

BSc Thesis Project

An assessment of Key Physico-Chemical Properties of Badland Soils from the Karoo, South Africa

1.) BACKGROUND: In an assessment of badland soil characteristics in the semi-arid region of the Karoo, South Africa, reduced vegetation cover and general lack of shallow roots increases soil compaction and reduces infiltration. Both factors, in combination with low organic carbon content, facilitates rapid runoff-generation and increases the susceptibility of soils to erosion (see image below).

3.) FUTURE WORK: Given these uncertainties, opportunity exists for a BSc student looking for a Bachelors project to undertake a laboratory-based assessment of key physical and chemical properties of soils & sediments sampled from the 10 badland sites. The main aim of this work would be to compare and contrast data between all 10 sites.



2.) CURRENT STATUS: Long-term erosion monitoring on 10 badland sites in the Karoo (by our research partners at Oxford University, UK) have revealed vastly different annual average erosion rates; despite all 10 sites being located within ca. 4 km radius of each other. This suggests that rainfall, the typical driver of runoff and erosion in semi-arid landscapes, is less dominant than originally assumed. Exact reasons why are unknown, but might be due to site-specific variations in physico-chemical properties associated with badland soils that could be influencing; 1.) the colonisation and growth of vegetation (see image above, right), and hence, 2.) controlling the rate of organic carbon inputs into soils, which, 3.) determines the stabilising influence of soil organic carbon, which binds particles and enables aggregates to better resist erosive processes.

4.) PROJECT OUTLINE: Some data is already available, but the outstanding analytical work, most of which will be performed in the Geography Laboratories at Klingelbergstr. 27, will involve undertaking necessary laboratory protocols to enable the candidate to perform key soil / sediment analyses, that will probably include:

- Carbon: Nitrogen Ratios
- Aggregate Stability / Physical weathering tests
- Particle size characteristics
- Cation Exchange Capacity
- Soil pH

5.) INTERESTED CANDIDATES: If you are interested and would like further information, please contact either:

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