks.co.za/maloti_drakensberg_pes.htm

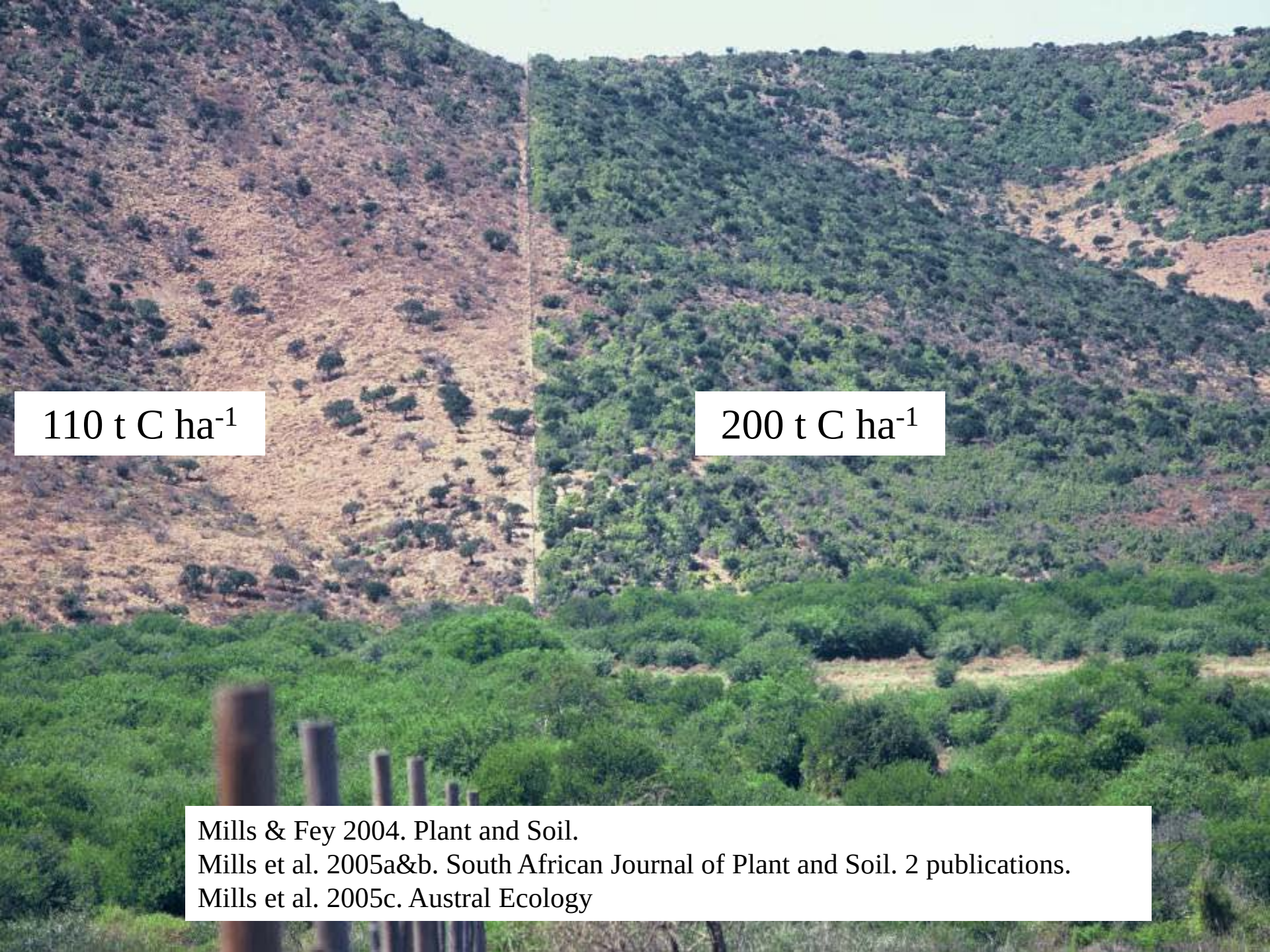
Case Study 2:
The benefits of large-scale restoration of degraded landscapes in the Eastern Cape in terms of carbon capture, ecosystem functioning and the rural economy.



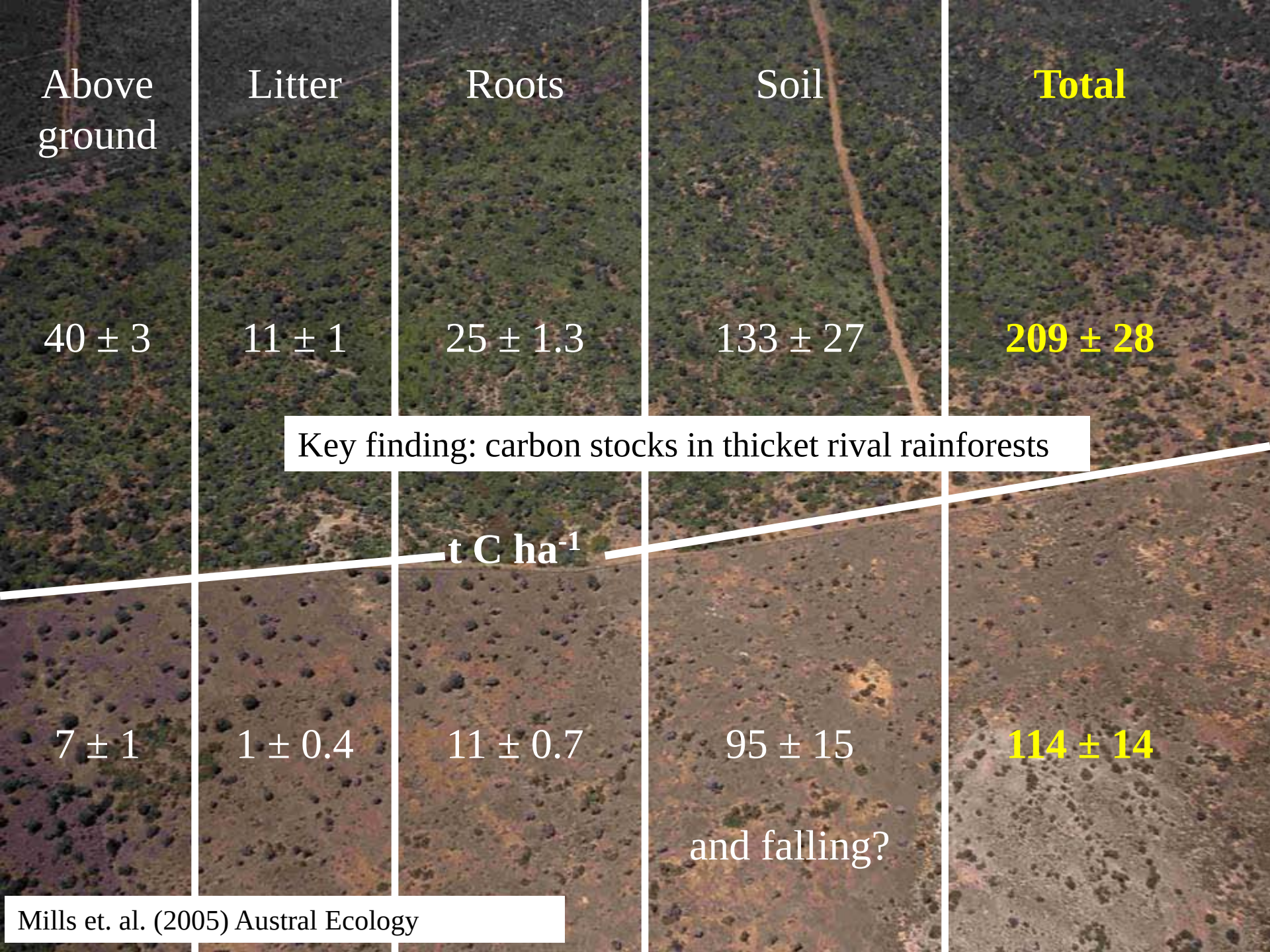
Anthony Mills
Department of Soil Science,
Stellenbosch University

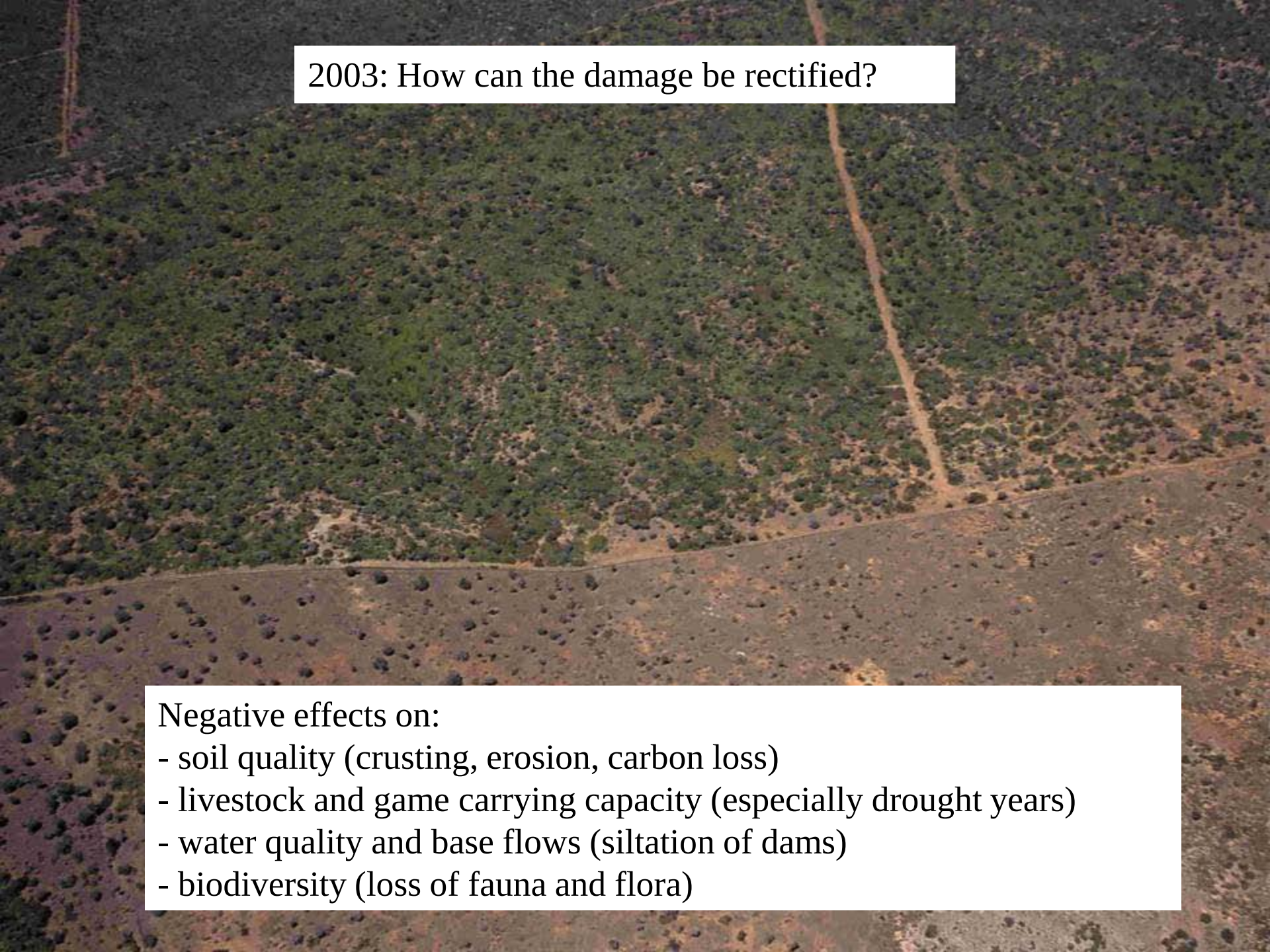
1. Background

1930’s onwards: large-scale degradation of thicket by goat farming



Mills & Fey 2004. Plant and Soil.
Mills et al. 2005a&b. South African Journal of Plant and Soil. 2 publications.
Mills et al. 2005c. Austral Ecology

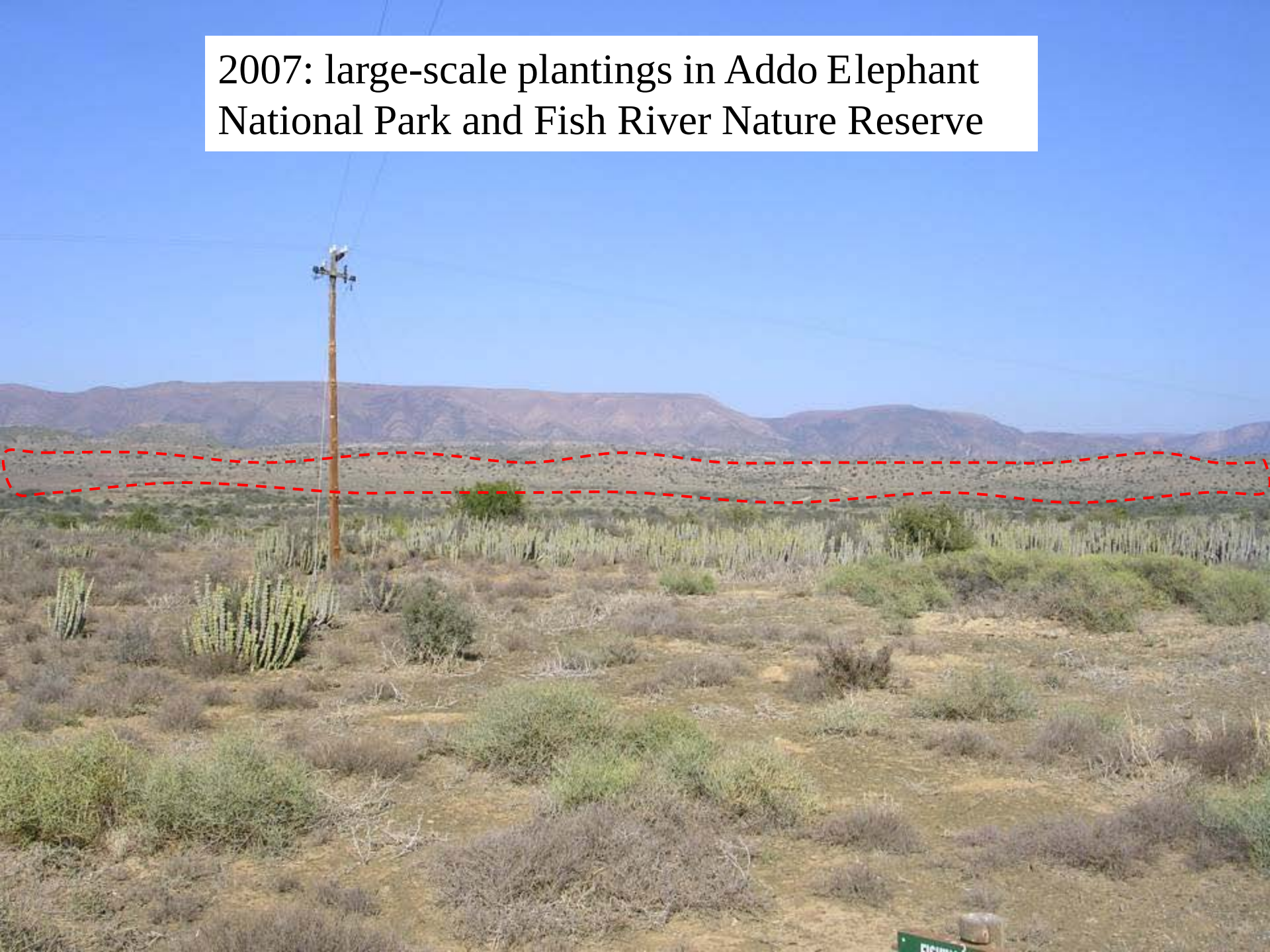

Above ground
Litter
Roots
Soil
Total
40 ± 3
11 ± 1
25 ± 1.3
133 ± 27
209 ± 28
Key finding: carbon stocks in thicket rival rainforests
t C ha-1
7 ± 1
1 ± 0.4
11 ± 0.7
95 ± 15
and falling?
114 ± 14
Mills et. al. (2005) Austral Ecology



2003: How can the damage be rectified?

Negative effects on:
- soil quality (crusting, erosion, carbon loss)
- livestock and game carrying capacity (especially drought years)
- water quality and base flows (siltation of dams)
- biodiversity (loss of fauna and flora)

2004: Department of Water Affairs and Forestry thicket restoration project.
Budget today: R6 million per annum.
Aim: catalyse large-scale restoration in private sector


2007: large-scale plantings in Addo Elephant National Park and Fish River Nature Reserve

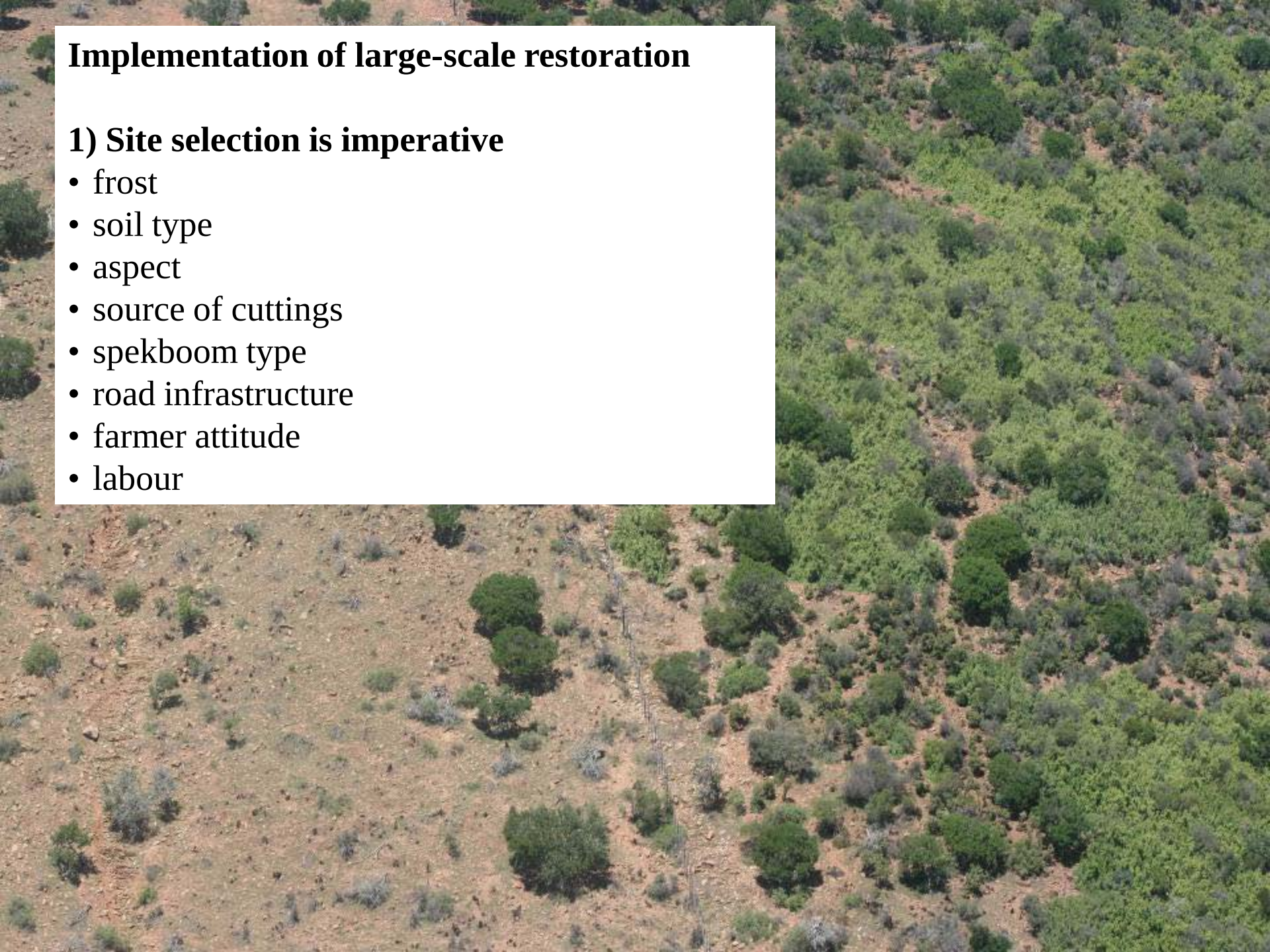
2008: thicket-wide plots: 300 sites across Eastern Cape

3. Availability of land

Original extent of thicket dominated by spekboom: ±1,900,000 ha

Moderate degradation: ±600,000 ha

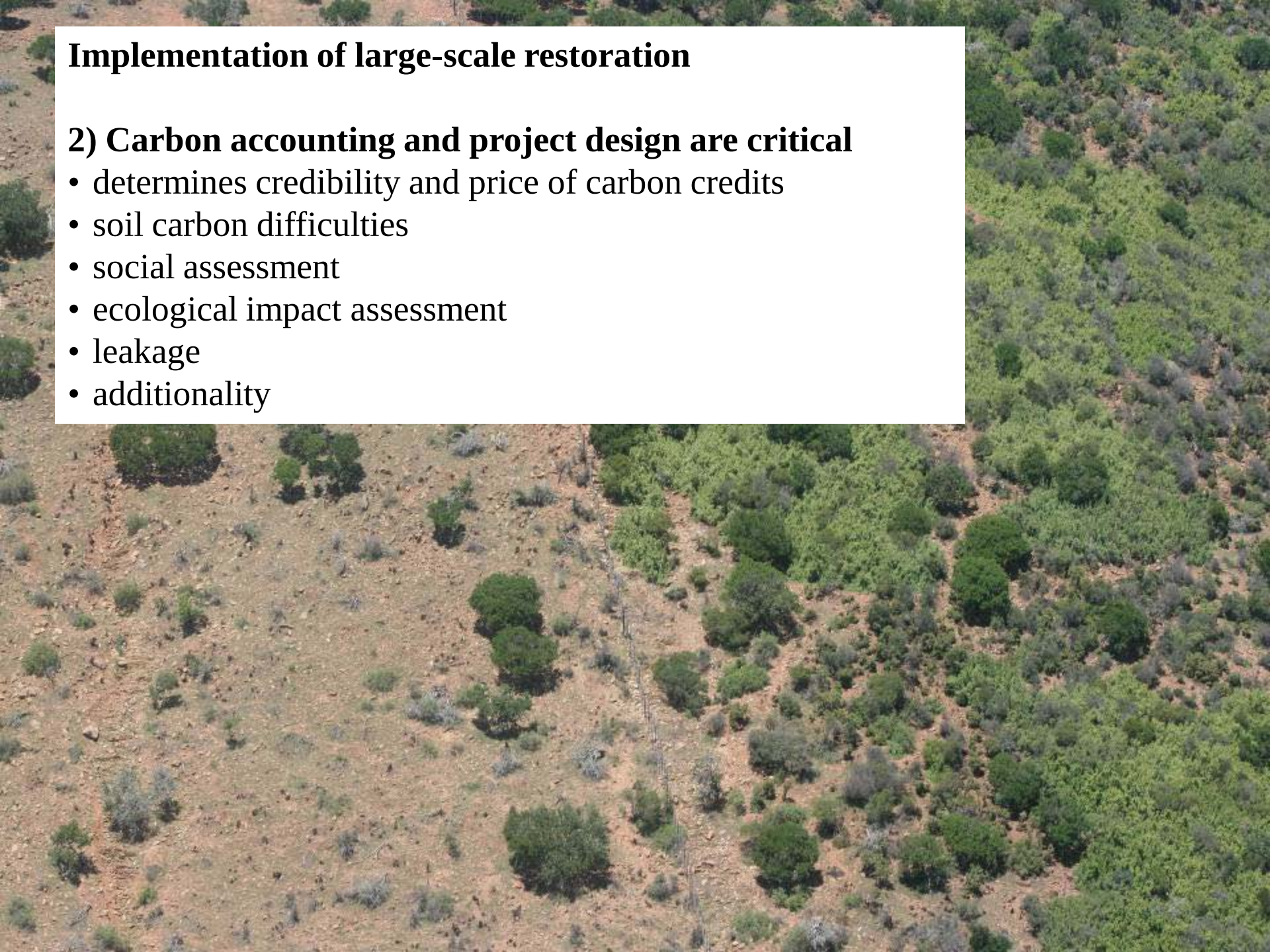
Severe degradation: ±800,000 ha



Implementation of large-scale restoration

1) Site selection is imperative

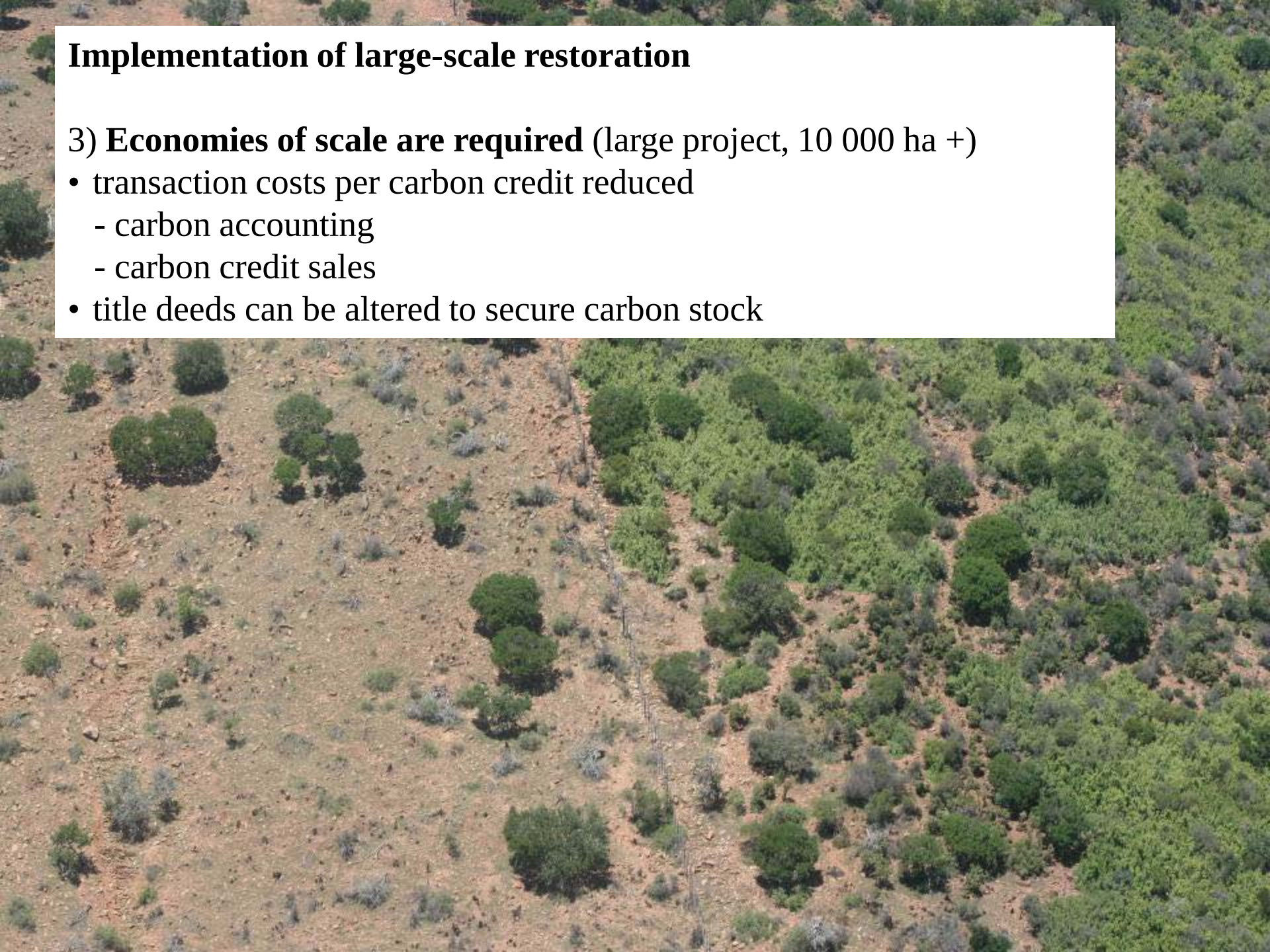
- frost
- soil type
- aspect
- source of cuttings
- spekboom type
- road infrastructure
- farmer attitude
- labour



Implementation of large-scale restoration

2) Carbon accounting and project design are critical

- determines credibility and price of carbon credits
- soil carbon difficulties
- social assessment
- ecological impact assessment
- leakage
- additionality

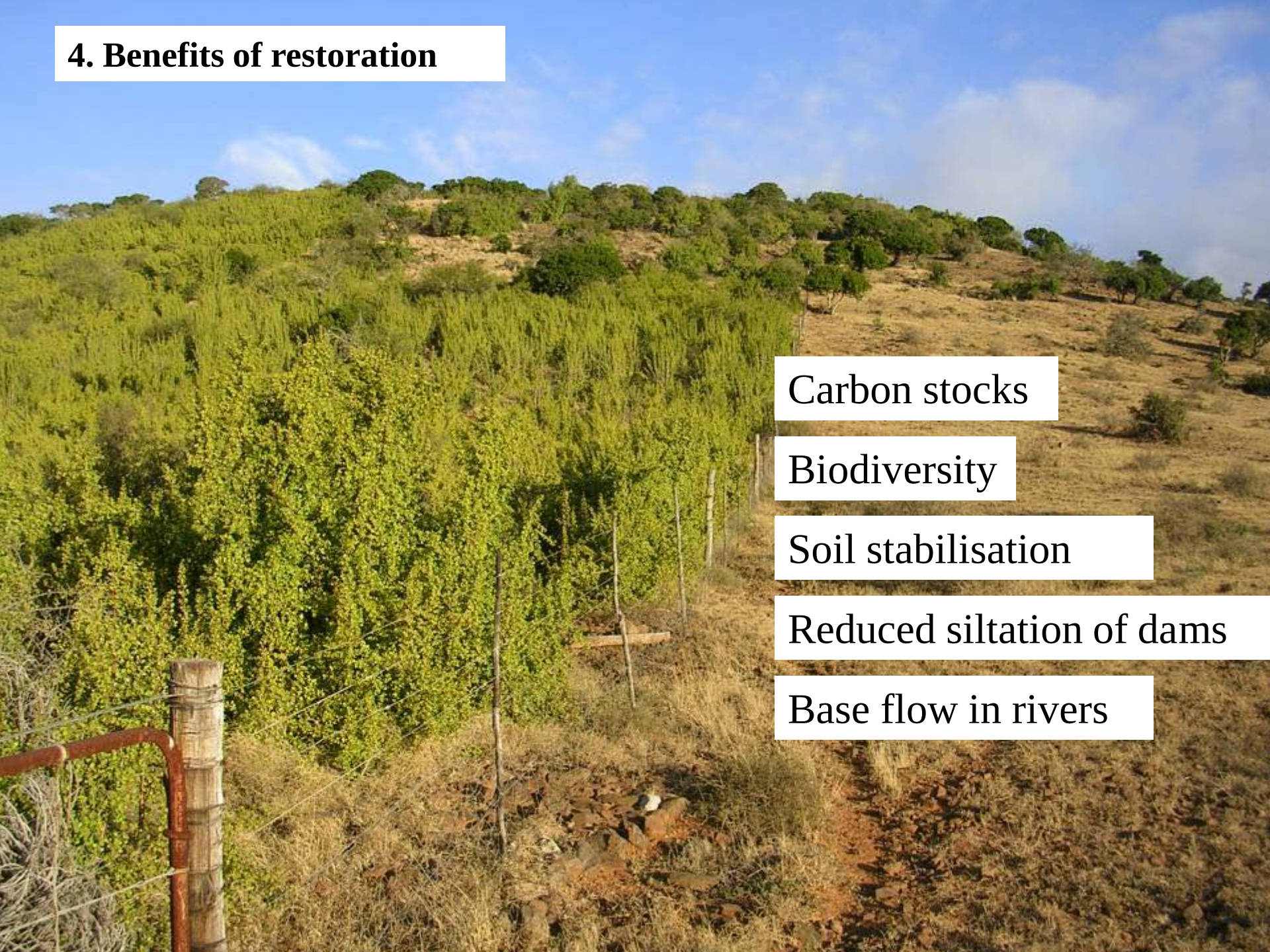


Implementation of large-scale restoration

3) **Economies of scale are required** (large project, 10 000 ha +)

- transaction costs per carbon credit reduced
  - carbon accounting
  - carbon credit sales
- title deeds can be altered to secure carbon stock

4. Benefits of restoration



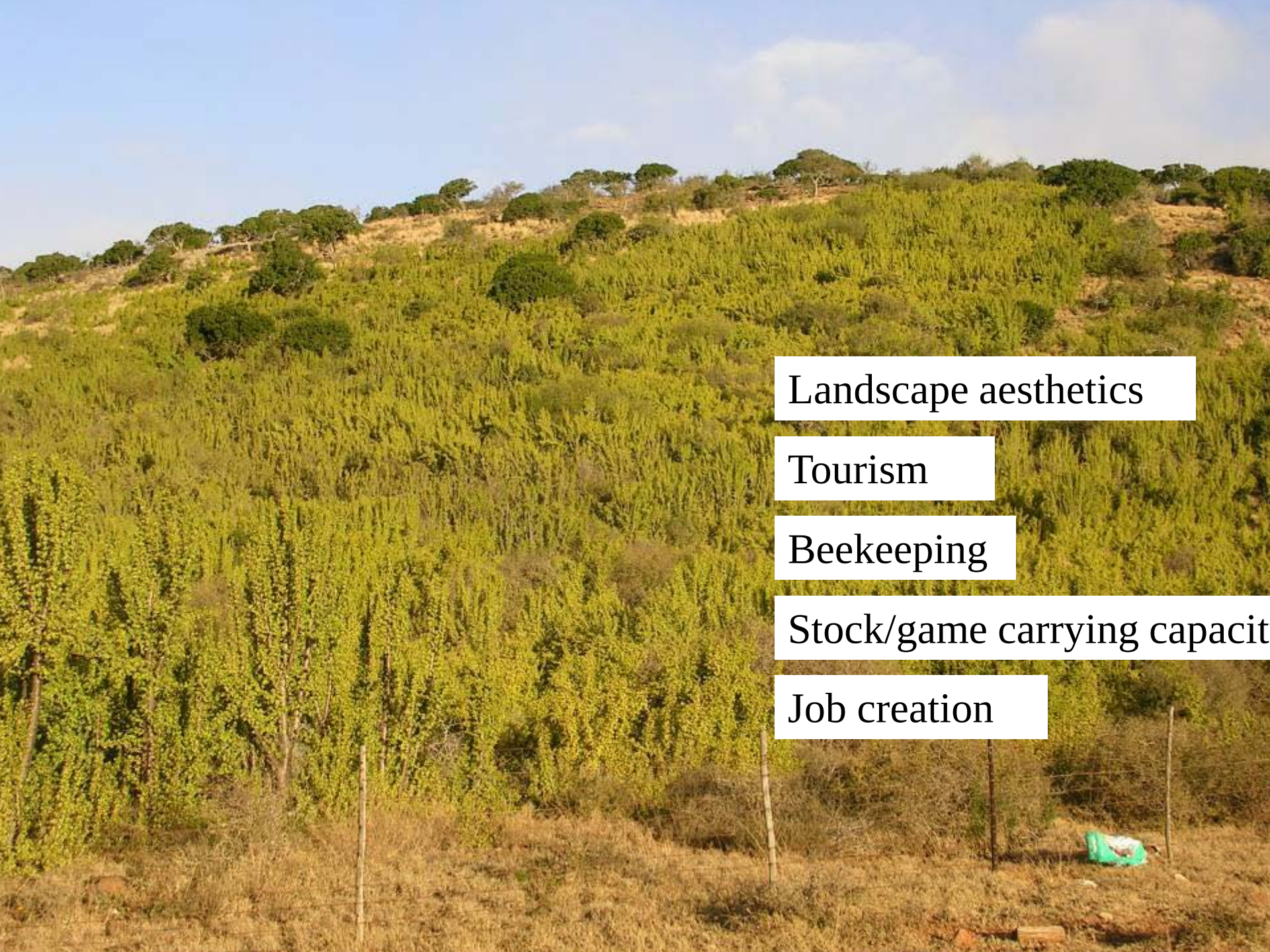
Carbon stocks

Biodiversity

Soil stabilisation

Reduced siltation of dams

Base flow in rivers


Landscape aesthetics
Tourism
Beekeeping
Stock/game carrying capacit
Job creation

5. Financial overview

- Planting costs
- Carbon credits over 40 years
- Cost per carbon credit
- Price of carbon credits on voluntary market
- Internal rates of return
- Income from goat farming
- Potential income from carbon credits in full production (after 10 years)

5. Financial overview

Planting costs:

<R1000 – R3000 per hectare

Carbon credits over 40 years:

400 – 500 per hectare

Cost per carbon credit:

R2 – R7.5

Price of carbon credits on voluntary market:

R100 – R200

Internal rates of return:

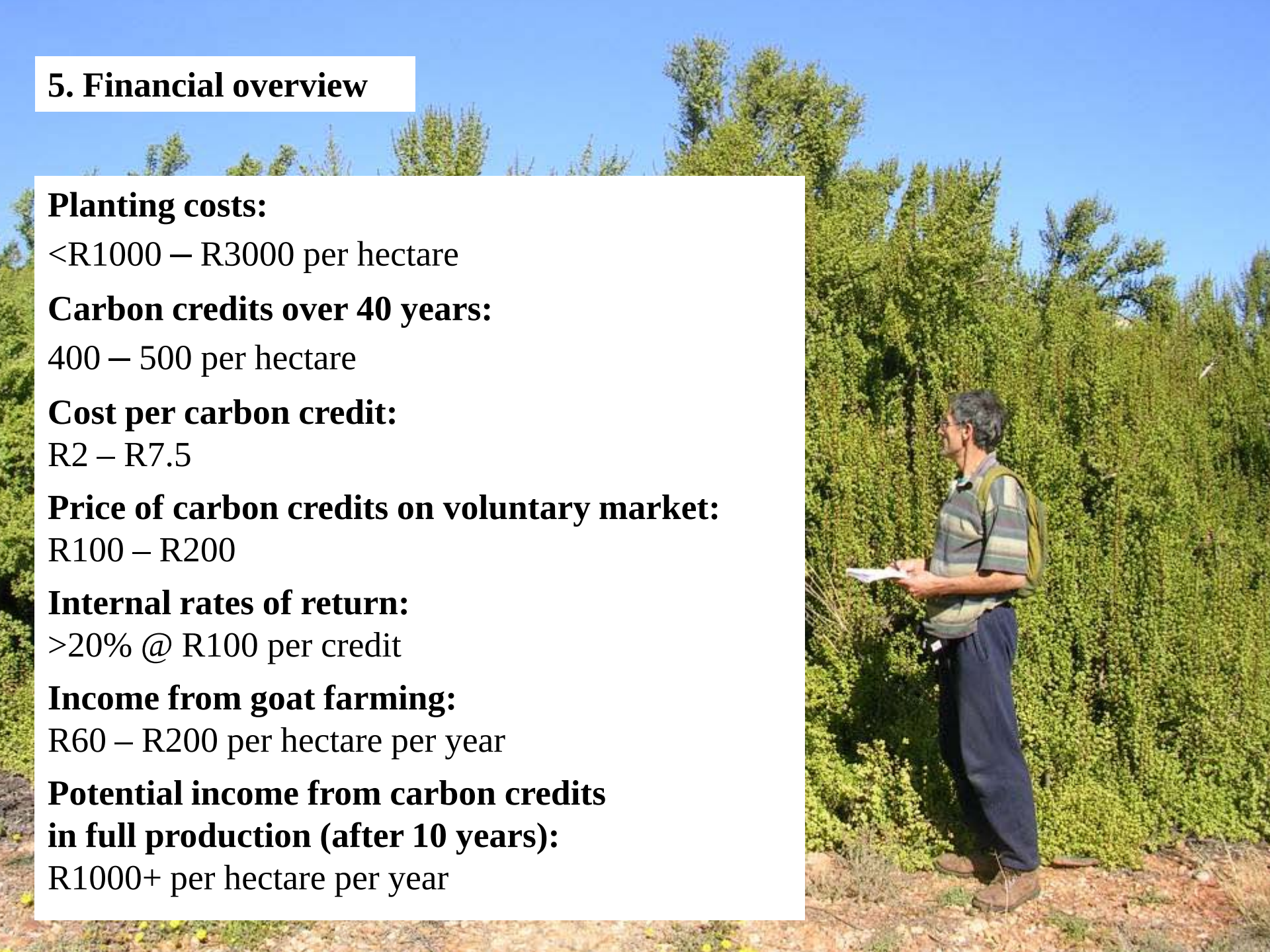
>20% @ R100 per credit

Income from goat farming:

R60 – R200 per hectare per year

Potential income from carbon credits in full production (after 10 years):

R1000+ per hectare per year



6. Next steps

Upscale the government project by engaging with the private sector.

>300 farmers in appropriate landscapes have indicated their willingness to participate in a large-scale restoration initiative.

Case Study 3:
Study to investigate the potential for payments for water and carbon related ecosystem services in the Baviaanskloof

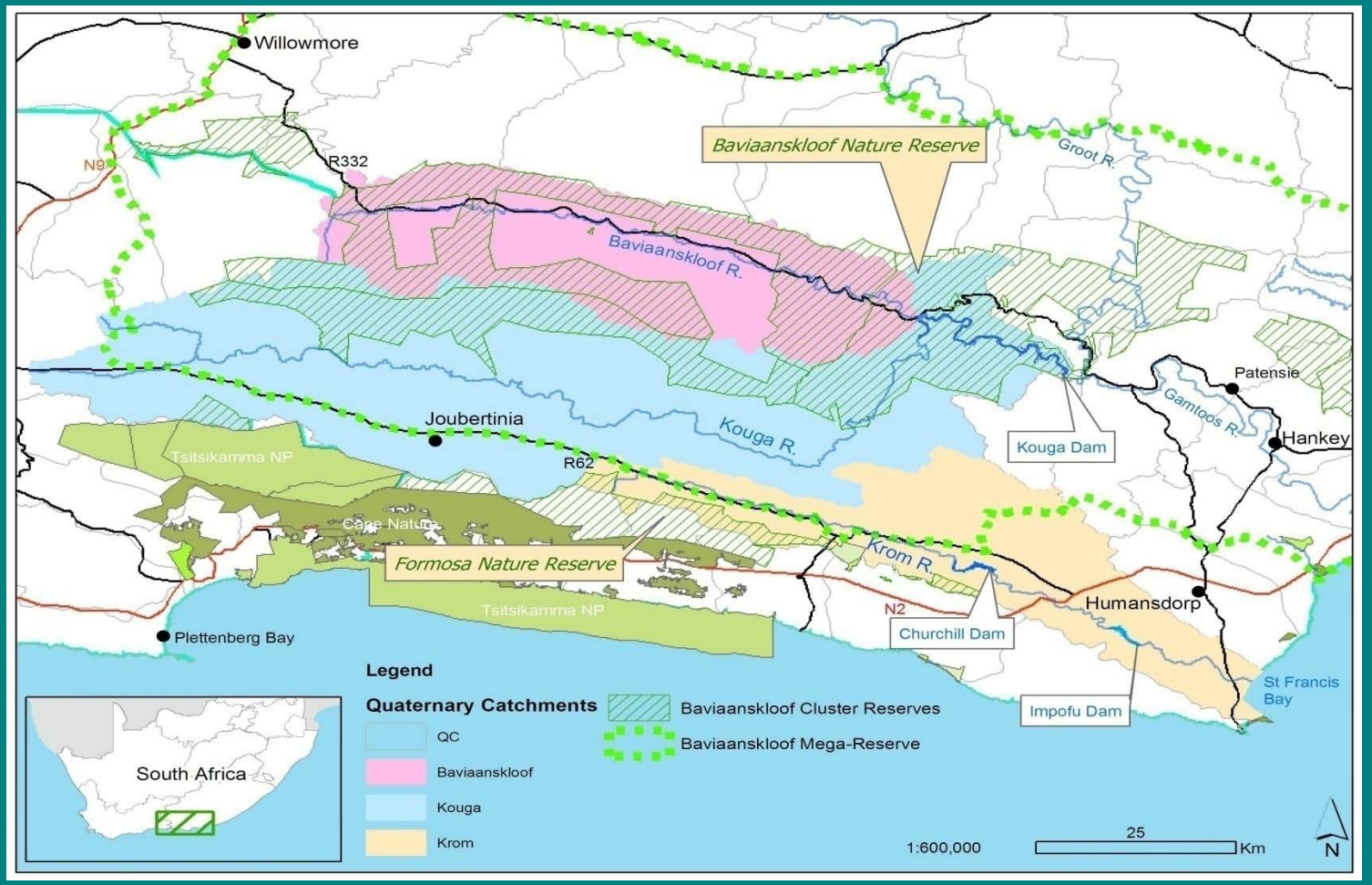
Study Motivation

- PES is a relatively new concept that shows promise as a funding source particularly for areas such as the Baviaanskloof where conventional income sources (for e.g., entrance fees and other concessions) are less likely to meet sustainable funding needs.
- However, it requires further exploration through the rigorous study of potential pilot sites to assess its true potential.
- C.A.P.E. and its partners have thus initiate a PES study in order to pilot the PES concept in the region.

Objectives

- To conduct a PES pilot in the Baviaanskloof Mega-reserve area that would include the development a hydrological model that can be used to investigate the potential for payments for water related services stemming from alien clearing, habitat restoration and other land use changes.
- To extend this analysis to incorporate existing information regarding the carbon sequestration potential of thicket restoration into a comprehensive analysis of PES opportunities.
- Recommend management actions needed to implement a PES system.

The outcomes of the study will be used to interact with potential 'buyers' and 'sellers' of environmental services, policy makers and other stakeholders/partners.


Willowmore
N9
R332
Baviaanskloof Nature Reserve
Groot R.
Baviaanskloof R.
Patensie
Gamtoos R.
Hankey
Joubertinia
Kouga R.
Kouga Dam
Tsitsikamma NP
R62
Cape Nature
Formosa Nature Reserve
Krom R.
Tsitsikamma NP
N2
Humansdorp
Churchill Dam
Plettenberg Bay
St Francis Bay
Impofu Dam
Legend
Quaternary Catchments
QC
Baviaanskloof
Kouga
Krom
Baviaanskloof Cluster Reserves
Baviaanskloof Mega-Reserve
South Africa
1:600,000
25
Km
N

Approach

- Construct a GIS-based hydrological model that can be used to clearly illustrate and quantify the links between vegetation cover / land use changes and hydrological outcomes in the Baviaans, Kouga and Kromme catchments. These will include outcomes/services in terms of:
  - *Increased yield,*
  - *Reduced sedimentation and siltation,*
  - *Improved base flows.*
- Integrate implementation cost information into the model.
- Calculate the potential value of the various water services to potential buyers.
- Compare implementation costs to the likely willingness to pay of buyers.
- Integration or bundling of water related and carbon based services.

Case Study 4:
WWF Water Neutral

With thanks to Dr Deon Nel of WWF SA

Objective

Essentially an Offsets scheme devised to harness private sector commitment for the security and wise-management of South Africa's scarce water resources, by reducing water demand and investing in the security of our water supplies.

Uses 3-step process to achieve neutrality:

1. **Review**
2. **Reduce**
3. **Replenish**

Review

Review water footprint using standardised methodology

- **Two components:**
  1. Direct water consumption
  2. Total water footprint (including value chain)

Reduce

Work with WWF to implement a realistic and time bound water reduction strategy

- Practical, 10 to 15 year strategy
- Targets and milestones

Replenish

- **Invest in water security projects that can offset the 'water deficit'**
- **Using differences in evapo-transpiration rates we can calculate a Rands/Kilolitre value for releasing 'new' water**
- **Can also calculate social benefits**
- **Using the 'water calculator' developed by WWF and Working for Water**

Structure of scheme

- **Underpinned by a 'Water Neutral Fund' managed by WWF**
- **Fund will disperse resources for clearing and rehabilitation work**
  - Initially work will be done through government agencies
  - Later will allow private landowners to access funding – subject to management agreements
- **Funding structure has operational as well as management and communications components**

Corporate Benefits

- Innovation and leadership
- Private, public, civil society partnership
  - WWF, Water Affairs, private sector
- Meeting social and environmental imperatives
- International credibility
- Communications, branding and public relations
- Integration with sustainability reporting

Lessons from the South Africa experience thus far

- Working for Water has paved the way focused on clearing alien invasive plants and has shown benefits
- Now we also have Working on Fire and Working for Wetlands forming part of the public works programme
- Strong scientific and ecological research capacity exists which has layed the foundations
- Cross-disciplinary work between ecologist, economists, sociologist, etc. is encouraged and has resulted in holistic approaches

Lessons from the South Africa experience thus far (2)

- The link with livelihoods from the start has increased political acceptability
- The environment sector has not worked in isolation and allies in key economic ministries have emerged and been cultivated.
- National Treasury published an Environmental Fiscal Reform document that has acted as a catalyst for market mechanisms in general
- Aside from these environmental initiatives, Treasury is generally receptive to user pays initiatives (as opposed to 'blunt' taxes such as income tax)
- Corporate Social (and Environmental) Responsibility is emphasised and presents opportunities for funds

Challenges and next steps in SA

- Challenge is to convert the Working for Water type initiatives into functioning PES projects with private transactors and sustainable funding flows
- A process is under way to motivate for an amendment to national water pricing policy that allows for the levying of water charges for land use management initiatives – this will help formalisation and ensure sustainable funding based on user pays principle
- Successful pilots are key to show that PES can work and in what circumstances it can work – not a panacea

Challenges and next steps in SA (2)

- PES requires a great deal of deliberate effort (return on investment not clearly high given the required effort and high risk / uncertainty)
- Essential to lubricate the institutional inertia and some form of broker / transaction advisor and / or facilitator / champion is needed
- Bundling of services seems to be financially more viable, yet institutionally more complex

Thank you!

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