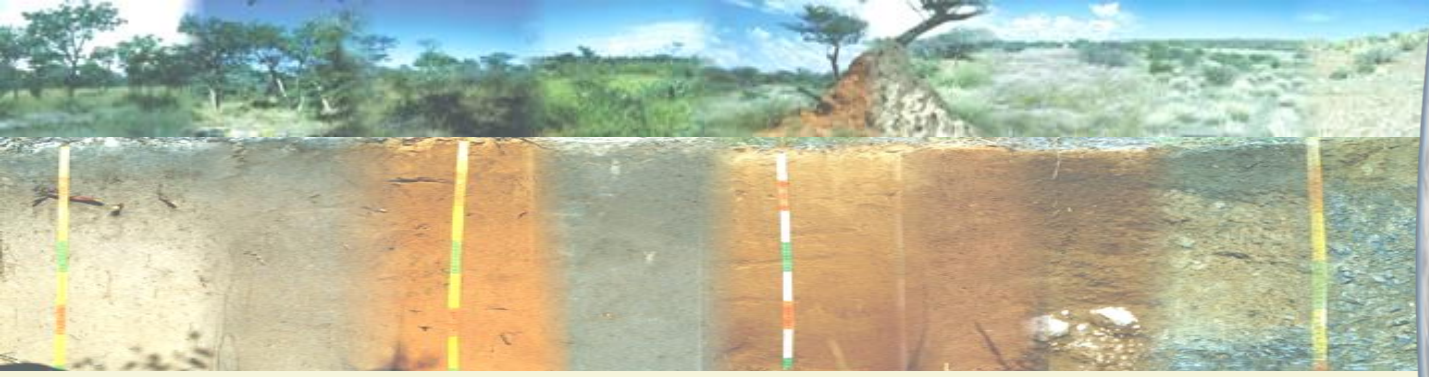

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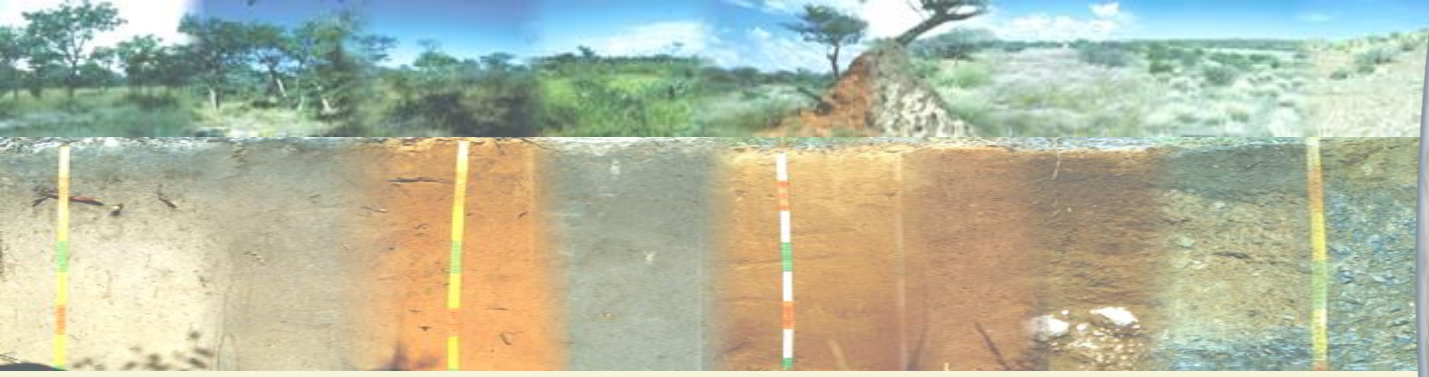
BIOTA SOUTH

Observation of abiotic site properties: Results for biodiversity and implications for monitoring

Petersen, Andreas (1)

Gröngröft, A. (1); Schmiedel U. (2), Jürgens, N. (2), Eschenbach, A. (1); Miehlich, G. (1)

(1) Institute of Soil Science, University of Hamburg
(2) Biocentre Klein Flottbek, University of Hamburg



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BIOTA SOUTH

Outline

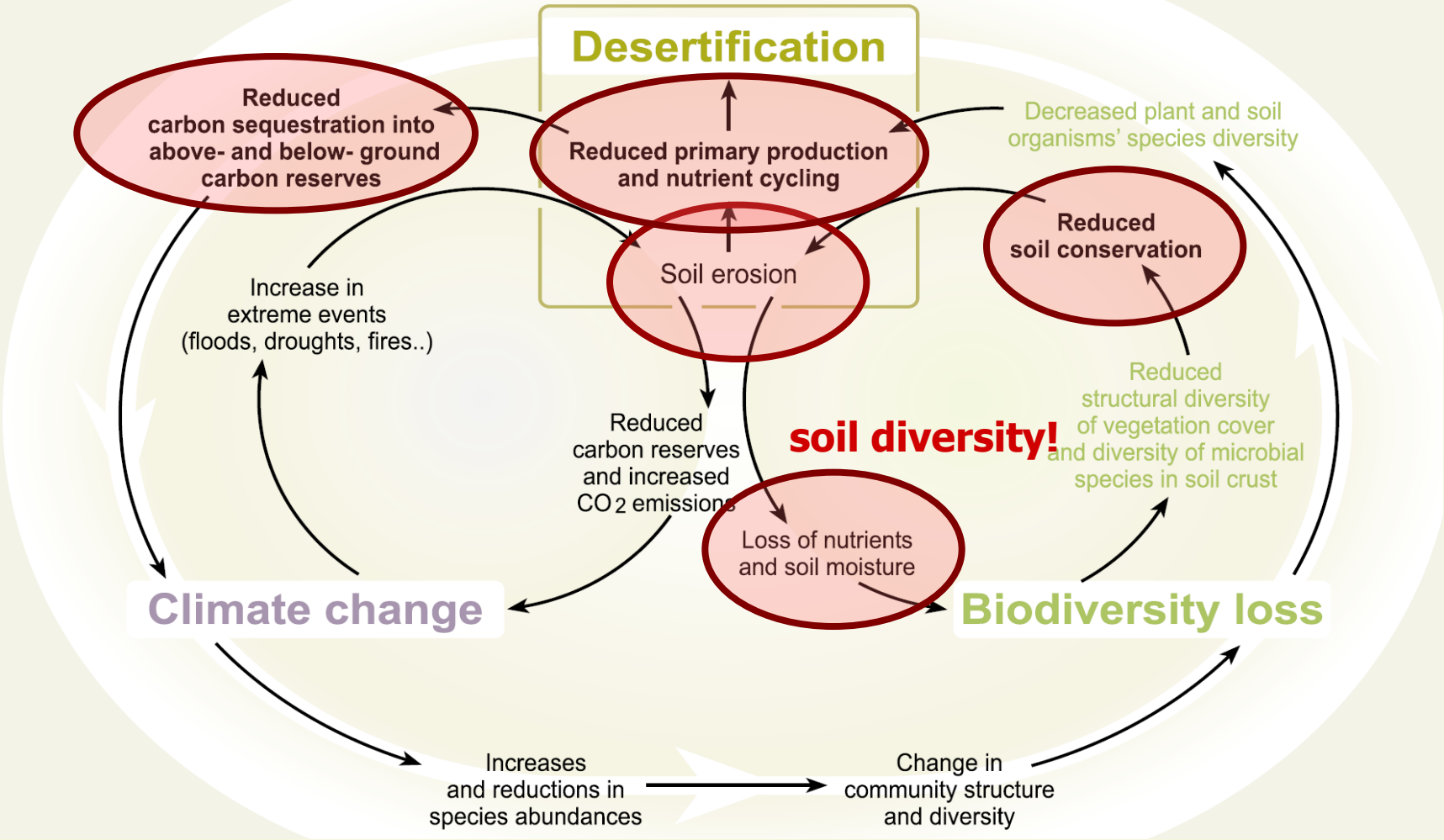
1. Soil as a part of ecosystem analyses and observation in BIOTA

2. Results of soil diversity in Biota South

3. Scales and future aspects of soil monitoring

1. Soil as a central part for ecosystem analyses and observation

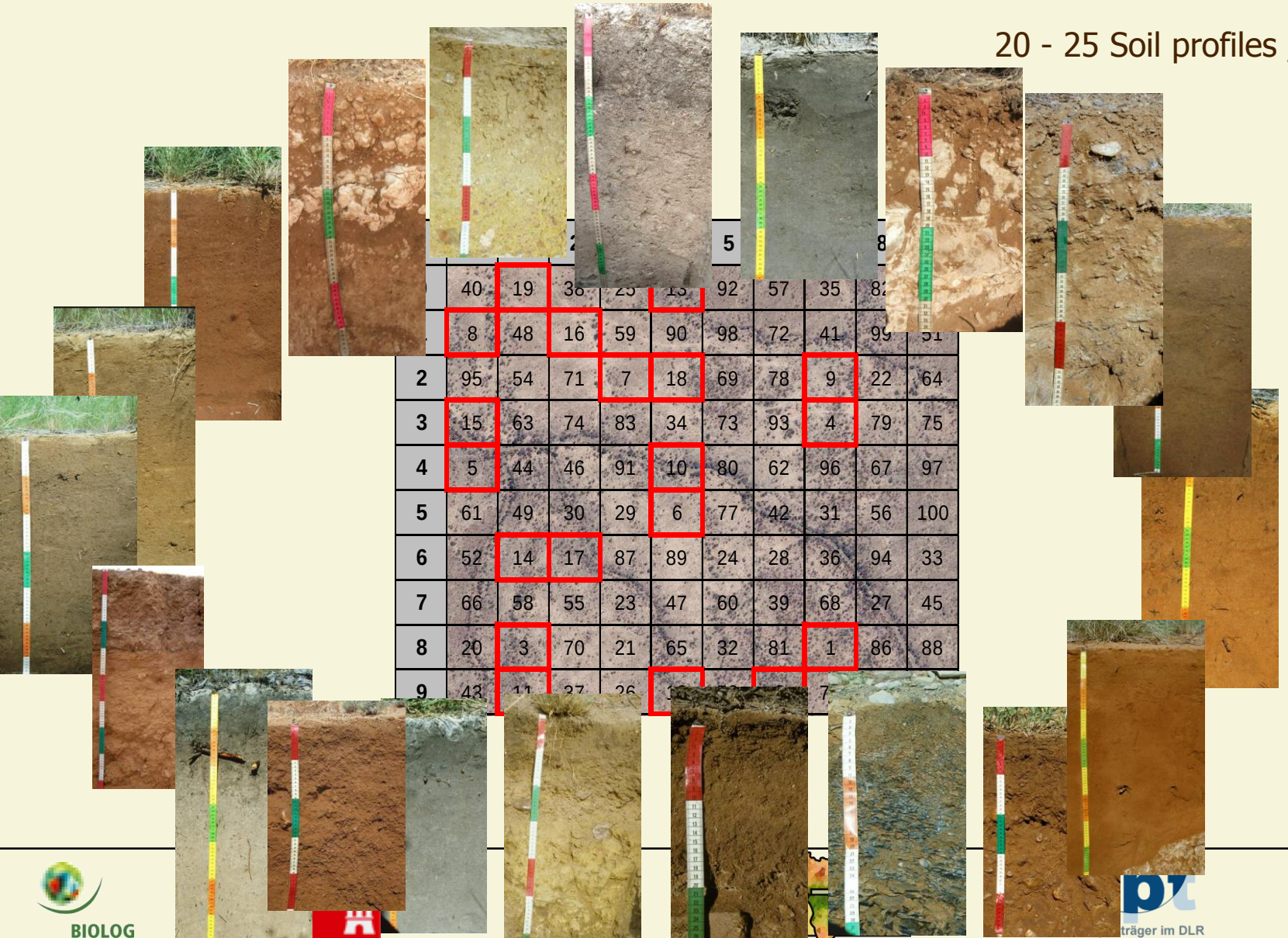
Role of soil in linkages in ecosystem components and services



Source: Millenium ecosystem Assessment

Methodology for soil diversity assessment

20 - 25 Soil profiles / obs.



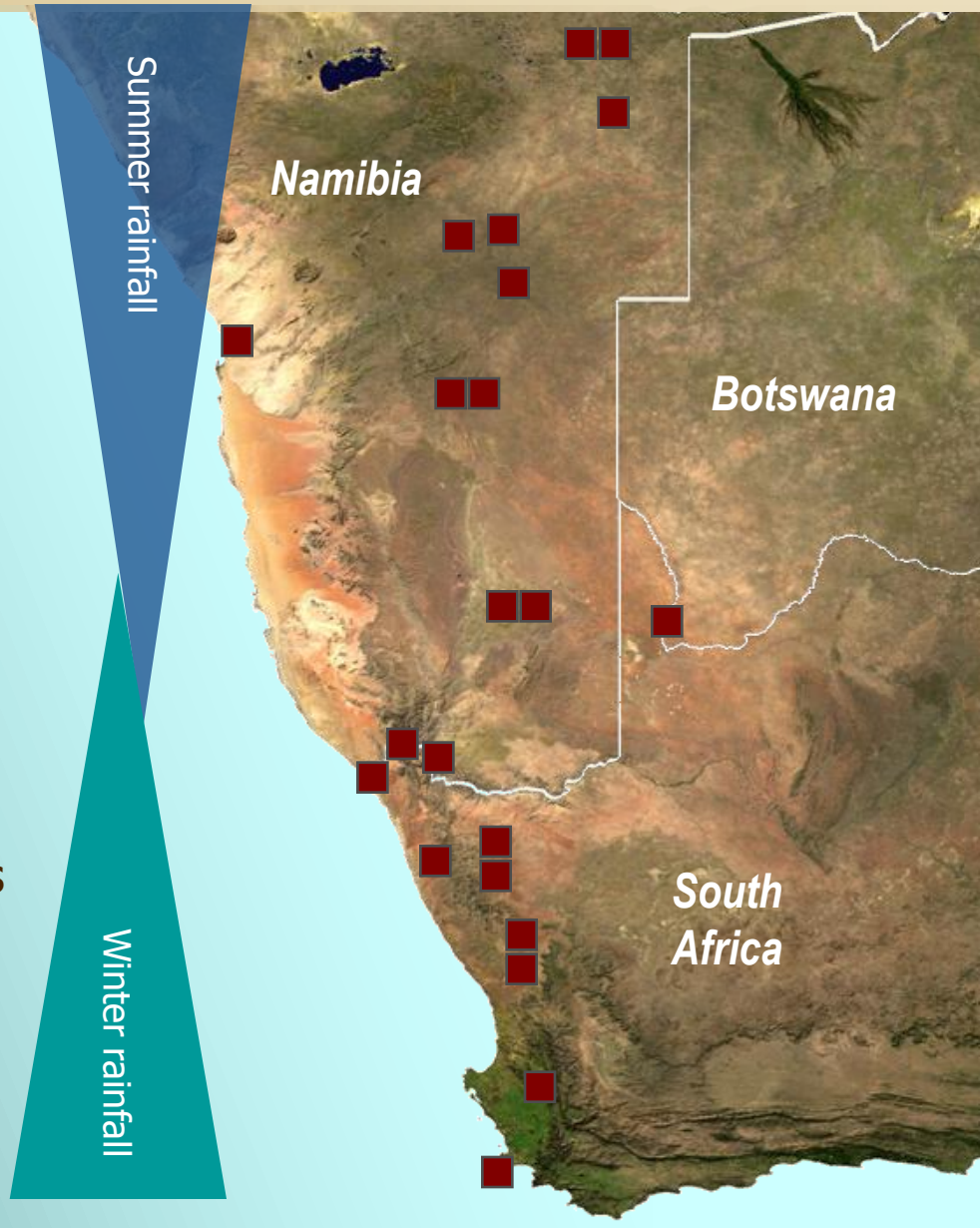
2. Results of soil diversity

Derived dataset in BIOTA South

- 22 observatories
  - > 1000 soil profiles
  - > 4000 analysed samples

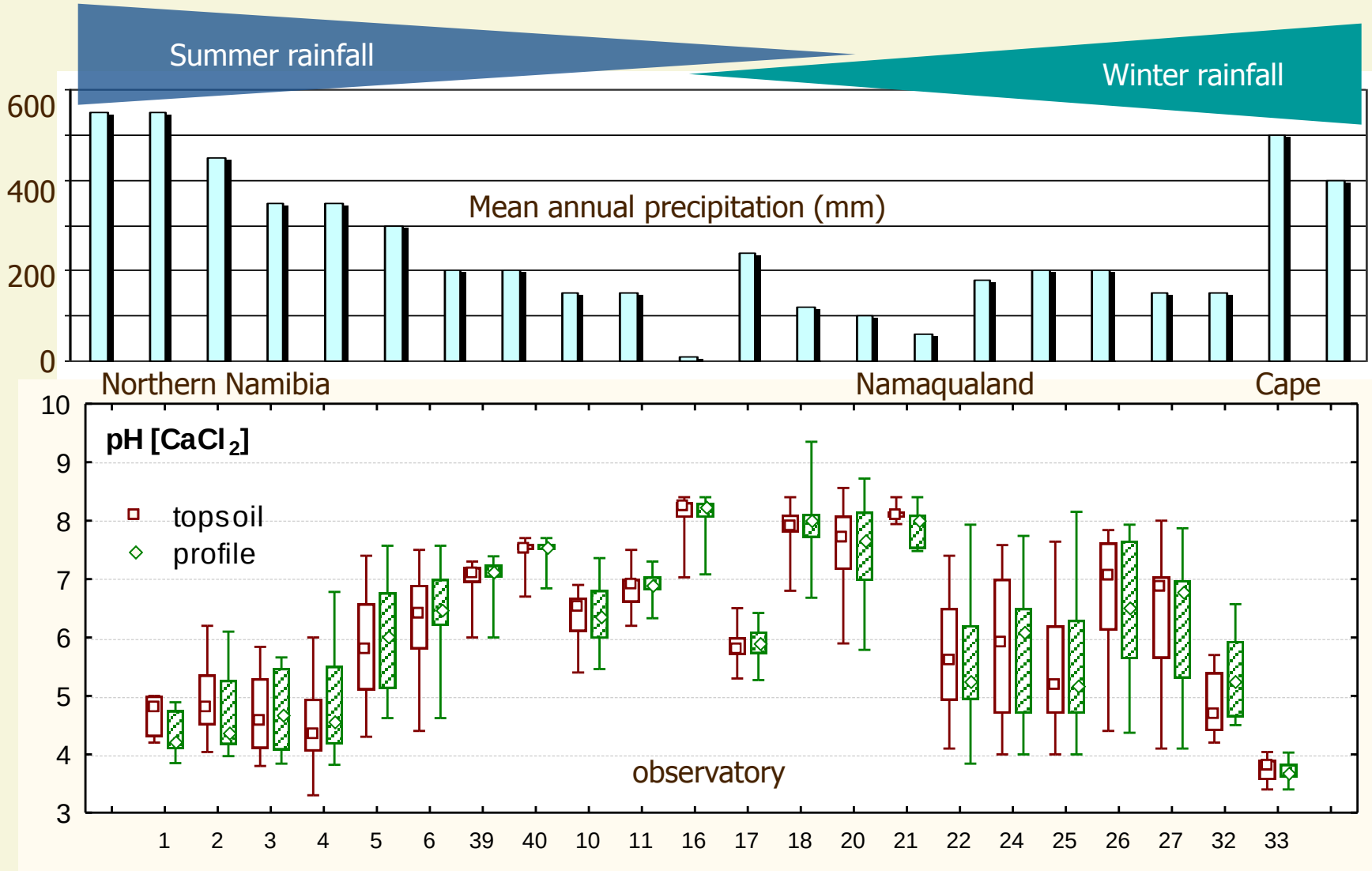
classification by

World Reference Base for Soil Resources
(FAO 1998, 2006)



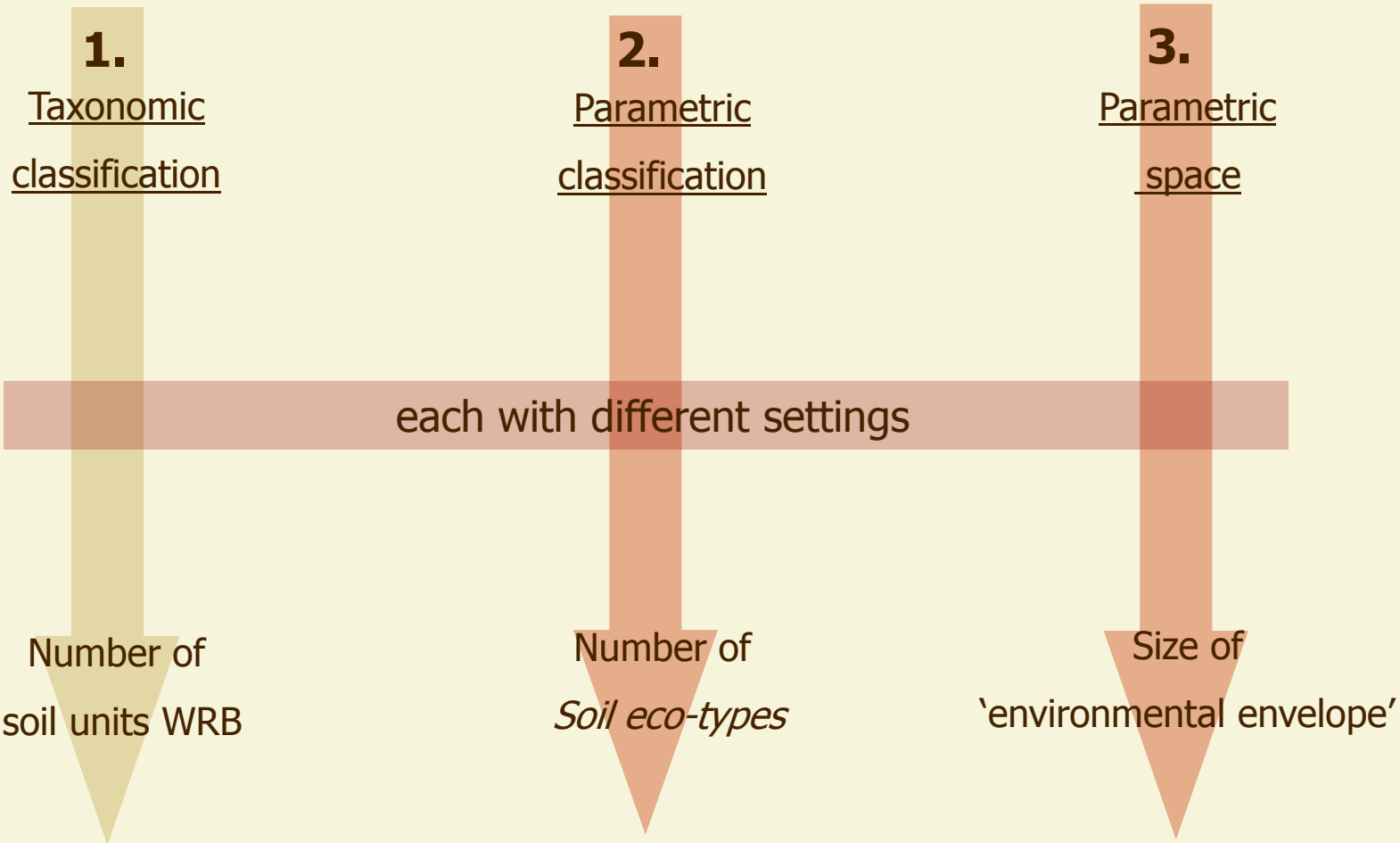
2. Results of soil diversity

Variability of soil parameters along the transect



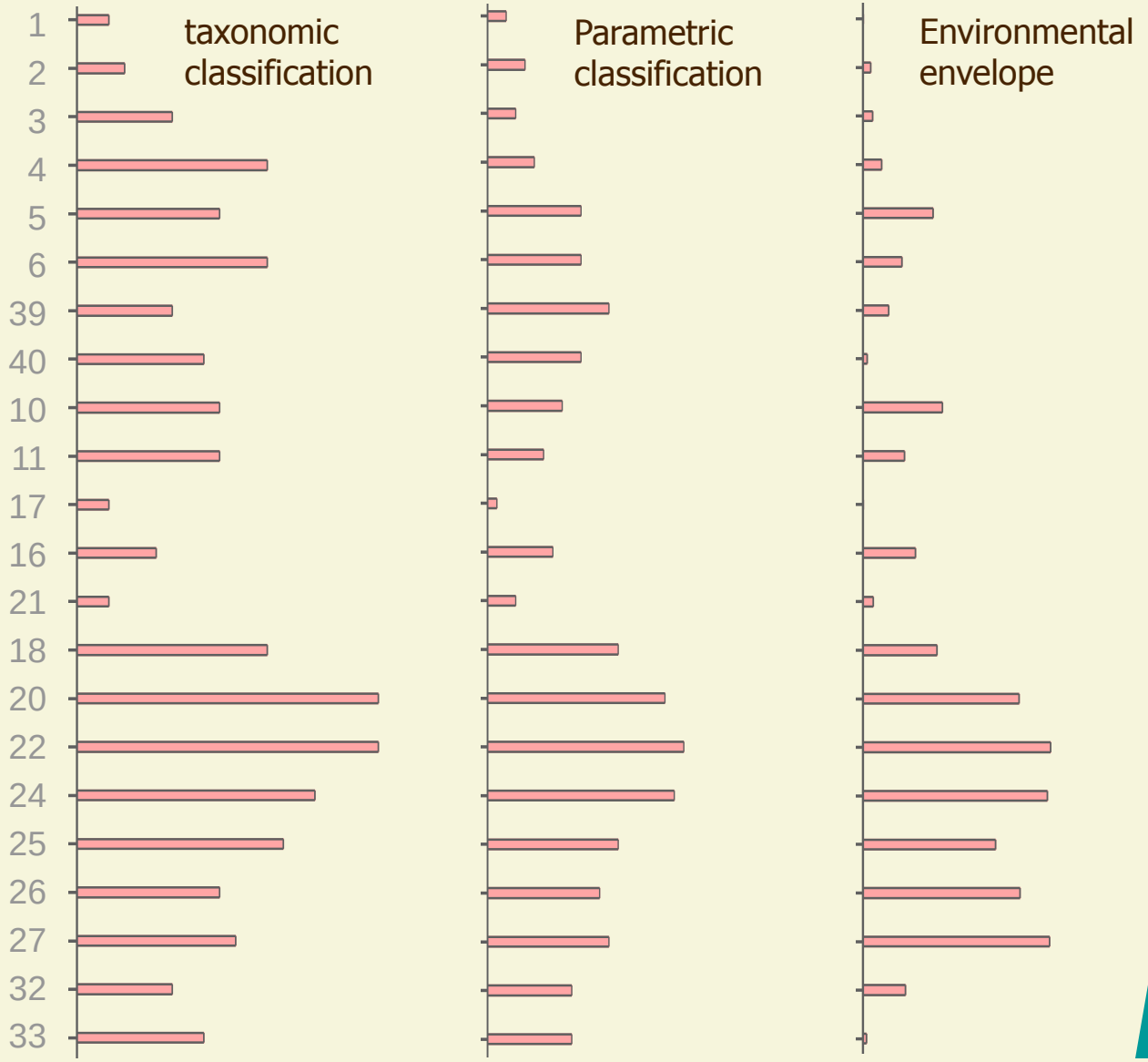
2. Results of soil diversity

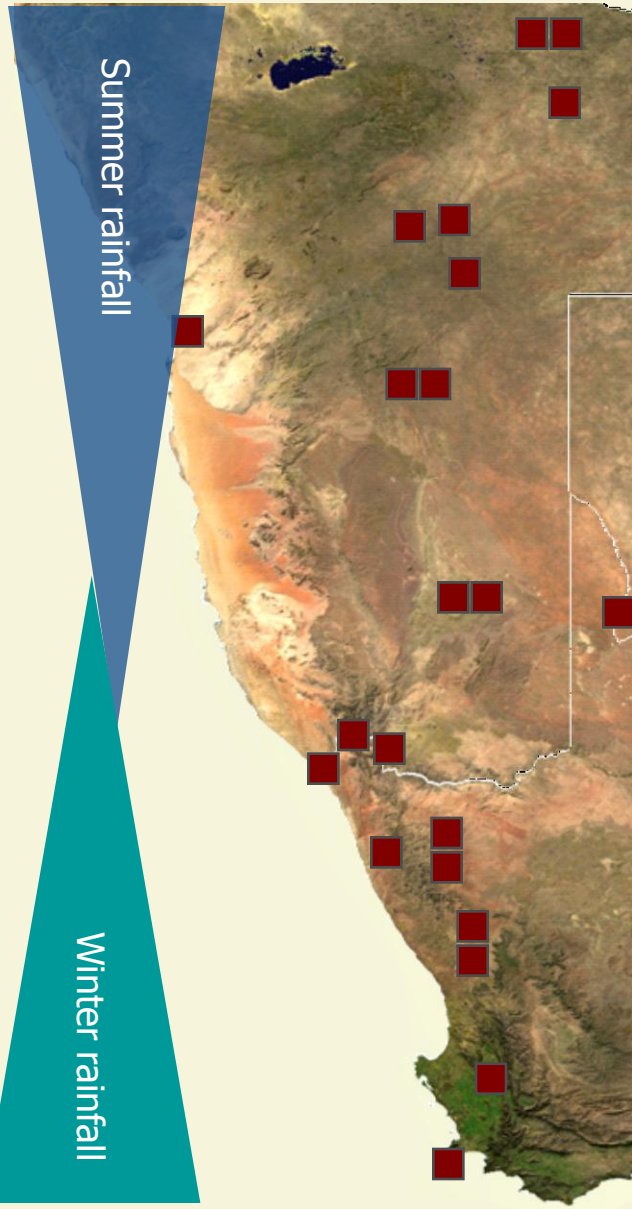
Approaches to derive integrative pedodiversity indices



2. Results of soil diversity

Pedodiversity along the transect

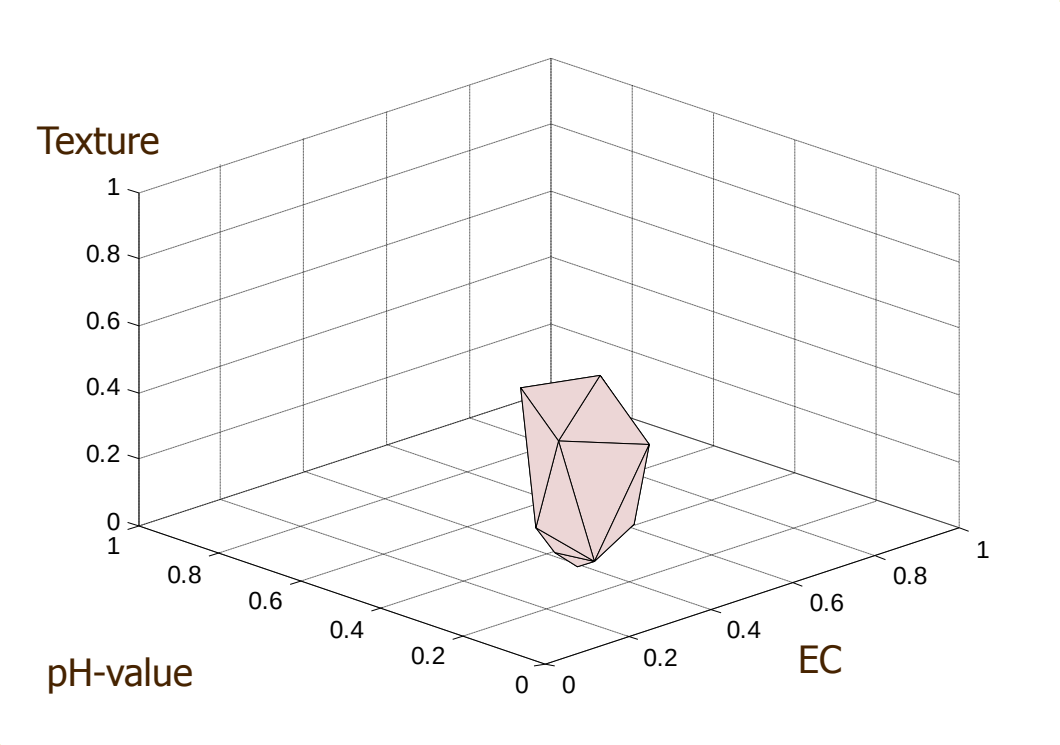


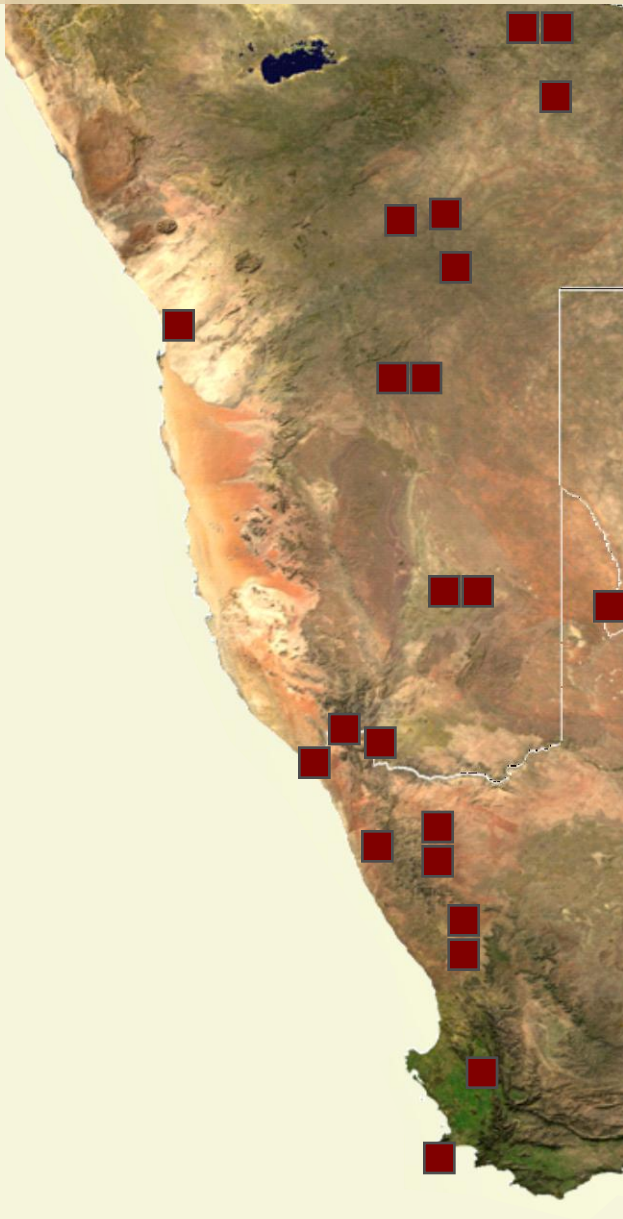


2. Results of soil diversity

Pedodiversity along the transect

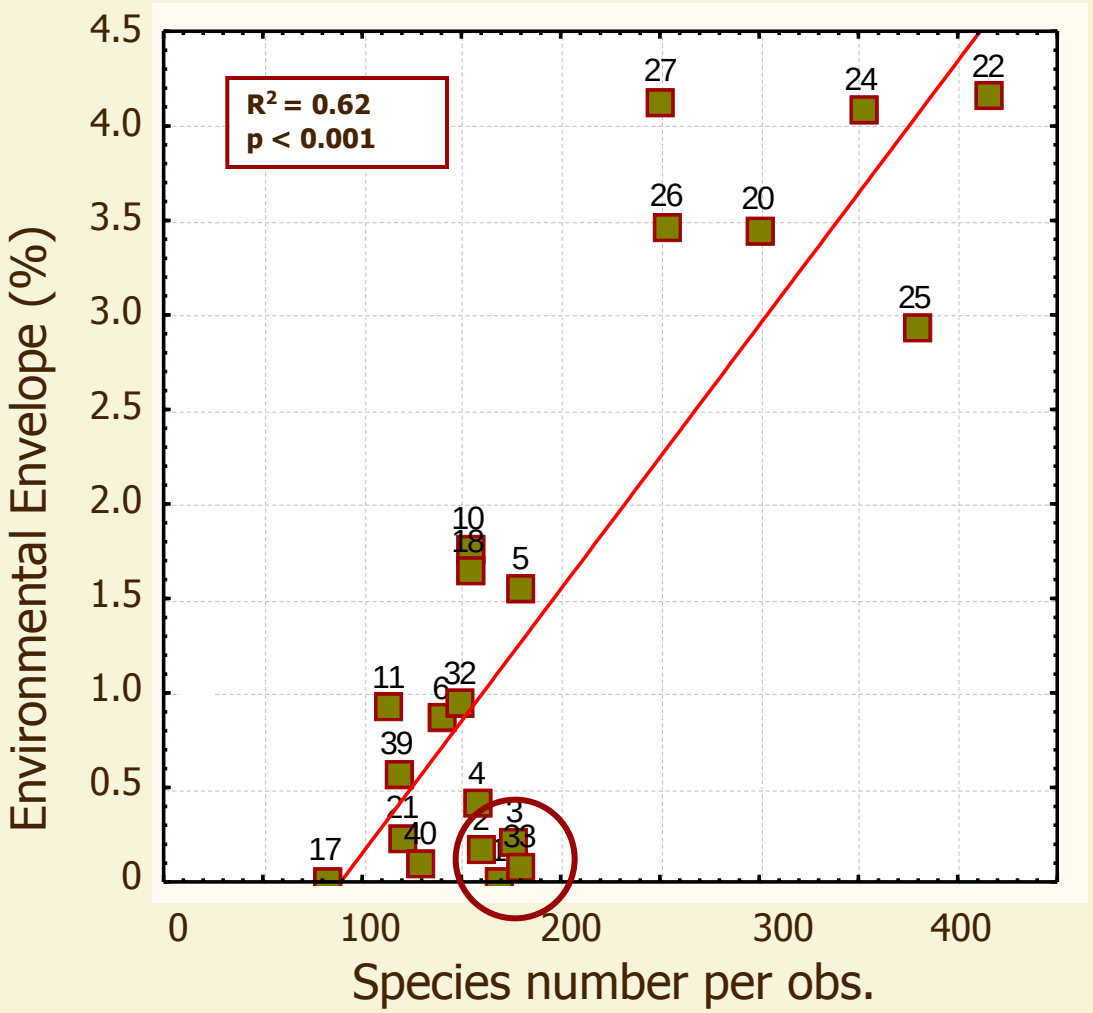
Size and position of *environmental envelope* per Observatory





Petersen et al. (2008) Geoderma. in press

Correlation of pedo- and phytodiversity

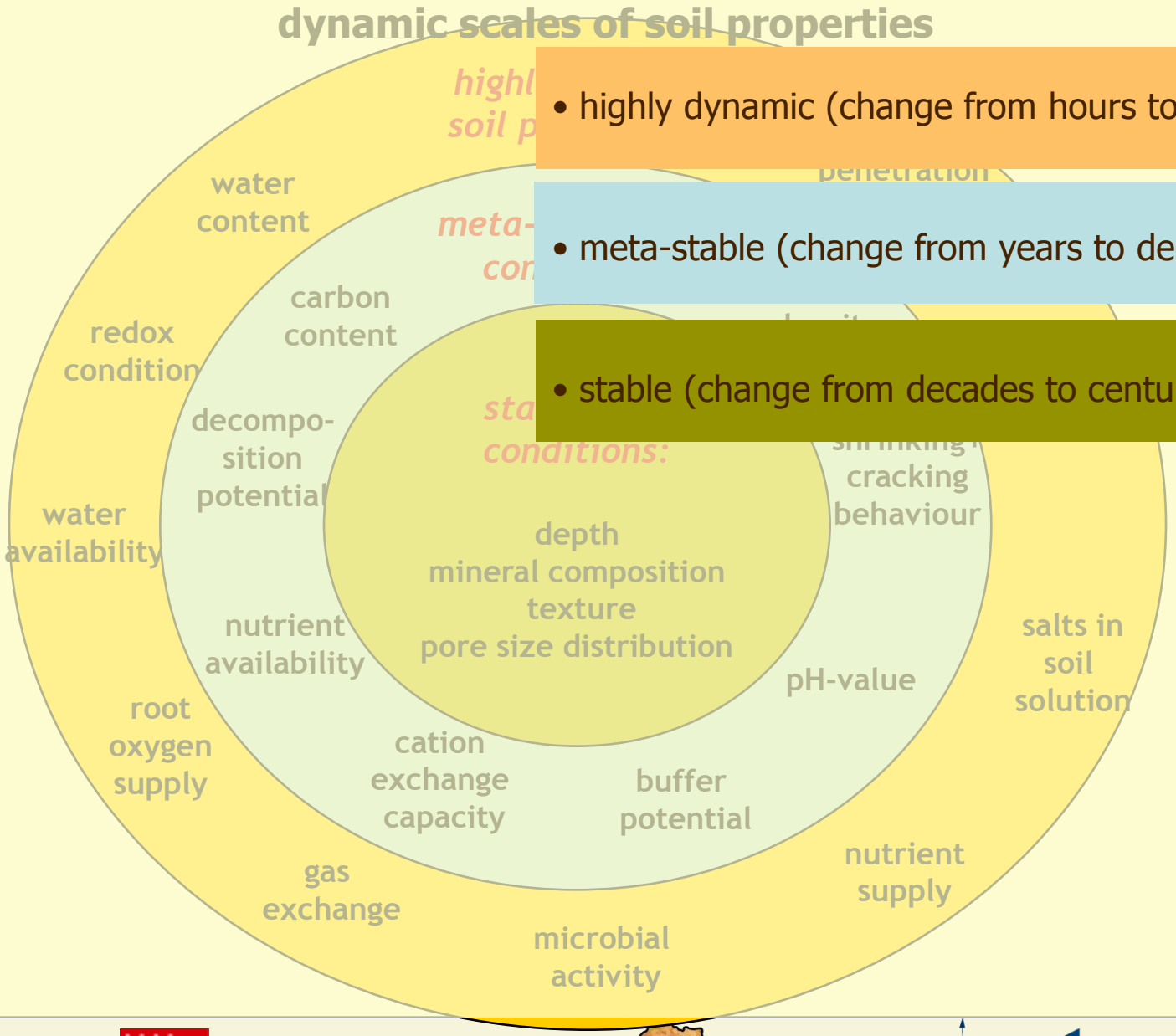


= Observatory

Monitoring of soils WHY and HOW?

- structural soil diversity rules a major part of biodiversity
- monitoring of abiotic site properties has to consider this structural soil diversity
- land use changes often starts with subtle changes in soil conditions (e.g. organic carbon)
- changes in soil conditions depend on different time scales which requires suitable monitoring concepts

3. Scales and future aspects of soil monitoring



3. Scales and future aspects of soil monitoring

Example: highly dynamic

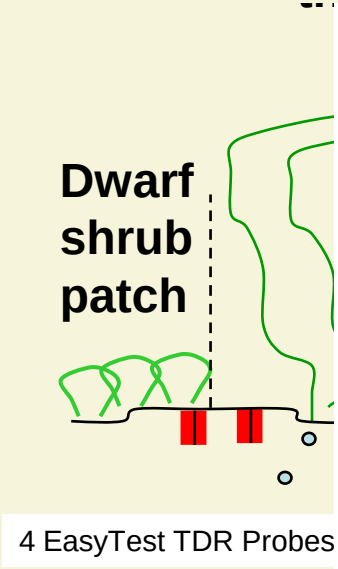
Setup of a soil moisture monitoring site

= process analyses

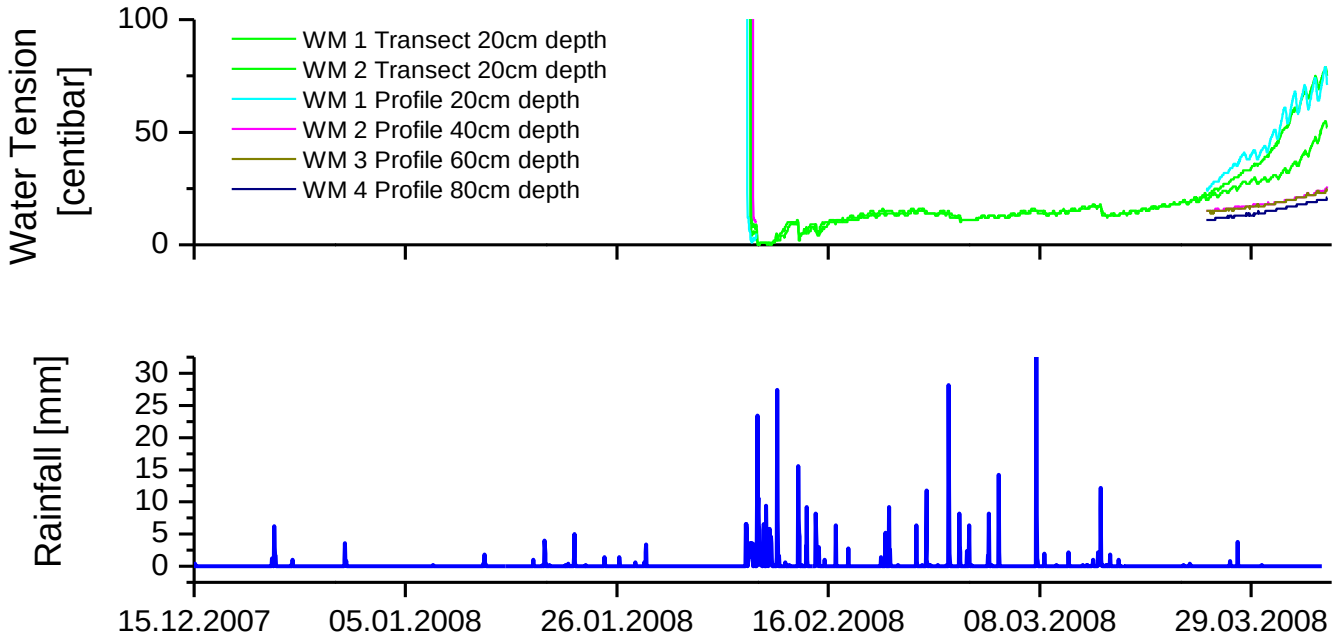
Time series for causality analyses and modelling approaches

e.g. Generic Savannah model (Meyfarth et al.)

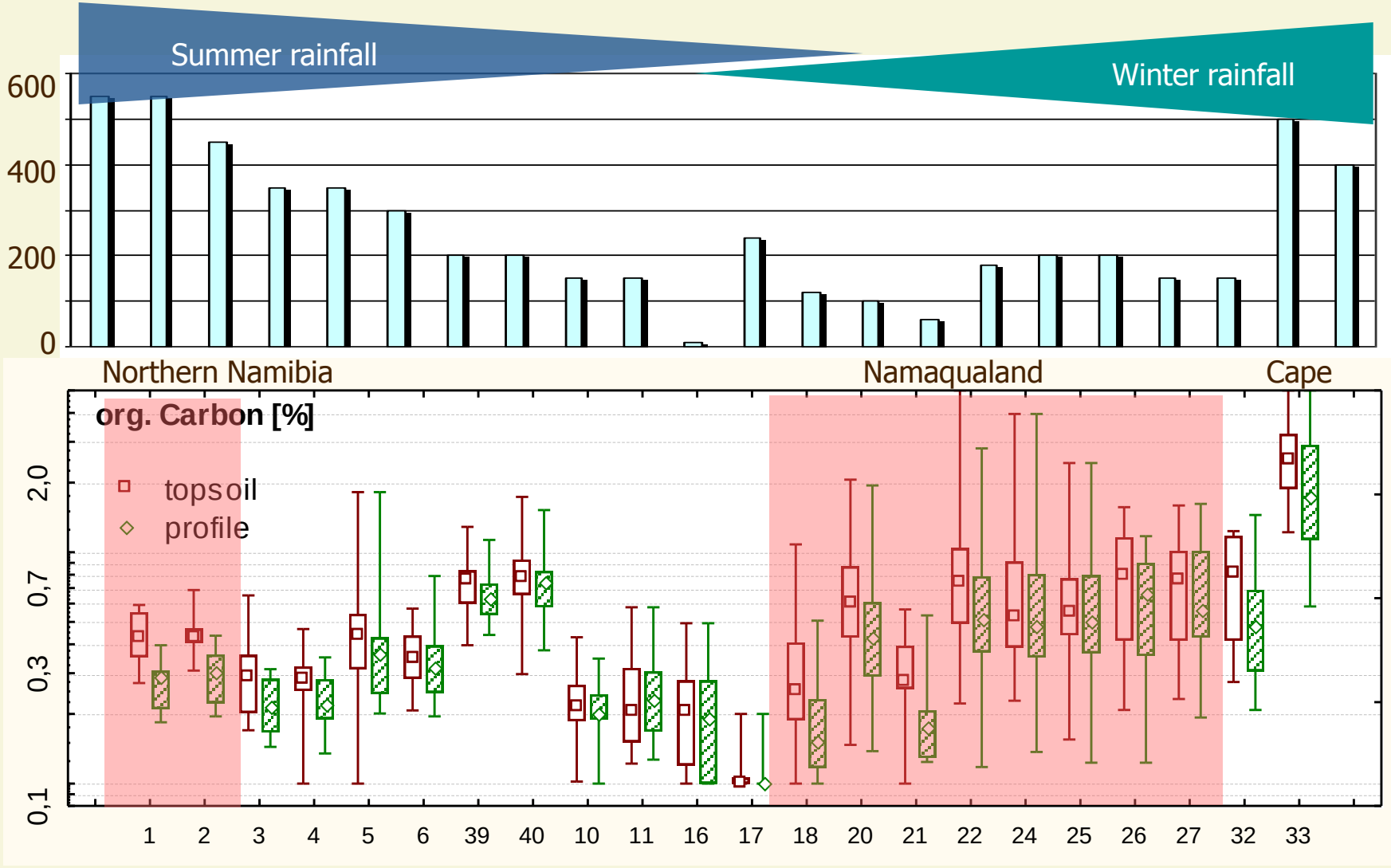
Relevant for: bush encroachment, climate change effects



4 EasyTest TDR Probes



Example: Meta stable, organic carbon



3. Scales and future aspects of soil monitoring

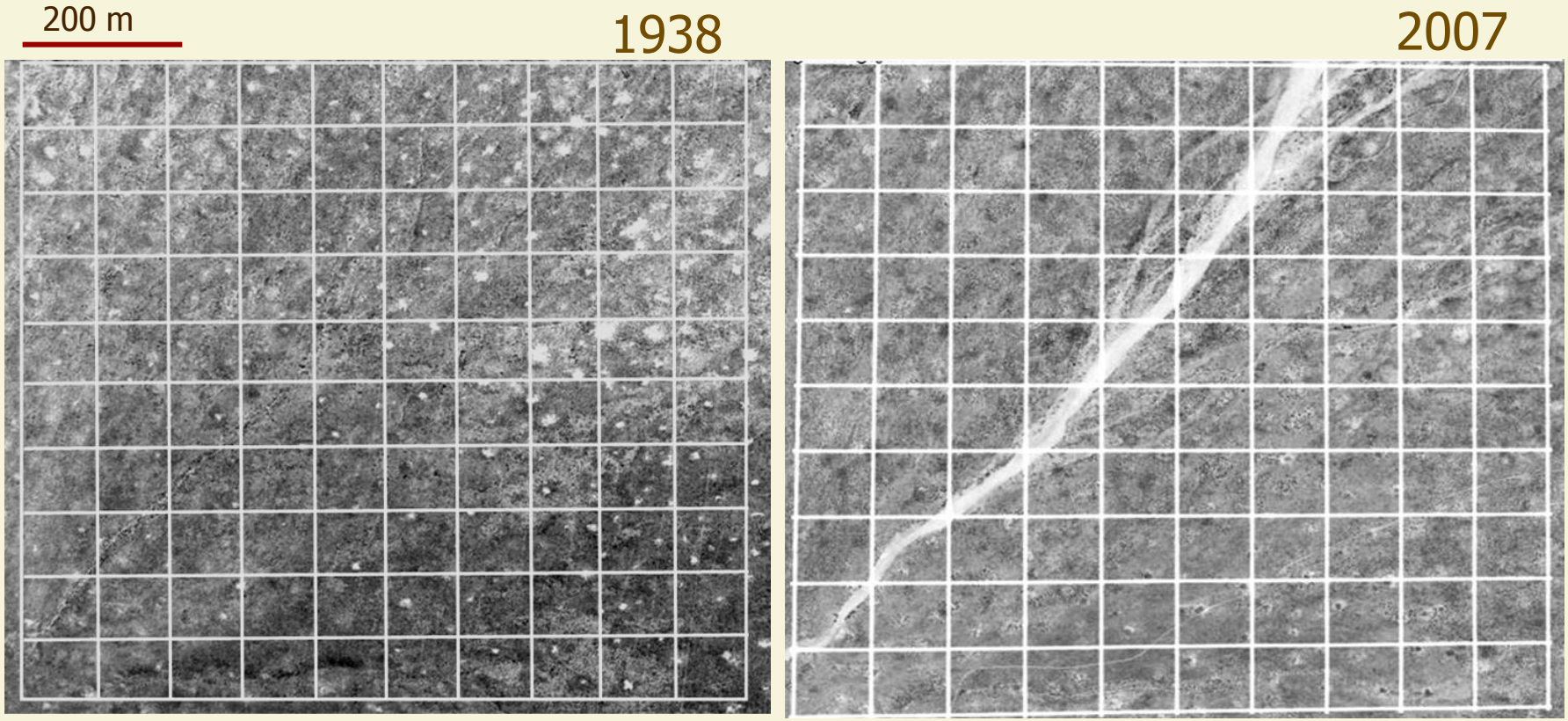
Example: change of stable soil conditions

Observatory Koeroegabvlakte, Richtersveld RSA

Example: change of stable soil conditions

3. Scales and future aspects of soil monitoring

Changes in the observatory Koeroegabvlakte



High resolution remote sensing data provide an important future tool for observation of structural diversity and monitoring of soil erosion

4. Conclusion

Soil diversity of southern African drylands is strongly correlated with biodiversity

Pedodiversity analysis comprises both a comprehensive ecosystem assesment and a sound data basis for future monitoring

Soil monitoring aspects are indispensable for the detection of land-use impact

4. Outlook

Carbon & Nitrogen flux analyses → carbon sequestration is a key element for detection of changes by land use and climate change

IPCC 4AR (2007) highlight the lack of dryland soil information regarding fluxes of Carbon and Nitrogen

Ecohydrology → Analyses of soil water fluxes to improve modelling

Termites as a key species and ecosystem engineer for nutrient fluxes and diversity of savannah ecosystems

Further analyses of relationship of pedo- and biodiversity, also in regional subsets

Baseline studies for assessment of degradation

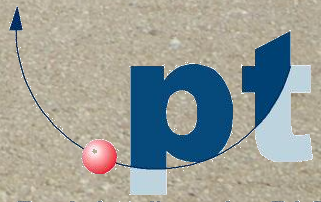
Thank you !

University of Hamburg

Biocentre Klein Flottbek

Federal Ministry
of Education
and Research

BIOLOG



Projektträger im DLR