



## Reprint of: The evil of sluits: A re-assessment of soil erosion in the Karoo of South Africa as portrayed in century-old sources<sup>☆</sup>



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### ABSTRACT

Deep, linear gullies are a common feature of the present landscape of the Karoo of South Africa, where they were known locally in the early twentieth century as ‘sluits’. Recent research has shown that many of these features are now stable and are no longer significant sediment sources, although they are efficient connectors in the landscape. Because most of the gully networks predate the first aerial photographs, little is known in the scientific literature about the timing of their formation. One secondary source, however, throws interesting light on the origin of these features, and the early response by landowners to their rehabilitation. The Agricultural Journal of the Cape of Good Hope at the turn of the Twentieth Century carried a number of articles by farmers and agricultural officers concerning the “evil of sluits”. The authors gave accounts of widespread incision of valley bottoms by deep, wide gullies. Many of these gullies had been in existence for some thirty years but apparently had formed within living memory. A number of attempts to prevent further erosion had been put in place at the time of writing. This paper presents a review of land degradation, specifically gully erosion, and rehabilitation recommendations as given by authors writing in this journal. It reflects on the findings in the context of assessing land degradation processes through the local knowledge portrayed in the journal.

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### 1. Introduction

The Karoo of South Africa is a semi-arid to arid region that covers an area of approximately 427 025 km<sup>2</sup> in the Cape Province of South Africa (Fig. 1). Despite a low mean annual rainfall varying from around 100 mm in the west to over 400 mm in the east, this area has supported a livestock industry for many hundreds of years, firstly by indigenous pastoralists and later, from the 1700s, by European settlers. Several authors have described land degradation in the form of soil erosion coincident with a loss of vegetation cover and species change, as presented in Section 2. They ascribe degradation to the intensification of human settlement in the second half of the nineteenth century, but the timing of the start of soil erosion remains vague. Information garnered from travelers’

journals and government reports fails to give a convincing picture of the soil erosion process since the start of European settlement.

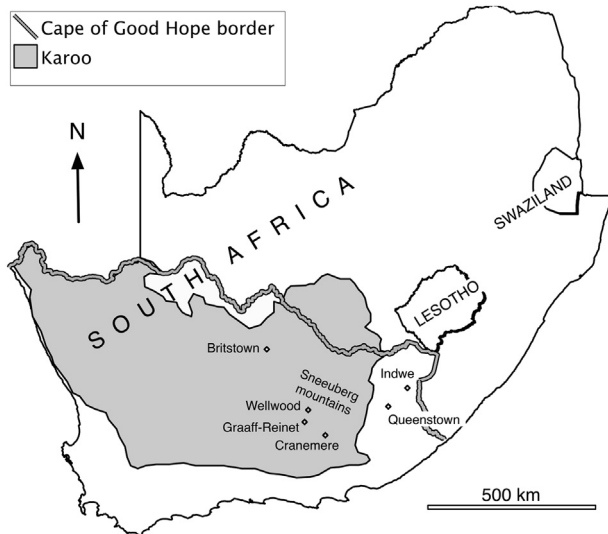
This paper explores an as yet little tapped source of local knowledge on erosion in the Karoo at the turn of the nineteenth century – the Agricultural Journal of the Cape of Good Hope (hereafter referred to by its acronym AJCGH), published between 1889 and 1910. This was the official mouthpiece of the Department of Agriculture of the Cape Colony; it educated farmers on best agricultural practice through publishing reports on agricultural experiments and providing a forum for debate (Bennett, 2011). In 1899 the official circulation figure was 5000 (Brown, 2003a).

A number of authors have used this journal recently as a source of information on agricultural problems and developments at the turn of the nineteenth century. A literature search via Google Scholar using the search terms ‘Agricultural Journal of the Cape of Good Hope’ or its acronym AJCGH produced the results given in Table 1. There has been a clear bias towards papers investigating livestock disease, followed by pest plants, especially prickly pear (*Opuntia*). Two environmental historians who have made extensive use of the journal are van Sittert (1998, 2000, 2002, 2004) and Brown (2003a, 2003b). It is surprising, however, that hitherto only two articles that addressed the soil erosion issue (Bradfield, 1908; Kanthack, 1908) appear to have been cited in the standard

<sup>☆</sup> The publisher wishes to reprint the article “The Evil of Sluits: A Re-assessment of Soil Erosion in the Karoo of South Africa as Portrayed in Century-Old Sources” [YJEMA 130C (2013) 98–105] as it was wrongly published in regular issue YJEMA 130 due to a production error. For readers of the online version, please follow the below link <http://dx.doi.org/10.1016/j.jenvman.2013.08.041>

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**Fig. 1.** Location of the Karoo in South Africa. The border of the Cape of Good Hope was reconstructed from Blackie's map of 1860. Place names refer to places mentioned in the text.

academic journal articles and only [Bradfield \(1908\)](#) within the context of erosion ([Beinart, 1984](#)).

A number of articles in this journal document government officials' and farmers' perceptions of and responses to land degradation in the Karoo and other areas of the Cape of Good Hope ([Fig. 1](#)), with the main debate ongoing from 1900 to 1908 ([Table 2](#)). It is the unexplored debate over soil erosion and "The Evil of Sluits" that is presented in this paper. As explained in [Section 2](#), an unanswered question in the current erosion debate is the timing of valley floor gully erosion. A key question addressed in this paper is therefore 'when did valley floor gully erosion begin and why?'

[Section 2](#) reviews the current debate on degradation in the Karoo and highlights the lack of evidence cited for the timing of valley floor incision. [Section 3](#) presents the debate on soil erosion and, specifically, "sluit" erosion that was actively promoted through the AJCGH at the turn of the century. Supporting evidence for the timing of soil erosion is provided by an analysis of contemporary rainfall data in [Section 4](#). The discussion in [Section 5](#) summarizes the key findings and presents an appraisal of the AJCGH articles as a form of local knowledge.

## 2. Land degradation in the Karoo – the research context

Land degradation in the Karoo has been the subject of academic debate since [Acocks \(1953\)](#) published his expanding Karoo hypothesis. His assertion was that poor veld management was causing the encroachment of grassland by drought resistant shrubs and that, if unchecked, would advance to transform the grasslands to

**Table 1**  
Citation of papers published in the Agricultural Journal of the Cape of Good Hope (AJCGH) based on a Google Scholar search.

Topic	No. of AJCGH papers	No. of citations
Livestock disease	14	66
Prickly pear and other pest plants	5	21
Erosion and degradation of vegetation cover	2	12
General agriculture	2	5
Forestry	1	2

**Table 2**

List in date order of the key articles from the AJCGH that address the debate on land degradation.

Author	Date	Title
Smith	1989	Deterioration of old sheep-farming districts
McNaughton	1898	Silt in dams (correspondence)
Ogilvie farmer	1891	Fifty years of sheep farming in South Africa
Hobson	1900	Deterioration of veld in the Midlands (266–270)
Anon	1900	Deterioration of grazing lands (530–535)
Bradfield	1903	The preservation of the soil from damage caused by sluits
Bradfield	1903	Sluits and their remedy some practical notes (correspondence)
Sim (District Forest Officer)	1904	The evil of sluits – and how far it could be prevented and remedied by tree-planting.
Gordon (Director of Irrigation)	1904	Sluits- their evil and prevention
Dugmore	1905	Sluits – their evil and prevention
Anon	1905	The utilization of Karoo flood water: Mr. Southey's success at Schoombie.
Braine	1906	Dongas or sluits – their effect and treatment
Bradfield (farmer and miner, Indwe)	1908	Erosion and desiccation of the Karoo
Kanthak	1908	The destruction of mountain vegetation: its effects upon the agricultural conditions in the valleys

the more humid east. Since then a number of authors have challenged this view, suggesting that observed changes may, in part, be a dynamic response to a variable climate subject to wet and dry periods ([Meadows and Sugden, 1988](#); [Hoffman and Cowling, 1990](#); [Bond et al., 1994](#); [Dean et al., 1995](#); [Hoffman et al., 1995](#)).

Vegetation changes are mirrored by changes to the soil, with soil erosion being a prevalent feature of the Karoo landscape ([Roux and Vorster, 1983](#); [Rowntree, 1988](#); [Boardman et al., 2003](#); [Foster et al., 2012](#)). Two types of erosion dominate visually. The first is gully erosion, taking the form of either incised channels along valley floors or hillslope gullies, which may be discontinuous ([Rowntree, 1988](#); [Grenfell et al., 2012](#)). These incised channels can take dramatic dimensions and are locally known as dongas or sluits. The second form of erosion is badland erosion that takes the form of dense dendritic networks of narrow gullies, located mainly on colluvial footslopes ([Boardman et al., 2003](#)). Badland erosion is often associated with widespread loss of topsoil, exposing subsoil that is bare of vegetation.

Because ecologists carried out much of the early research on Karoo degradation, the focus of the research was vegetation (cf [Acocks, 1953](#); [Dean et al., 1995](#)). [Roux and Vorster \(1983\)](#) and [Rowntree \(1988\)](#) drew attention to the relationship between soil erosion and vegetation cover. More recently [Boardman et al. \(2003\)](#) and [Keay-Bright and Boardman \(2006, 2007, 2009\)](#) turned their attention to a detailed investigation of soil erosion. They concluded that the spatial extent of both gully networks and badland areas was established by the time that the earliest aerial photographs became available, 1945. In line with the ecologists, they linked the initiation of erosion to permanent European settlement from the early nineteenth century, with its associated stock farming and communication networks in the form of wagon tracks ([Neville et al., 1994](#)). They pointed to droughts in the 1920s and high stock number peaking in the 1930 being contributory factors, but could not provide substantive evidence of when erosion began. Their work was taken further by [Foster et al. \(2005\)](#), [Foster et al. \(2007\)](#), [Foster et al. \(2012\)](#), [Rowntree and Foster \(2012\)](#) who reconstructed historical catchment sediment yield using palaeo studies of sediment in farm dams in the Sneeu Berg Mountains. Their research revealed two key findings. First, sediment yields

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