

South African Land Degradation Monitor – A Project Overview

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INTRODUCTION

Land degradation is an important issue in South Africa due to the high variability of the climatic conditions, the strong population growth and economic demands, among others. It has been linked to the terms veld degradation (Fig. 1) and soil degradation (Fig. 2) challenging e.g. the access to water (SDG 6) by off-site effects like the siltation of reservoirs (Fig. 3). But there is still uncertainty on the extent of human induced land degradation as compared to periodic climate induced land surface changes.



Figure 1
Veld degradation in the Eastern Cape Province (Photo: J. Baade 2010).



Figure 2
Soil degradation by gully erosion in our study site in the Free State challenging e.g. SDG 2, 6 & 15 (Photo: Baade 2019).

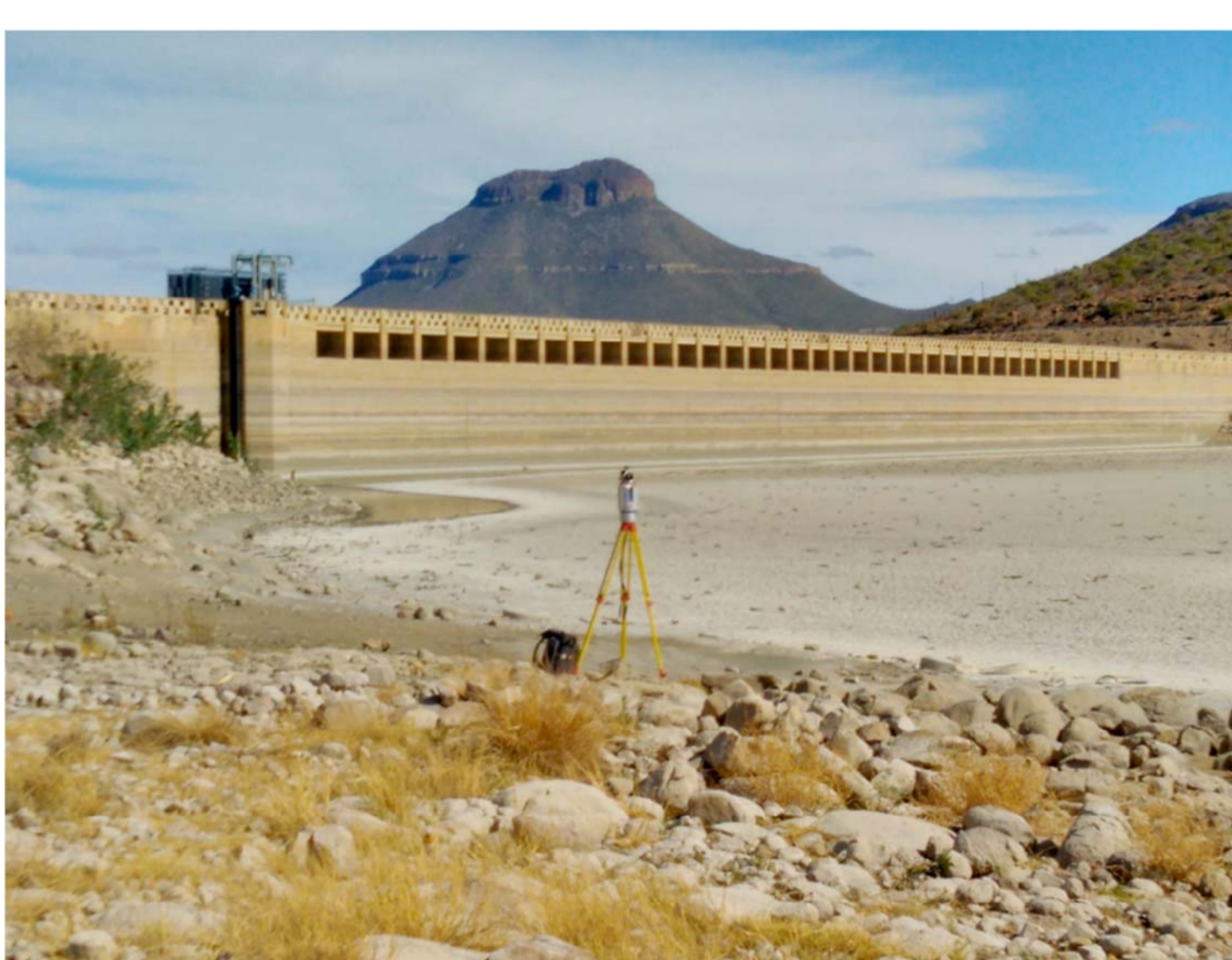


Figure 3
Surveying a silted-up reservoir during the current drought to assess off-site damages from soil erosion challenging e.g. SDG 2 & 6 (Photo: J. Baade 2019).

AIMS

In cooperation with a number of South African institutions and stakeholders (Fig. 8), the overarching goal of SALDi is to implement novel, adaptive, and sustainable tools for assessing land degradation in multi-use landscapes. Based on a cross-linked work plan (Fig. 5), SALDi aims

- 1) to develop an automated system for high temporal and spatial resolution change detection monitoring of ecosystem service dynamics (e.g. Fig. 6),
- 2) to develop, adapt and apply a regional earth system model (i.e. WRF-Hydro) to South Africa and investigate the feedbacks between land surface properties and the regional climate,
- 3) to advance current soil degradation process assessment tools for soil erosion.

SALDi focuses on six ~100 x 100 km² study regions across South Africa (Fig. 4). These regions represent a major climate gradient, from the winter rainfall region in the SW across low summer rainfall to high summer rainfall regions at the escarpment in the NE. The regions cover also different geological conditions and represent landscapes with varying land degradation status (LDI 2013) and different agricultural practices.

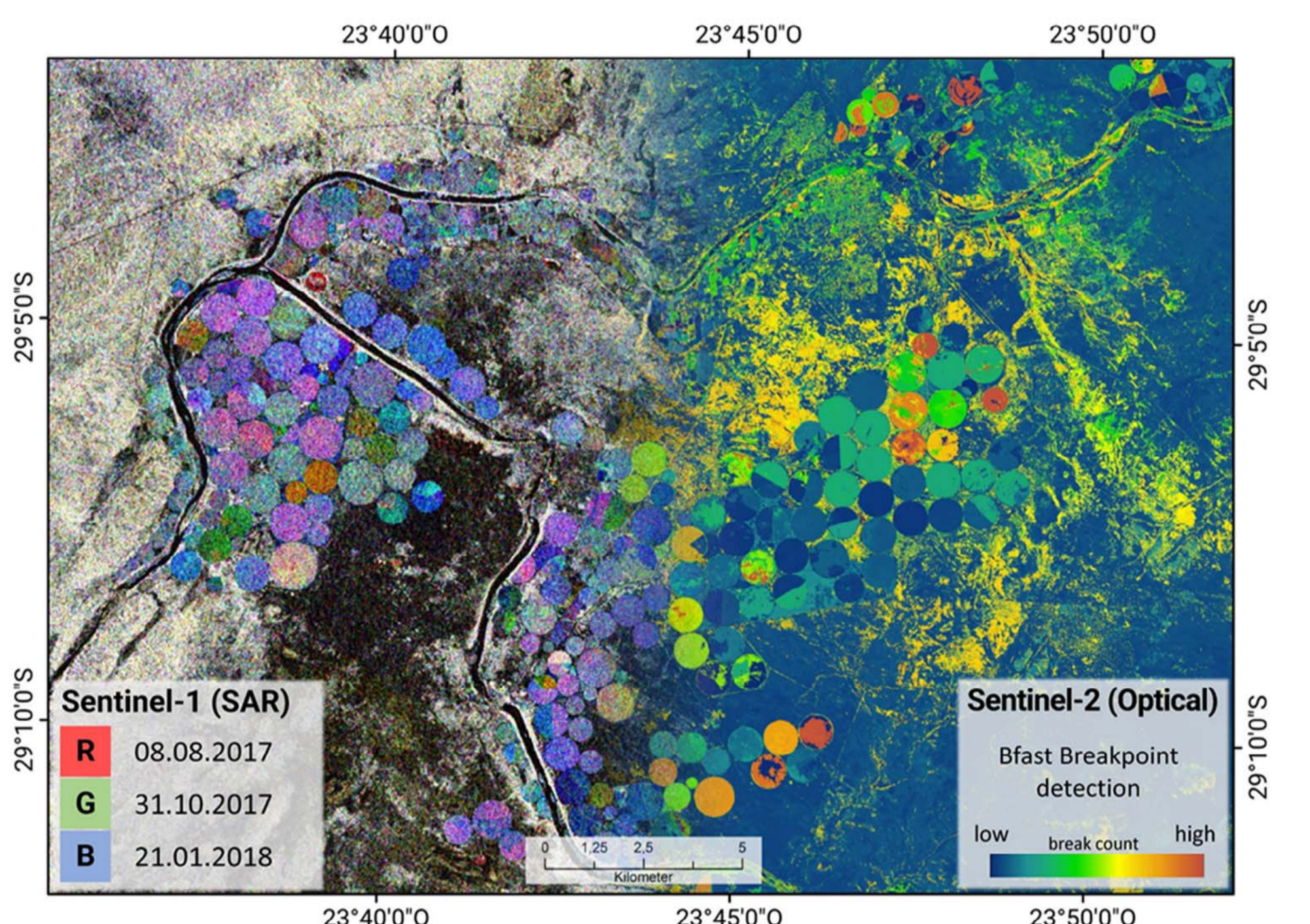


Figure 6
Example of synergistic combination of Sentinel-1 and Sentinel-2 time series analysis for monitoring agricultural dynamics at a site near Douglas (Sol Plaatje study area).

SALDI APPROACH

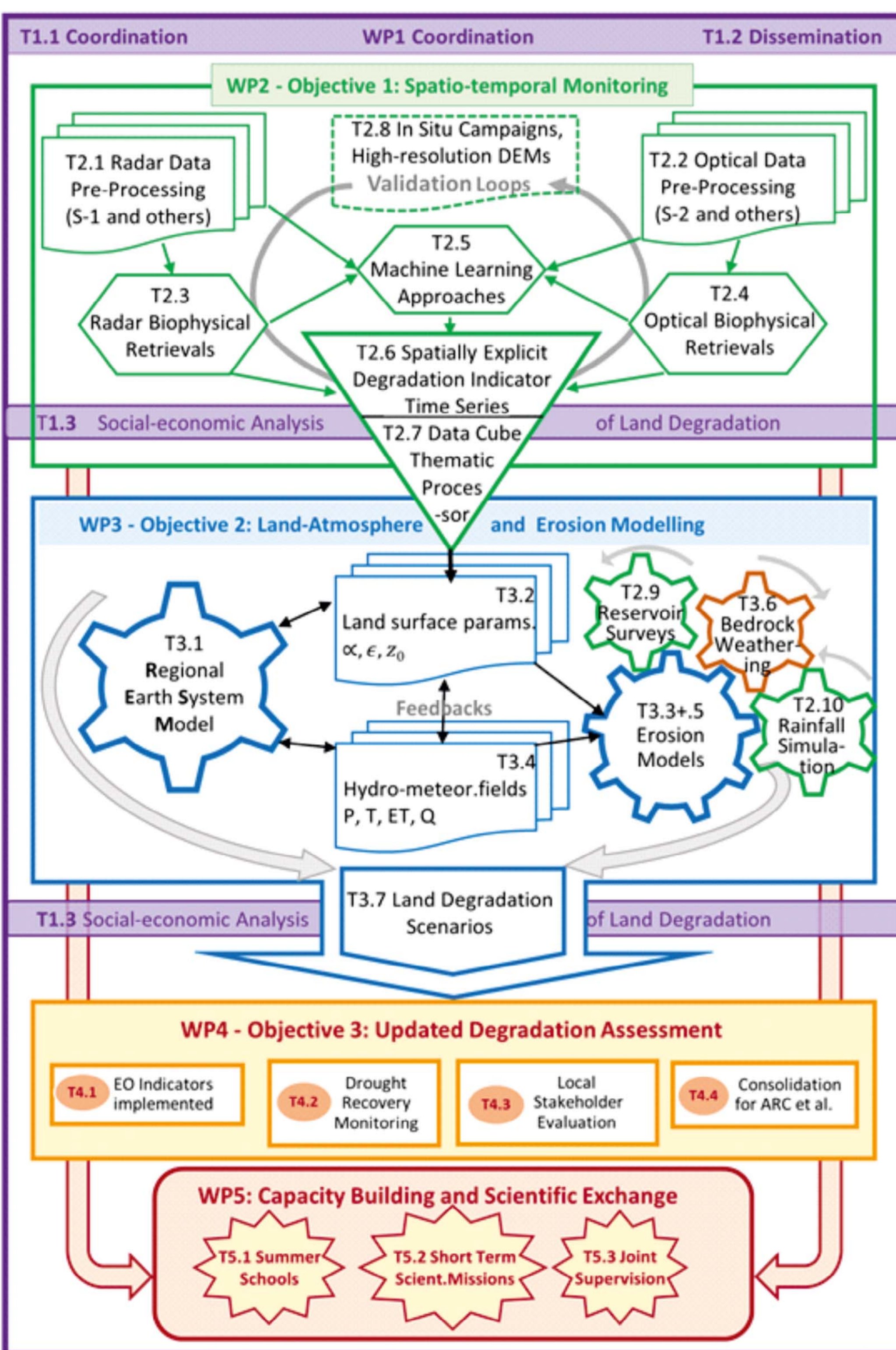


Figure 5
SALDi cross-linked work plan, work packages (WP) and tasks (T).

SALDI OUTREACH & EXCHANGE

SALDi is committed to make the results freely available to all stakeholders in southern Africa for non-commercial use. In particular, the SALDi Data Cube will be exchanged with SANSI and the SASSCAL Open Access Data Center. We hope that the results will improve land and soil degradation management in politics, communal and agricultural planning. The validation of SALDi products on the local farm scale (Fig. 7) is an important goal.

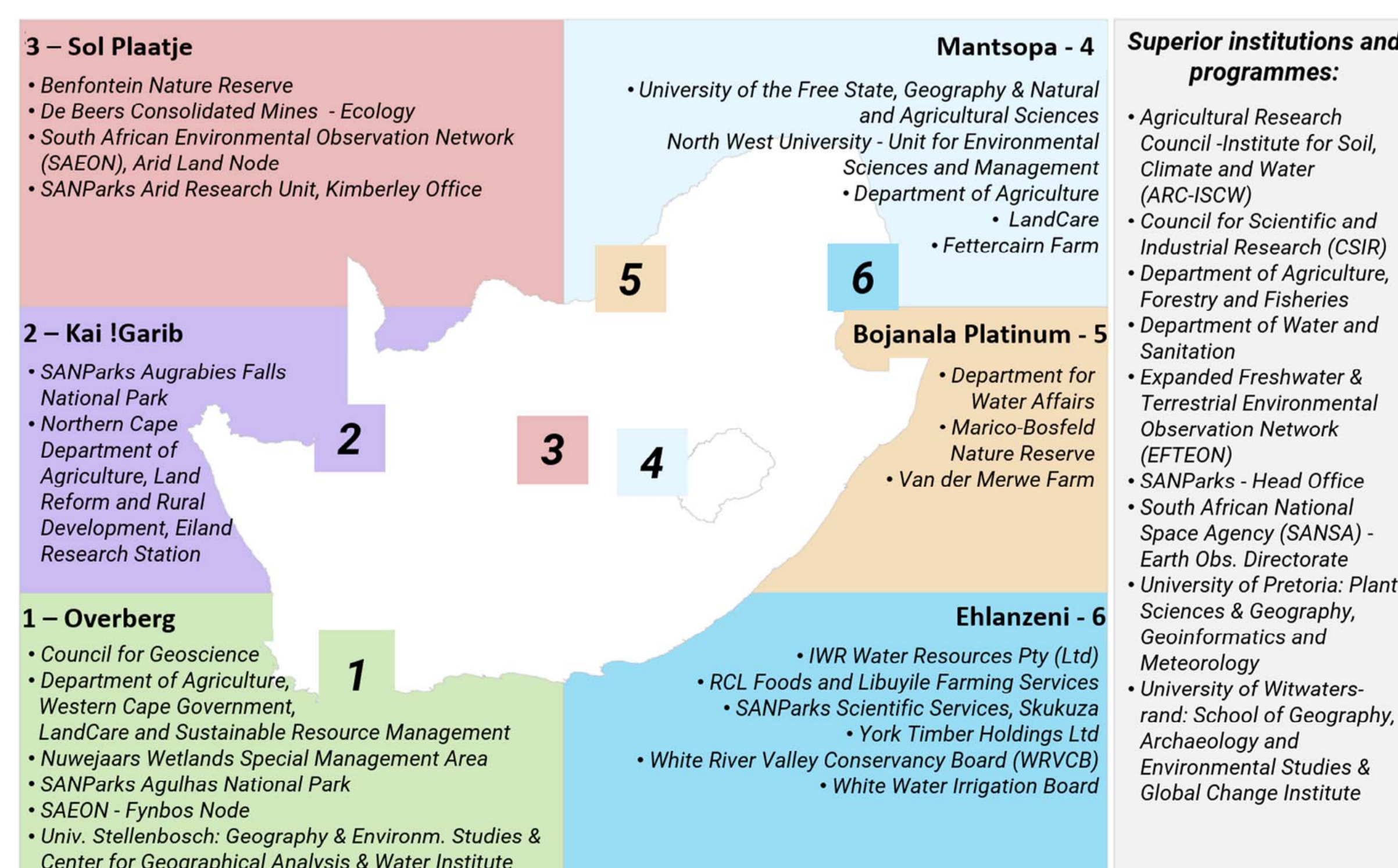


Figure 7
Discussing issues of soil erosion and land degradation with a local LandCare team close to Ladybrand (Photo: J. Baade 2019).

Figure 8
SALDi study sites and cooperation partner network.

Acknowledgement

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