UNIVERSITY OF CAPE TOWN

South African NATIONAL PARKS

Changes in plant available nitrogen with changes in available water in a mesic savanna

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Introduction

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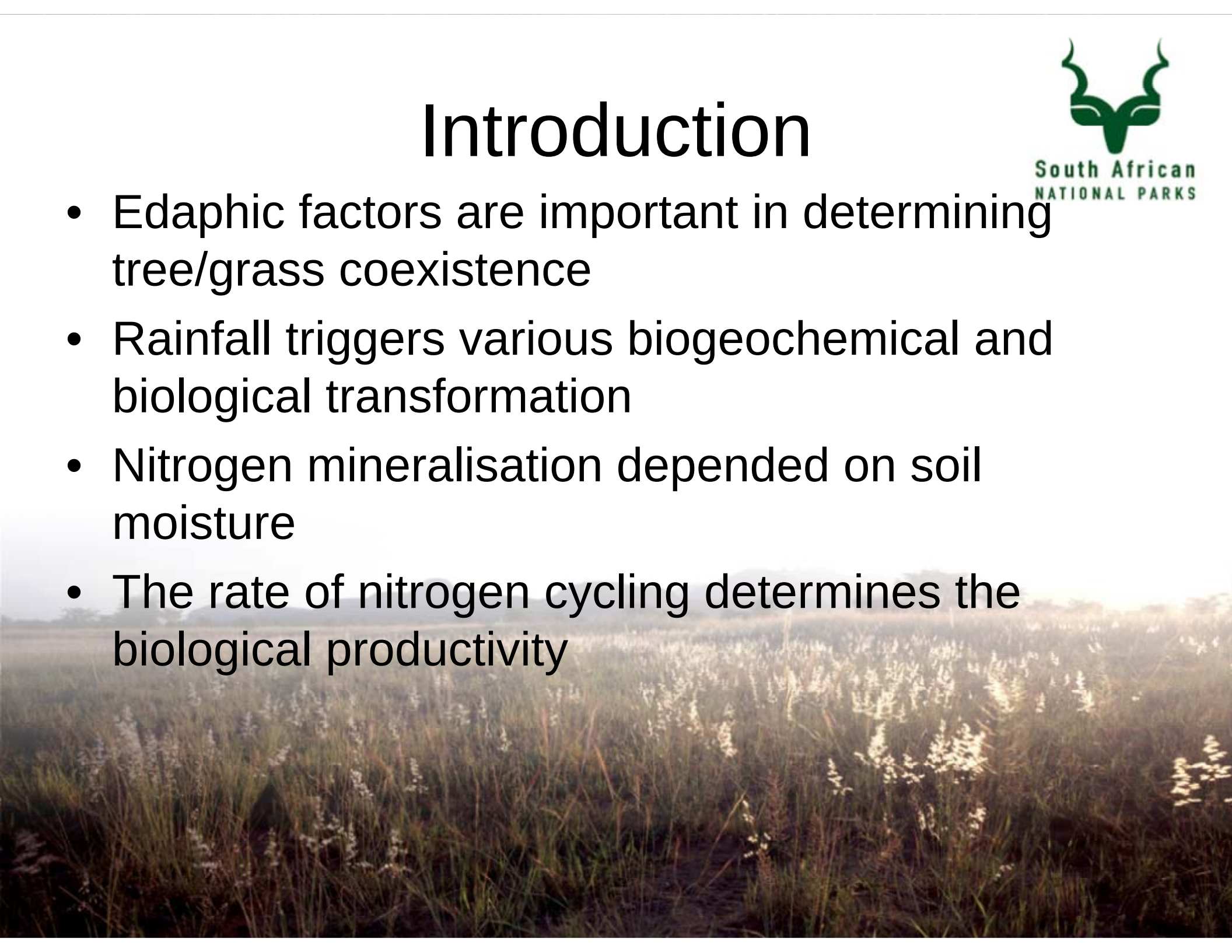
- Edaphic factors are important in determining tree/grass coexistence
- Rainfall triggers various biogeochemical and biological transformation
- Nitrogen mineralisation depended on soil moisture
- The rate of nitrogen cycling determines the biological productivity



Introduction

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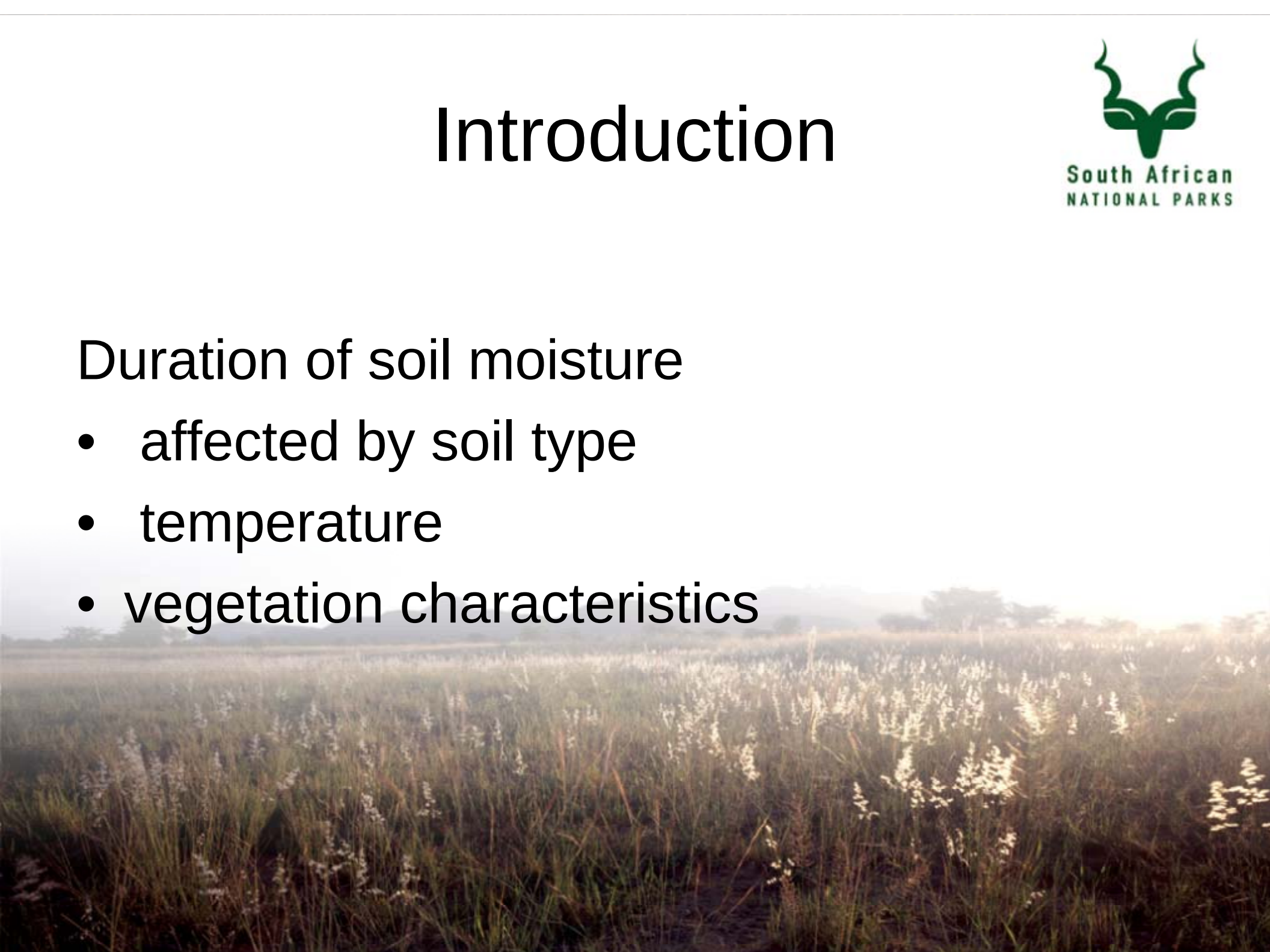
Duration of soil moisture

- affected by soil type
- temperature
- vegetation characteristics



Question

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- Is the coexistence of trees and grasses determined or modified by the combination of available nutrients and water?

Study area

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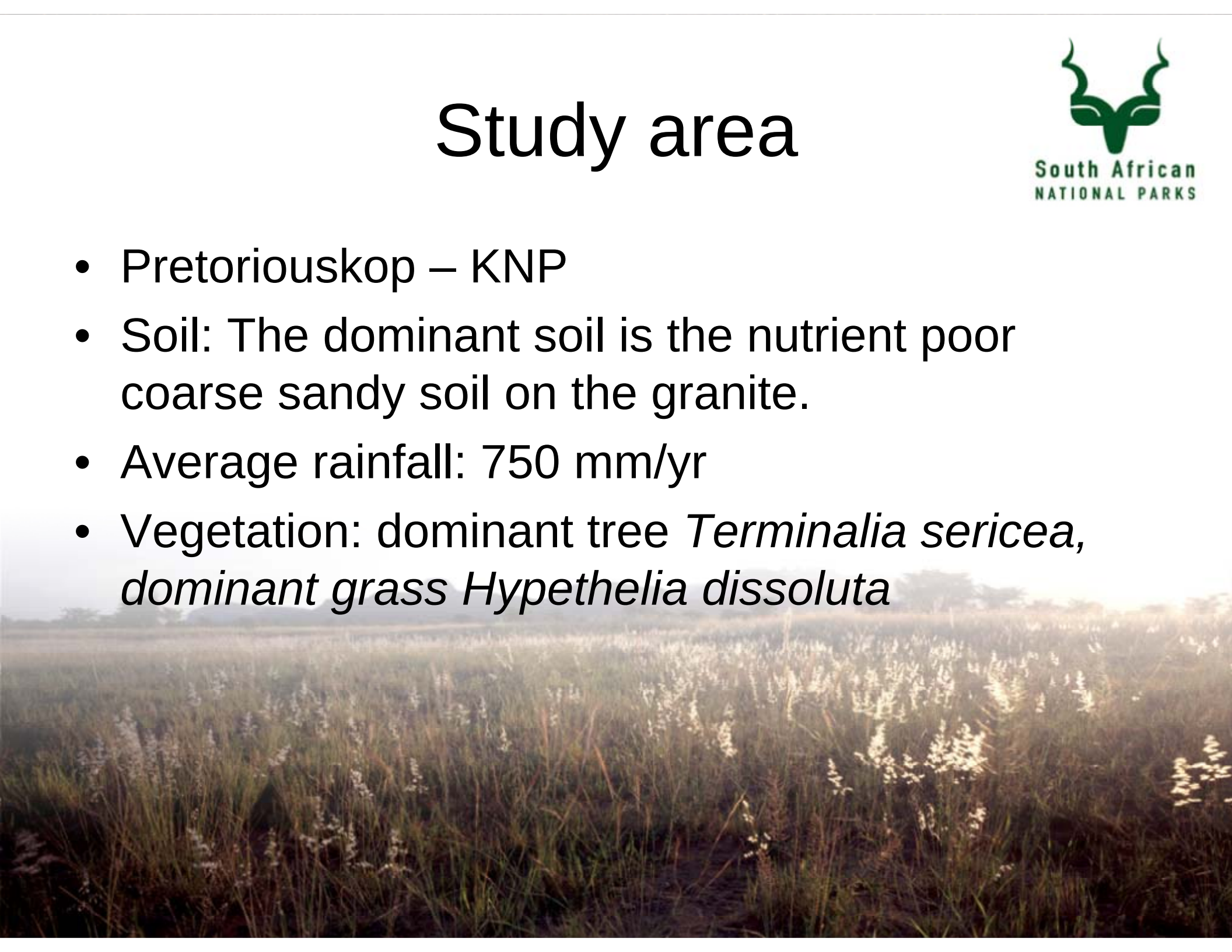
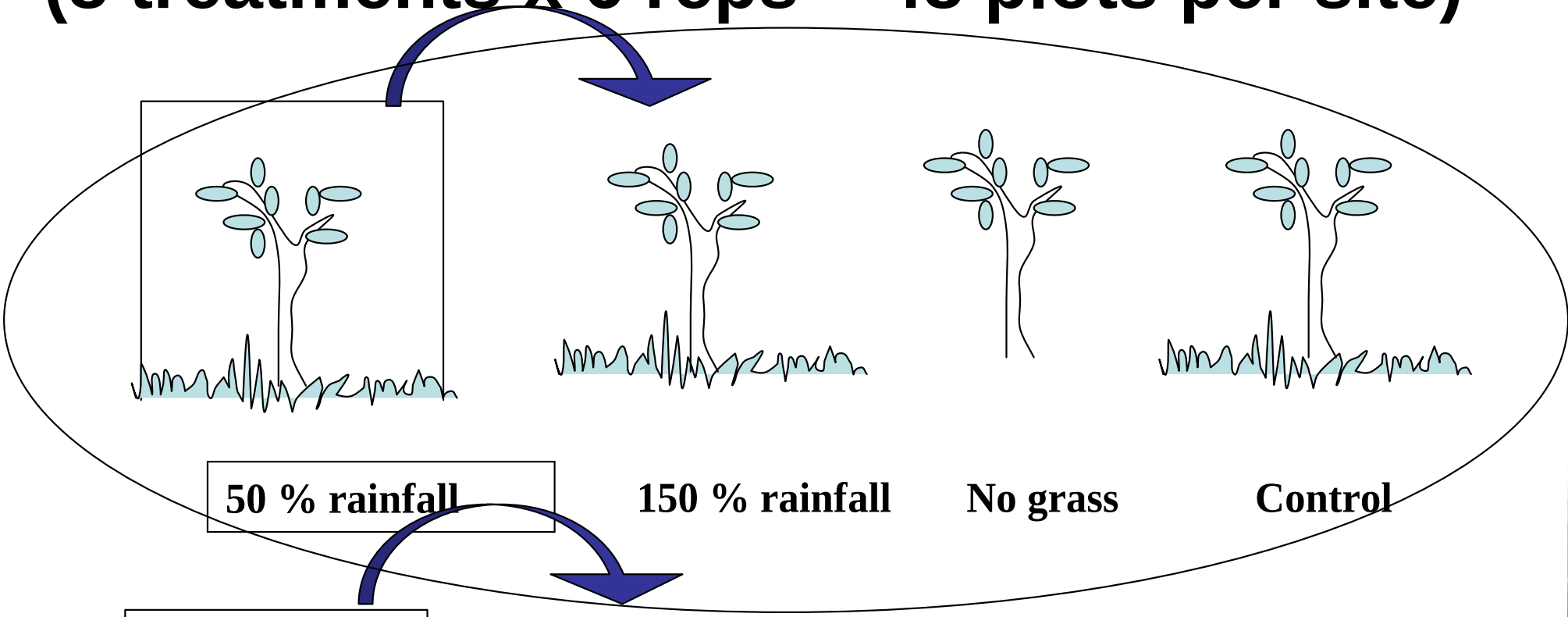
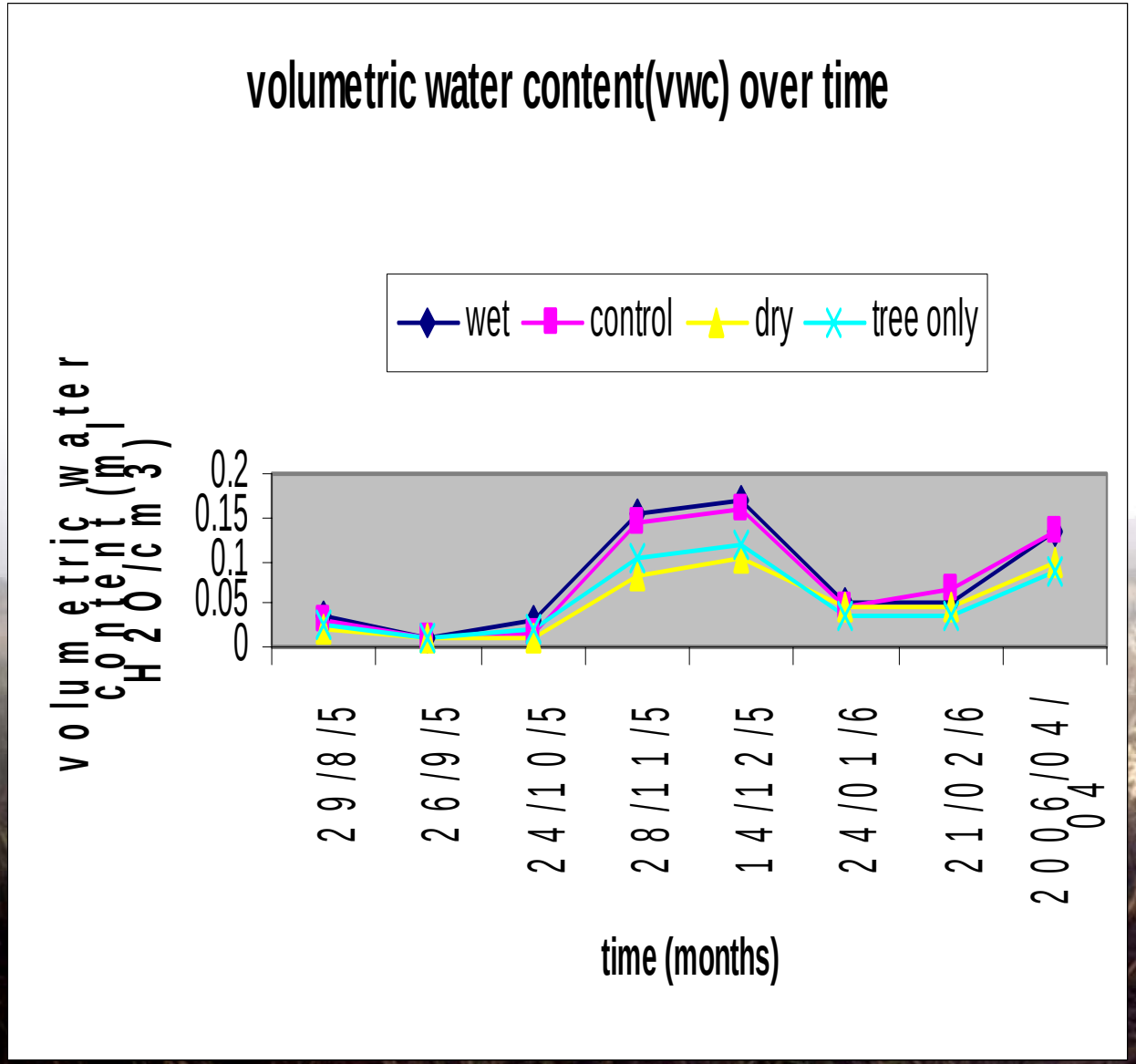
- Pretoriouskop – KNP
- Soil: The dominant soil is the nutrient poor coarse sandy soil on the granite.
- Average rainfall: 750 mm/yr
- Vegetation: dominant tree *Terminalia sericea, dominant grass Hypethelia dissoluta*



Experimental design
(8 treatments x 6 reps = 48 plots per site)

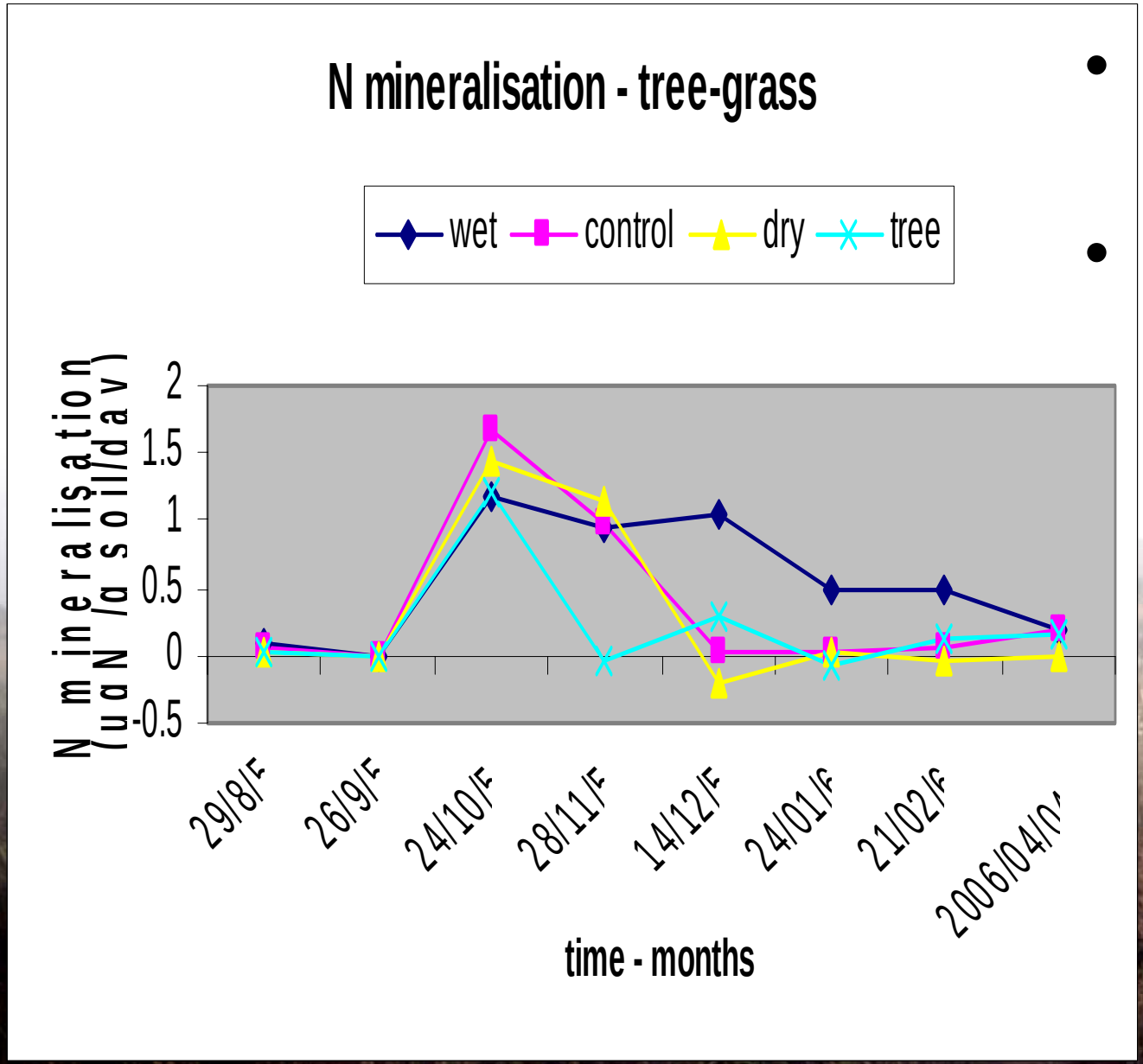


Results



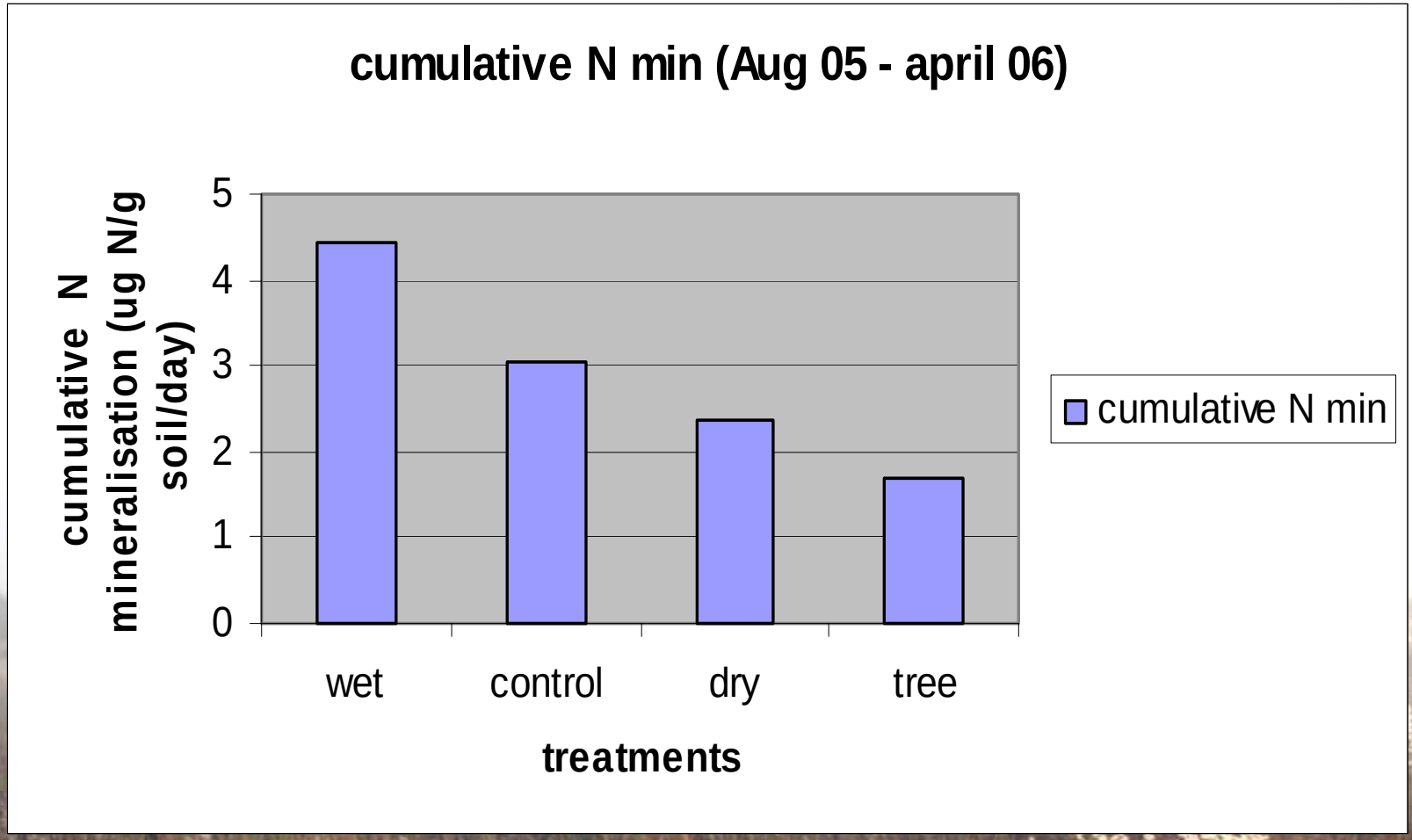
- Seasonal rainfall pattern
- Tree-only same water amount as control, difference in vwc
- Tree-only dryer than dry treatment towards end season
- Grasses – infiltration and retention

Results

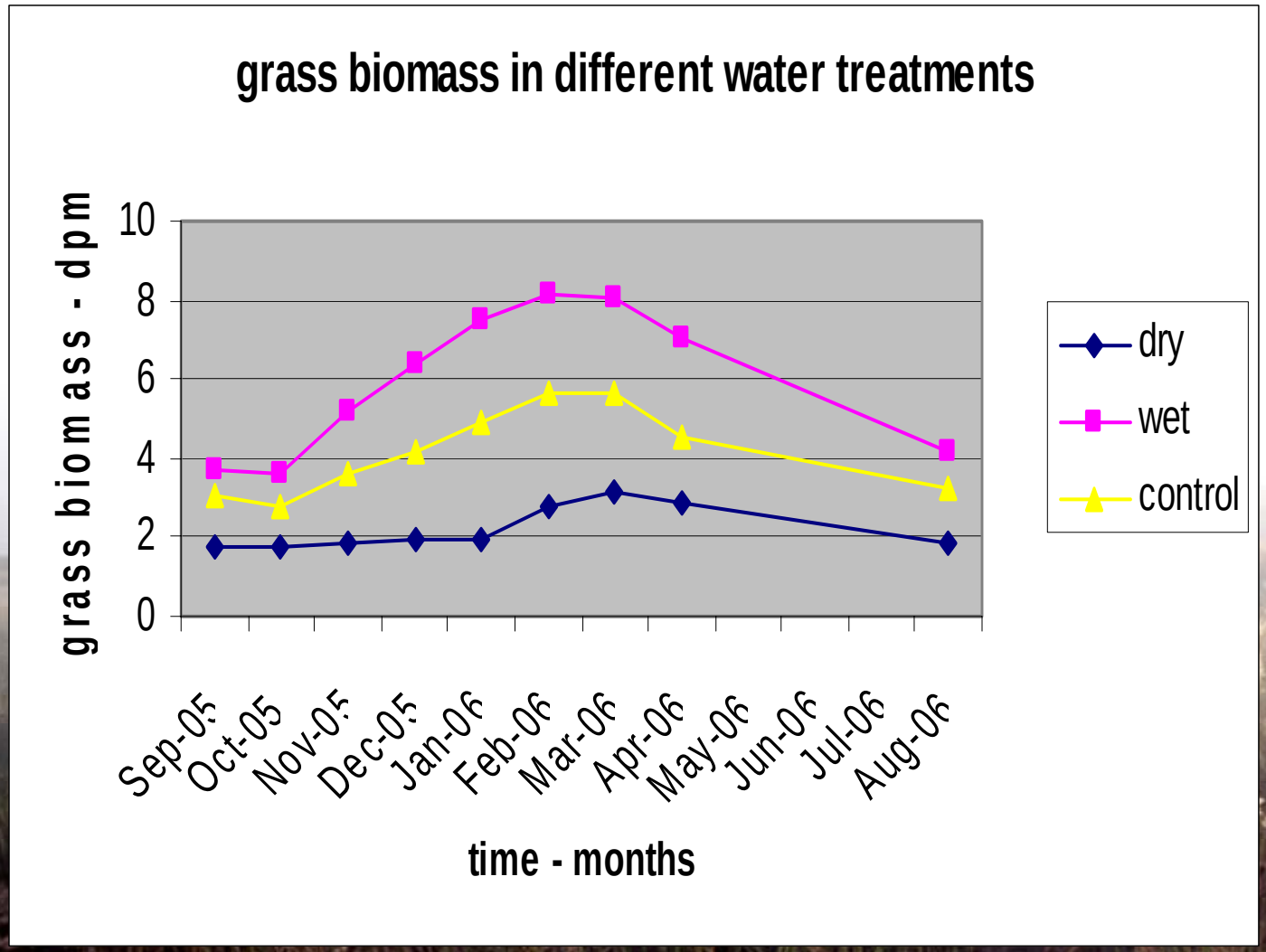


- N mineralisation triggered by rainfall
- All treatments shows increase of N min, drops gradually throughout the season

Cumulative N min

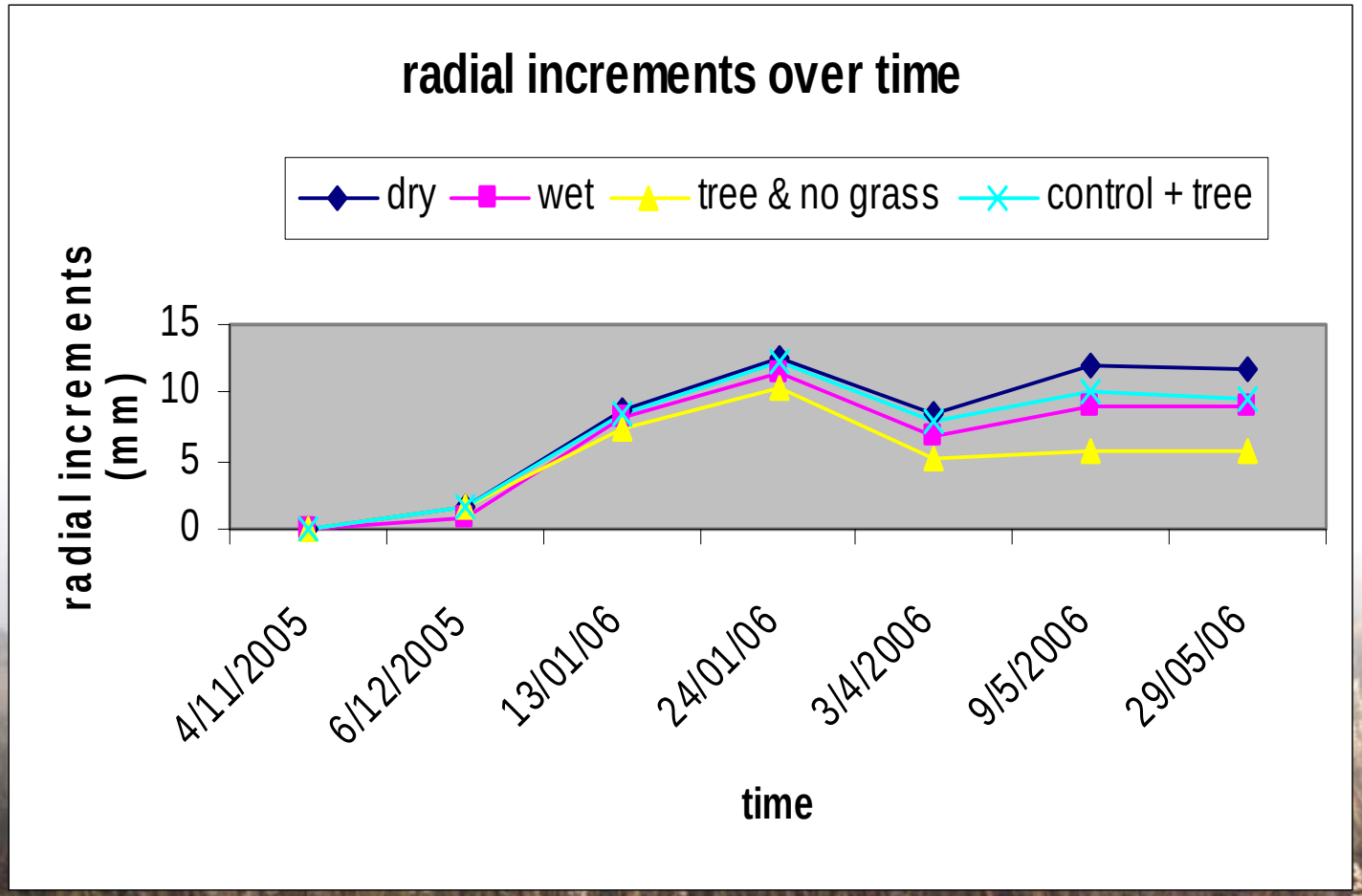


Results – grasses



- Grasses responds to water treatments
- More biomass in wet treatments
- Less biomass in dry treatment

Results – trees



- Dry treatments, less grass biomass, high tree growth
- Wet treatments, high grass biomass, low tree growth
- Tree no grass-
  - **Grass eliminated, yet less tree growth**

Discussions

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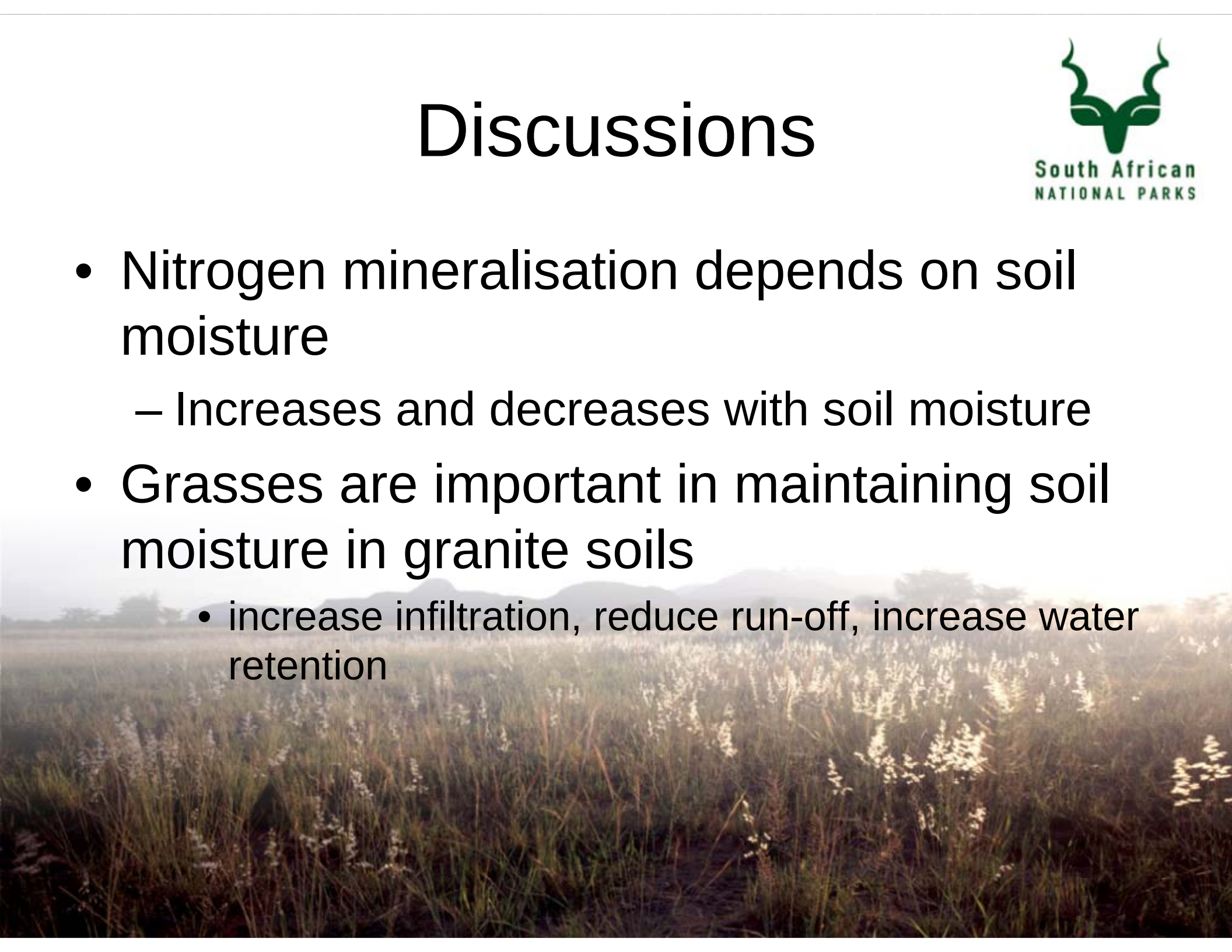
- Nitrogen mineralisation depends on soil moisture
  - Increases and decreases with soil moisture
- Grasses are important in maintaining soil moisture in granite soils
  - increase infiltration, reduce run-off, increase water retention



Conclusion

Grass relationship to trees

- Detrimental at high biomass:
  - competition for resources which slows the growth rate of trees
  - creating fuel load for fire, trees under a fire trap
- Beneficial at low biomass:
  - increase water retention especially in sandy soils, consequently increase nitrogen mineralisation rates

Thank you for listening

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<u>Acknowledgements</u>

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SANParks

UCT Tree-Grass Programme