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Vegetation change (1961-2009) along an aridity gradient in the eastern Karoo and southern Free State grasslands

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Introduction

Predictions for 2050 for the Eastern Karoo suggest:

- A 'biome shift' in response to overgrazing (Acocks 1953)
- A contraction of biomes (especially grasslands) in response to climate change-induced 'aridification' (Midgley et al. 2008)

HOWEVER....

Historical analyses (e.g. Hoffman & Ashwell, 2001) point to an improvement in cover and composition of the eastern Karoo rangelands as a result of more sustainable land use practices

So....what is the current status of this debate?

Key questions

- Has annual rainfall changed over the 20th century?
- Has the cover of shrubs and grasses changed along the broad Karoo-Grassland ecotone over the last 55 years?
- Is there evidence for an expanding Karoo as a result of overgrazing or a contraction of grasslands as a result of 'aridification'?

Method

Eight sites (4 Karoo & 4 Grassland) along a 1,000km rainfall gradient from Graaf-Reinet to Wepener previously surveyed by Roux (1969) as well as Hoffman and Cowling (1990) was re-surveyed and re-photographed in 2009.

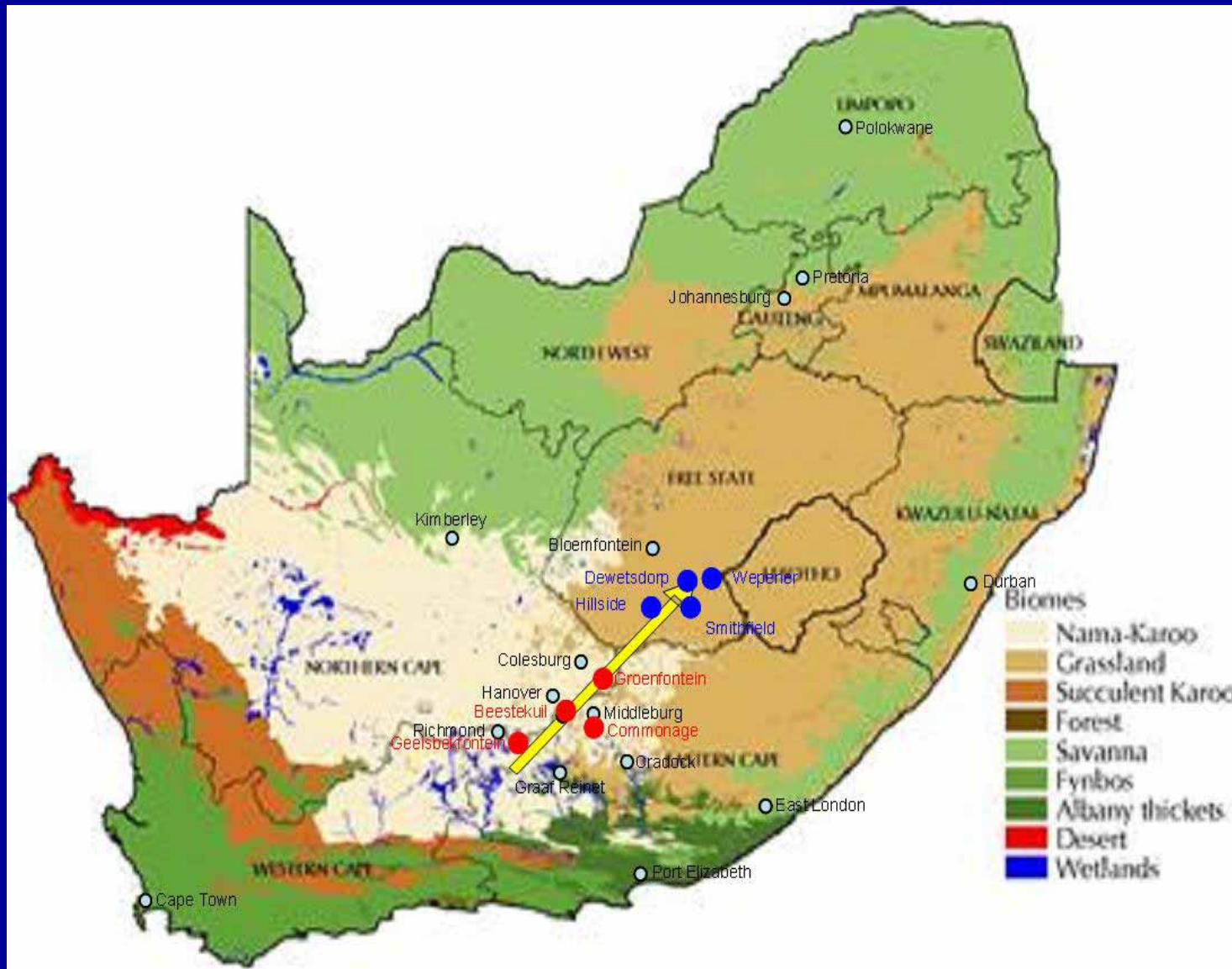


Figure 1: Map of the study sites with the arrow representing the 1,000 transect

Results

- No significant change in annual rainfall

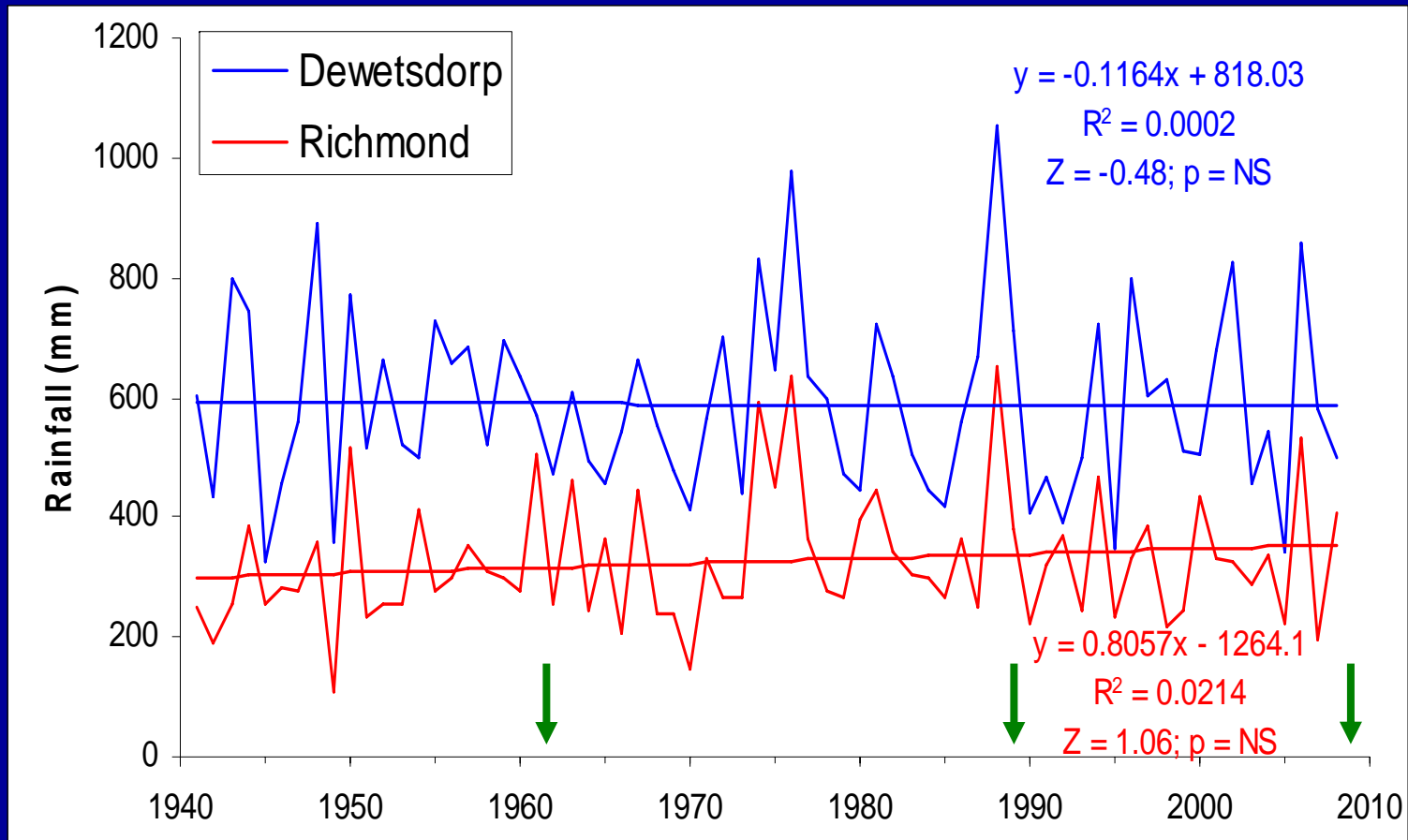
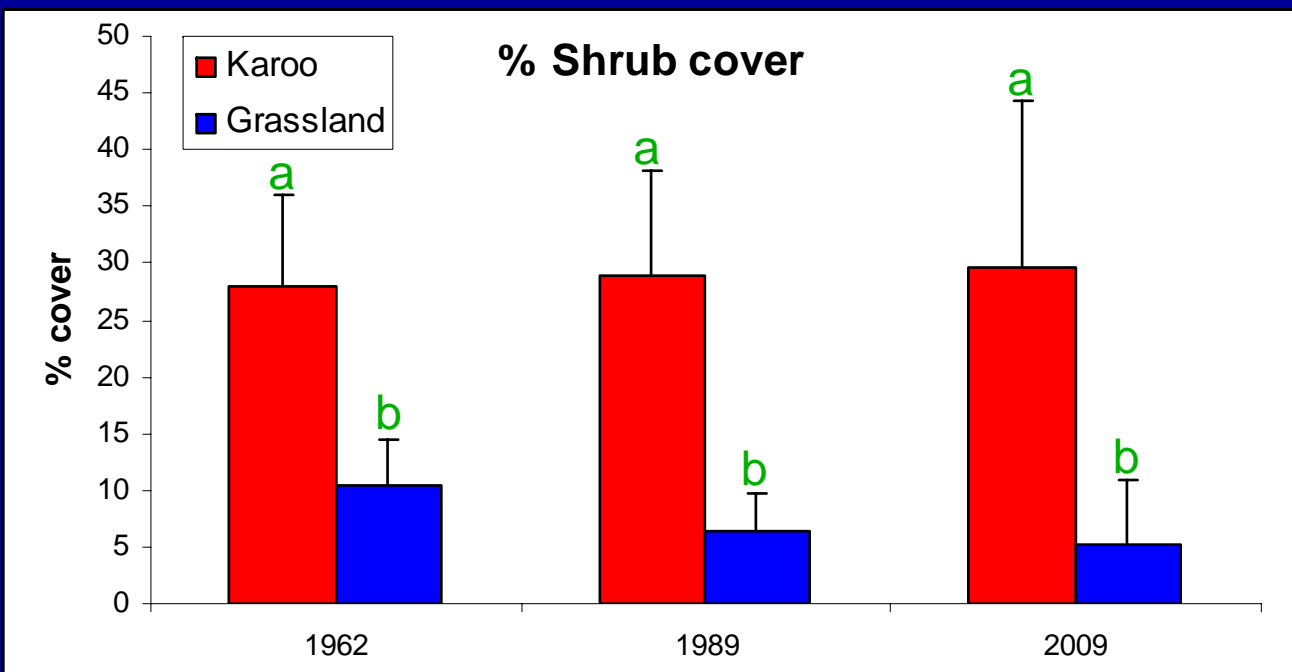
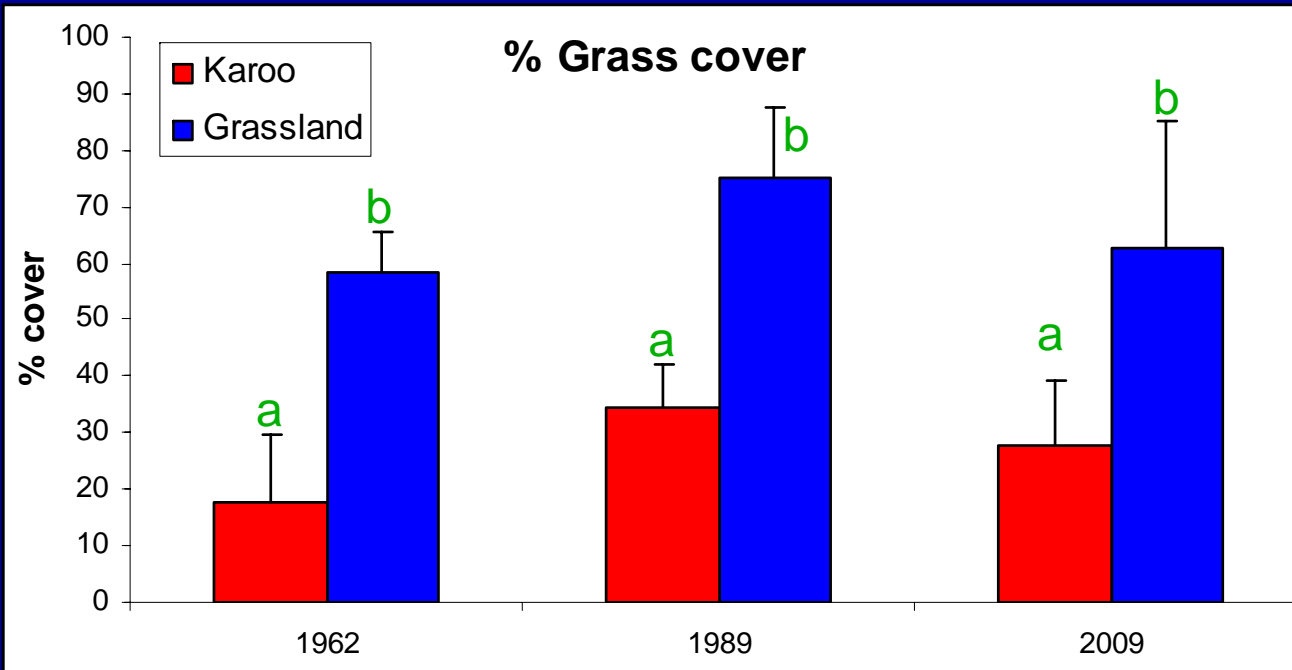


Figure 2: Annual rainfall (Oct-Sep) for arid Karoo (Richmond) and mesic Grassland (Dewetsdorp) sites along the ecotone. Green arrow shows the year of survey



GRASSES

No significant change

Variable in response to rainfall conditions

SHRUBS

Very stable within Karoo sites

Non-significant decline in Grassland sites



1962

KAROO SHRUBLAND EXAMPLE

Middelburg Town Commonage



1989



2009

1962



GRASSLAND EXAMPLE

Wepener Town Commonage

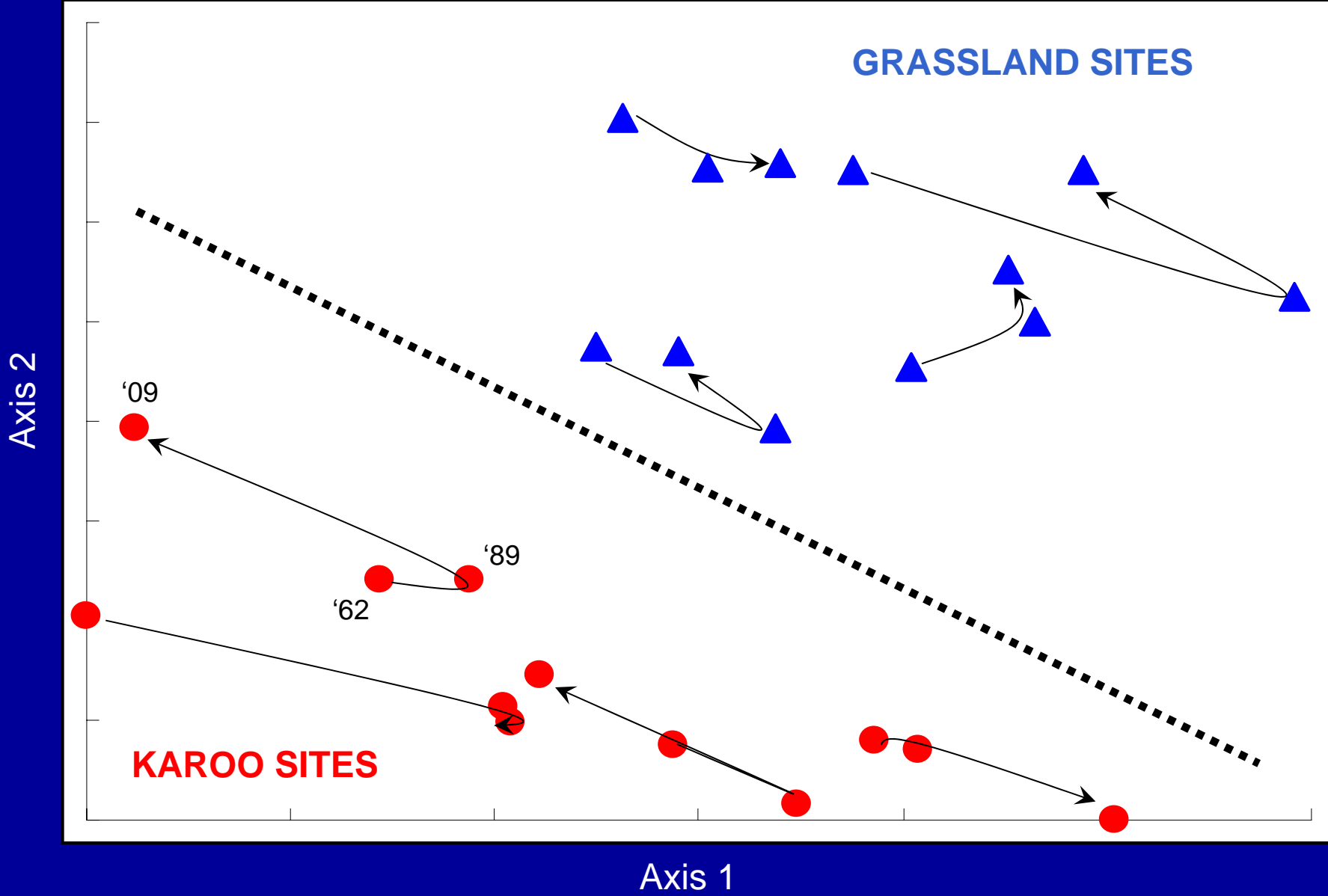
1989



2009



DECORANA Ordination 1962, 1989, 2009





Conclusion



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No significant change in annual rainfall

No significant change in shrub or grass cover although community composition is influenced by short-term changes in rainfall and grazing

No evidence for either an expansion of Karoo shrublands in response to overgrazing or a contraction of grasslands in response to aridification

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