



Interdisciplinary perspectives
on change and continuity in
South Africa's drylands

Contested KAROO

Cherryl Walker & M Timm Hoffman
(EDITORS)



Contested Karoo

**Interdisciplinary perspectives
on change and continuity in
South Africa's drylands**

Editors:

Cherryl Walker
M. Timm Hoffman



Contested Karoo: Interdisciplinary perspectives on change and continuity in South Africa's drylands

Published by UCT Press

All rights reserved

Copyright © 2024 UCT Press and the editors

This publication was subjected to an independent double-blind peer evaluation by the publisher.

The editors and the publisher have made every effort to obtain permission for and acknowledge the use of copyrighted material. Refer all enquiries to the publisher.

No part of this book may be reproduced or transmitted in any form or by any electronic, photographic or mechanical means, including photocopying and recording on record, tape or laser disk, on microfilm, via the Internet, by e-mail, or by any other information storage and retrieval system, without prior written permission by the publisher.

Views reflected in this publication are not necessarily those of the publisher.

UCT Press is a joint venture with African Sun Media. Scholarly, professional and reference works are published under this imprint in print and electronic formats.

First edition 2024

ISBN 978-1-991450-00-5

ISBN 978-1-991450-01-2 (e-book)

<https://doi.org/10.52779/9781991450012>

Set in Arial 10/13

Cover design, typesetting and production by African Sun Media

Front cover image: © Stephanie Borchardt

Back cover image: © M Timm Hoffman

Our publications can be ordered from:

orders@aficansunmedia.co.za

Takealot: bit.ly/2monsfl

Google Books: bit.ly/2k1Uilm

aficansunmedia.store.it.si (*e-books*)

Amazon: amzn.to/2ktLpkL

JSTOR: <https://bit.ly/3udc057>

Visit aficansunmedia.co.za for more information.

Contents

Acknowledgements	i
Figures	ii
Tables and boxes	vi
Abbreviations	viii
Chapter 1	
Contested Karoo: An introduction	1
Cherryl Walker and M. Timm Hoffman	
Chapter 2	
Karoo Studies: A selected overview of published research to 2020	19
M. Timm Hoffman and Hana Petersen	
Chapter 3	
Surplus populations in the Upper Karoo: A historical perspective from Prieska	65
Michela Marcatelli	
Chapter 4	
Karoo ‘dorpescapes’: Social change and continuity in three small towns – Sutherland, Loeriesfontein and Vanwyksvlei	91
Cherryl Walker and Jan Vorster	
Chapter 5	
Agrisycretic knowledge production and applications among Namaqualand herders.	121
Clement F. Cupido, William Ellis and M. Igshaan Samuels	
Chapter 6	
Beyond livestock farming: Game farming and sustainable development in the Ubuntu Local Municipality of the Northern Cape	151
Charmaine R.S. Manyani	
Chapter 7	
Ongedierte: Commercial farmers, black-backed jackals and human-wildlife conflict around the Square Kilometre Array (SKA), 2016–2019	179
Renelle Terblanche	

Chapter 8

Conserving the Karoo: Traditional approaches, new developments,
and future challenges 201
M. Timm Hoffman and Lindsey Gillson

Chapter 9

A just transition in the Karoo? Renewable energy and the limits of job
creation and community development in Loeriesfontein 233
Boitumelo Malope

Chapter 10

Shedding light on energy poverty: Household energy challenges in De Aar,
a renewable energy hub in the Northern Cape 257
Stephanie Borchardt

Chapter 11

Shale gas and sacrifice zones: Local perspectives on the costs and benefits
of fracking in the Central Karoo District of the Western Cape 287
Mzingaye Brilliant Xaba

Chapter 12

Change and continuity in the Karoo: Concluding reflections 311
Cherryl Walker and M. Timm Hoffman

Index 333

Contributing authors 343

Acknowledgements

The material presented in the following chapters draws on research supported in part by the National Research Foundation (NRF) of South Africa, which has funded the DSI/NRF SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development attached to the Department of Sociology and Social Anthropology at Stellenbosch University (Grant Number 98765). In recognising this very welcome support, we acknowledge that the opinions, findings and conclusions or recommendations expressed in this publication are those of the chapter authors alone, and that the NRF accepts no liability whatsoever in this regard. We also want to express our appreciation to the Leslie Hill Endowment Fund at the University of Cape Town (UCT), which has supported much of the research undertaken by the Plant Conservation Unit at UCT that is presented in this volume. We also want to thank both the NRF and the University of Cape Town's URC Open Access Journal Publication Fund for the financial support that has made the open-access publication of this book possible.

Many individuals have contributed their time and expertise to the production of the final manuscript. We are grateful for the assistance we have received in preparing the many maps that inform and enhance the chapters that follow. Here we wish to thank our primary cartographers, Hana Petersen and Sally Mashele, who worked as Research Assistants for UCT's Plant Conservation Unit, for both their professionalism and their patience in working with us on the many iterations of the maps that have been created specifically for this publication. We also want to acknowledge the generous assistance we have received from Johan Malherbe at the Agricultural Research Council (ARC), Johan Maritz at the Council for Scientific and Industrial Research (CSIR), and Stephanus Minnie at the Department of Agriculture, Land Reform and Rural Development (DALRRD) for the maps we have sourced from their respective institutions.

A number of people played other important roles in preparing the manuscript for publication. Here we want to acknowledge the contribution of Jill Claassen and Lena Nyahodza at UCT Press as well as Arin Barry and the publishing team at African Sun Media. In addition, special thanks go to Marinice Walters-Kemp, in the Department of Sociology and Social Anthropology at Stellenbosch University, for the administrative support she has provided to this project over several years.

Finally, this book would not have been possible without the generous support of colleagues, informants and research partners in our institutions, field sites and research networks over the years. Although you are too many to name individually here, we hope you will accept a collective "thank you" for your collegiality, insights and critically engaged scholarship, from which we have benefitted in so many ways.

*Cherryl Walker and M. Timm Hoffman
July 2023*

Figures

Note: Figures in the print versions of this book have not been reproduced in colour because of cost considerations.

Figure 1.1	Selected non-farming land uses (approved and proposed) in the Karoo, as of 2022	2
Figure 1.2	Rainfall distribution and global horizontal irradiation in South Africa: (a) Mean annual rainfall distribution, South Africa; (b) Global horizontal irradiation, South Africa	7
Figure 1.3	The Nama Karoo and Succulent Karoo biomes, showing provincial and local municipality boundaries and administrative centres	9
Figure 1.4	The Karoo Region according to the Karoo Regional Spatial Development Framework (DALRRD)	11
Figure 1.5	Location of the main case study sites discussed in this volume	12
Figure 2.1	Workflow for building the database of Karoo literature used in this analysis and for writing the interpretive overview	22
Figure 2.2	(a) Number of Karoo research publications (N = 2 939) from the 1850s to 2020; (b) Percentage contribution of each of the primary research groupings to the full Karoo literature corpus	23
Figure 2.3	The percentage of articles on the Karoo that are concerned primarily with studies in (a) the Earth Sciences in general and (b) Geology in particular	26
Figure 2.4	The number of articles on the Karoo that are concerned primarily with studies in the Environmental Sciences	27
Figure 2.5	The percentage of articles on the Karoo that are concerned primarily with studies on plants	30
Figure 2.6	The percentage of articles on the Karoo that are concerned primarily with studies on animals	32
Figure 2.7	The percentage of articles on the Karoo that are concerned primarily with studies in the Agricultural Sciences	35

Figure 2.8 (a) The percentage contribution of each of the main disciplines concerned with the Social Sciences in the Karoo (N = 190); (b) The number of publications per decade in each of the main disciplines of the Social Sciences 36

Figure 2.9 The percentage of articles on the Karoo that are concerned with different quantitative and qualitative aspects of Development Studies within the Social Sciences 39

Figure 2.10 (a) The percentage contribution of each of the main disciplines concerned with the Humanities in the Karoo (N = 208); (b) The number of publications per decade in each of the main disciplines of the Humanities 41

Figure 3.1 Prieska within the Siyathemba Local Municipality, showing selected land uses as of 2022 67

Figure 3.2 Northward shift of the border of the Cape Colony: 1805, 1824, 1847 70

Figure 3.3 The Northern Cape's asbestos belt (illustrative) 75

Figure 4.1 South African settlement typology 92

Figure 4.2 Location of the three research towns, showing Karoo biomes and selected new land uses as of 2022 94

Figure 4.3 Mural at entrance to Vanwyksvlei, 2016 100

Figure 4.4 Group Areas in Loeriesfontein, as gazetted in 1968 103

Figure 4.5 Vanwyksvlei, showing former white and 'coloured' areas 104

Figure 4.6 Erven under claim in Loeriesfontein town centre and adjacent *saailande*, showing former group-area boundaries 105

Figure 5.1 Steinkopf and Leliefontein communal areas, showing the Namaqualand study area 122

Figure 5.2 Herder meeting at a water point in Steinkopf 130

Figure 5.3 A workshop with Steinkopf livestock keepers and herders, using a participatory Geographic Information System (GIS) approach . . 131

Figure 5.4 Herders and livestock keepers from Leliefontein ranking and sorting plants according to their differences in palatability 135

Figure 5.5	Livestock owner administering a homemade remedy to a Boer goat	140
Figure 5.6	A herder with landrace dogs, <i>kierie</i> [stick] and <i>vuvuzela</i> to protect livestock from predators	142
Figure 6.1	Ubuntu Local Municipality in the Nama Karoo	152
Figure 7.1	The Square Kilometre Array (SKA), showing its core site within the Meerkat National Park, spiral arms and neighbouring small towns	180
Figure 7.2	The black-backed jackal	184
Figure 7.3	Public meeting organised by the Department of Science and Technology and Square Kilometre Array South Africa, Carnarvon, 17 May 2016	189
Figure 8.1	The distribution of different conservation types in the Nama Karoo and Succulent Karoo biomes	208
Figure 8.2	The accumulated area (ha ×1 000) under conservation protection in the Nama Karoo and Succulent Karoo biomes from 1930–2020	210
Figure 8.3	Smoothed lines showing the cumulative number of different sub-types of nature reserves in the Nama Karoo and Succulent Karoo biomes since 1950	214
Figure 8.4	A conceptual framework for how biodiversity and ecosystem conservation is embedded within sustainable development and intersects with socio-economic benefits and climate change adaptation	221
Figure 9.1	Loeriesfontein in the context of the Hantam Local Municipality, showing renewable energy sites as of 2022	234

Figure 10.1 Emthanjeni Local Municipality, showing De Aar and renewable energy sites as of 2022 258

Figure 10.2 De Aar neighbourhoods, showing Kareeville and survey area . . . 265

Figure 10.3 View of Kareeville, 2017 268

Figure 10.4 A typical house in Kareeville, 2017 269

Figure 10.5 Distribution of cooking fuels used in Kareeville (2017) and De Aar (2011) 272

Figure 10.6 Usage of secondary sources of energy in Kareeville 274

Figure 10.7 Genogram of Lisa’s household, Kareeville, 2018 276

Figure 11.1 The geological Karoo Basin, showing the Central Karoo District Municipality, shale-gas exploration areas in the Karoo (2010 and 2022) and location of the Square Kilometre Array (SKA) 289

Figure 12.1 Active and abandoned mines in the Karoo, as of 2012 313

Tables and boxes

Table 2.1	The controlled list of keywords used to organise articles within the database of Karoo literature into primary research groupings (capital letters), major disciplines (bold) and sub-disciplinary fields of research (italics)	21
Table 2.2	The number of contributions of each type of publication (N = 2 939) to the main research groupings with the percentage contribution to the full Karoo literature corpus indicated in parentheses	24
Table 4.1	Demographic change in the Karoo, 1911–2004	102
Table 4.2	Percentage of households with selected services in survey towns and in South Africa	107
Table 4.3	Selected demographic data for survey towns, Northern Cape and South Africa	109
Table 4.4	Percentage of women in survey towns whose first pregnancy was before age 20, by age cohort	111
Table 4.5	Poverty levels and dependence on state grants in survey towns, Northern Cape and South Africa	113
Table 5.1	Herder knowledge systems used in weather forecasting	133
Table 5.2	Herder knowledge systems used in taxonomy, pasture management and in the ecological understanding of plants and landscapes	137
Table 5.3	Herder knowledge systems in herd management	143
Table 6.1	Distribution of commercial farmer respondents in Ubuntu Local Municipality by age and farm type	160
Table 6.2	Level of education of commercial farmer respondents in Ubuntu Local Municipality	160
Table 6.3	Farm ownership among commercial farmer respondents in Ubuntu Local Municipality	161

Table 6.4 Education levels of small-scale farmers interviewed in Victoria West 164

Box 8.1 The main types and sub-types of conservation protection in the Karoo within the Protected Area (PA) and Conservation Area (CA) categories, as found in two separate registers maintained by the South African Department of Forestry, Fisheries, and the Environment (DFFE), and a description of their main characteristics 204

Table 8.1 The number and areal extent (ha) of different types of Protected Areas (PAs) and Conservation Areas (CAs) and their percentage area covered relative to the total area of the Nama Karoo biome (comprising 24 828 214 ha) and the Succulent Karoo biome (8 366 177 ha) 206

Table 8.2 A list of the 10 national parks in the Karoo showing the area (ha) and proportion (percentage) of the national park occurring in either the Nama Karoo or Succulent Karoo biomes, together with their date of establishment 212

Table 8.3 The four main sub-types of nature reserves in the Nama Karoo biome and Succulent Karoo biome showing their number, area (ha), percentage of the total area protected by all nature reserves, and average size (ha) 213

Table 9.1 The REIPPPP’s Economic Development Scorecard 240

Table 9.2 IPP spend on goodwill projects in Loeriesfontein by April 2016 247

Table 9.3 Educational level of worker informants in Loeriesfontein 248

Table 9.4 Gross monthly income of worker informants in Loeriesfontein 249

Table 9.5 List of planned community development projects in Loeriesfontein from 2018 251

Table 10.1 Monthly income of employed household members in Kareeville survey site 271

Table 10.2 Access to social grants in Kareeville survey site 271

Abbreviations

ANC	African National Congress
ARC	Agricultural Research Council
ASSAf	Academy of Science of South Africa
CA	Conservation Area
CCAC	Climate and Clean Air Coalition
CEPF	Critical Ecosystem Partnership Fund
CLO	Community Liaison Officer
COSATU	Congress of South African Trade Unions
CSIR	Council for Scientific and Industrial Research
DA	Democratic Alliance
DAFF	Department of Agriculture, Forestry and Fisheries
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs
DEIC	Dutch East India Company
DENC	Department of Environment and Nature Conservation
DFFE	Department of Forestry, Fisheries and the Environment
DLC	District Land Committee
DME	Department of Minerals and Energy
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DRC	Dutch Reformed Church
DSI	Department of Science and Innovation
DST	Department of Science and Technology
EbA	Ecosystem-based Adaptation
EIA	environmental impact assessment
ELM	Emthanjeni Local Municipality

FARR	Foundation for Alcohol Related Research
FASD	Foetal Alcohol Spectrum Disorder
GBP	British pound sterling
GCBR	Gouritz Cluster Biosphere Reserve
GDP	gross domestic product
GIS	Geographic Information System
Ha	hectare(s)
IAP(s)	invasive alien plant(s)
IDP	Integrated Development Plan
IEA	International Energy Agency
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IUCN	International Union for Conservation of Nature
KKNK	Klein Karoo National Arts Festival
kWh	kilowatt-hour
LTER	Long-Term Ecological Research
MPRDA	Mineral and Petroleum Resources Development Act
MW	megawatt(s)
NACOSA	Networking HIV & Aids Community of Southern Africa
NEMA	National Environmental Management Act
NERSA	National Energy Regulator of South Africa
NGO	non-governmental organisation
NP	National Park
NPAES	National Protected Area Expansion Strategy for South Africa
NRF	National Research Foundation
NUM	National Union of Mineworkers
NUMSA	National Union of Metalworkers of South Africa
OECD	Other Effective Area-Based Conservation Measures
PA	Protected Area

PASA	Petroleum Agency of South Africa
PPA	Purchasing Power Agreement
RDP	Reconstruction and Development Programme
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RSA	Republic of South Africa
SAAO	South African Astronomical Observatory
SACAD	South African Conservation Area Database
SAEON	South African Environmental Observation Network
SALT	Southern African Large Telescope
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SAPAD	South African Protected Areas Database
SARAO	South African Radio Astronomy Observatory
SARCHI	South African Research Chairs Initiative
SASSA	South African Social Security Agency
SAWEA	South African Wind Energy Association
SCA	Supreme Court of Appeal
SDG	Sustainable Development Goal
SEA	Strategic Environmental Assessment
SKA	Square Kilometre Array
SKA SA	Square Kilometre Array, South Africa
SKEP	Succulent Karoo Ecosystem Programme
StatsSA	Statistics South Africa
tcf	trillion cubic feet
UCT	University of Cape Town
UN	United Nations
UNDP	United Nations Development Programme

UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United States of America
USD	US Dollar
WCARS	Western Cape Archival Records Service
WRSA	Wildlife Ranching South Africa
WWF-SA	World Wide Fund for Nature South Africa
ZAR	South African Rand

Chapter 1

Contested Karoo: An introduction

Cherryl Walker and M. Timm Hoffman

The extensive, semi-arid Karoo region of South Africa is often regarded as a barren area on the periphery of key national developments – a place given over to sheep farming where not much has changed in decades. This is not only a poor depiction of the history and unique biodiversity of this region, but also a serious misrepresentation of the changes currently underway. The region has undergone something of a revolution in land use in the last 30 years, with major investments in astronomy (notably the globally networked Square Kilometre Array (SKA) radio telescope), in renewable and non-renewable sources of energy (solar, wind, potential shale-gas mining), in biodiversity conservation, and in wildlife farming all impacting significantly on social dynamics and the natural environment. These investments build on older histories of enclosure, dispossession and extractivism, histories that are interlaced with evidence of resilience and restoration. The spatial extent of these land-use changes is illustrated graphically in Figure 1.1; their impacts and implications are taken up more fully in individual chapters in this edited collection.

Understanding this confluence of issues is more than just a parochial concern for the people who are directly affected and a handful of researchers. These developments place this unique region at the centre of critical national and global concerns around climate change, sustainable development, knowledge production, the conservation of threatened biodiversity, and the pursuit of social and environmental justice. The issues they raise are pertinent for people living far beyond the Karoo and are of considerable relevance for researchers and policymakers concerned with understanding and responding appropriately to the mounting challenges of our time.

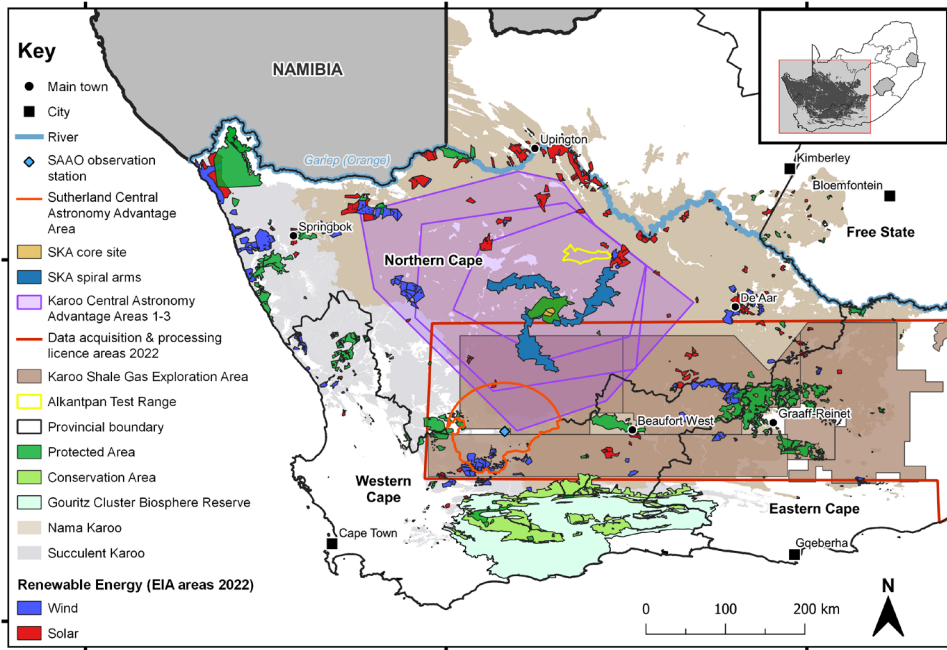


Figure 1.1 Selected non-farming land uses (approved and proposed) in the Karoo, as of 2022

The Karoo drylands cover almost a third of South Africa, extending down the country's Atlantic coast and stretching across the uplands of the southern and western interior to the Gariep (also known as the Orange) and Vaal Rivers in the east. Once an early frontier zone in the long, often violent history of colonisation in southern Africa, this land of wide, open spaces among rugged mountain ranges and freestanding *koppies* [hills] can today be regarded as a frontier zone once again – this time as a resource frontier within an established nation-state, in a new era of extractivism and unprecedented social-ecological change regionally, nationally and globally. As in the past, external agents, both corporate and state, are driving the nature and rate of change. Those investing in the new developments in this reconfigured resource frontier promise exciting opportunities for local employment and sustainable livelihoods, alongside national and global gains for science and the economy, as well as the reduction of South Africa's excessive carbon footprint. However, in the farming and small-town communities of the Karoo, troubling questions are being asked about the equitable spread of benefits from the new projects staking out the land, as well as the extent of local participation in the decision-making behind them.

The research presented in the chapters that follow has found that many Karoo residents are sceptical about the promises that are being made to them. They fear these will not materialise or the benefits will pass them by. Many think that addressing their daily struggles with poverty and dysfunctional government services should be the state's first priority. This research also points to serious concerns about the individual and cumulative impacts of the new developments on the tightly woven social and environmental fabric of life in the Karoo. Hydrologists warn of the significant threat to the region's precious underground water resources should shale-gas mining proceed. The SKA opens astonishing pathways to deeper understandings of the universe, but restricts other land uses around the site where it is being built. Wind and solar farms feed power into a struggling national electricity grid but bypass the poor households on their doorsteps. Large parts of the Succulent Karoo biome, a globally significant biodiversity hotspot in the western Karoo, have long been ravaged by inadequately regulated mining; now the damage is compounded by widespread poaching of rare and endangered botanical species for a global market.

This is the complex terrain this book explores. It brings together recent scholarship by established and younger researchers in both the social and the natural sciences, to examine the intersection in the Karoo of the local, the national and the global, the social and the environmental, as well as the complex triad of threat, opportunity and trade-offs embedded in this nexus. These issues are explored primarily through a series of case studies of selected developments in specific sites, complemented by several chapters that provide more historical and regional context. Collectively, the 10 research chapters unpack the ways in which the new developments are reordering land use and authority in different parts of the Karoo, and draw attention to the tensions and contestations that result. All recognise the importance of the interplay of the social and the environmental in shaping the dynamics they discuss. All are animated by the conviction that this work has wide significance, and that scholarly research should contribute to advancing commitments to social justice, conjoined with environmental sustainability.

The collection builds on recent syntheses of Karoo research, in particular two special issues in the *African Journal of Range & Forage Science* (Henschel et al., 2018) and in the *Journal of Southern African Studies* (Walker et al., 2019). The former addresses broad issues of land-use change and how it affects Karoo rangelands. Although articles are weighted towards the natural sciences, historical and sociological perspectives are also represented. The latter is more narrowly focused on the history and impact of astronomy in the Karoo, as a major land user with a marked earthly footprint. These two special issues built, in turn, on other important syntheses and subject-specific studies that are identified by Hoffman and Petersen in Chapter Two of this volume.

While there is no shortage of research on the Karoo, Hoffman and Petersen's review shows that it is uneven in terms of disciplinary focus. The contribution from the geological, palaeoecological, and biological sciences is significantly more extensive than that from the social and economic sciences. Very little research explores the impact of recent land-use changes on people and the environment, or offers holistic analyses designed to influence the direction of change. There is growing recognition that understanding the dynamics and trajectories of change in the Karoo requires an interdisciplinary approach that encompasses major fields of enquiry in the human/social and biophysical sciences (broadly understood). However, interdisciplinary research is hardly evident in the peer-reviewed literature that constitutes the dataset of close on 3 000 titles analysed by Hoffman and Petersen in Chapter Two of this volume.

We hope this collection will draw attention to the value of such work and the need for the research community to invest more time and resources in it. In this introductory chapter, we elaborate on selected points. In the next section, we consider the importance but also the challenges of inter-disciplinary work in and on the Karoo. This is followed by a discussion of the different ways in which the Karoo has been demarcated as a distinctive environment and what we consider its defining features to be. Thereafter, we provide a brief synopsis of each chapter, including the final chapter in which we review major themes that emerge from the collection and lay out areas for further research.

The interdisciplinary scope of the book

The title, *Contested Karoo: Interdisciplinary Perspectives on Change and Continuity in South Africa's Drylands*, highlights key dimensions of the way in which this compilation of recent research has been framed:

- The focus on the Karoo as a unique social-ecological environment ('South Africa's drylands')
- The understanding of the region as one in flux, in which certain continuities persist ('change and continuity')
- An engagement with the competing interests that are enmeshed in these dynamics ('contested Karoo')
- The foregrounding of interdisciplinarity, in terms of both content and the disciplinary backgrounds of authors ('interdisciplinary perspectives')

All the authors recognise the Karoo as a space in which social and environmental processes interact in complex ways and, in that interaction, demarcate a distinctive region within the country and the sub-continent more broadly. One increasingly prominent way of conceptualising the interaction of the social and the

environmental is to regard it as constituting a social-ecological system; that is, a system encompassing “societal (human) and ecological (biophysical) subsystems in mutual interactions” (Harrington et al., 2010:2773, quoted in Colding & Barthel, 2019). However, ways of understanding that interaction still tend to be anchored in strongly discipline-based analytical frameworks. Natural scientists focus mainly on their study organism or ecosystem, and on how human society affects the different components through land use and climate change. Social scientists working with the ideas of assemblage and actor-network theory emphasise the co-production of the world by both human and non-human actors (Murdoch, 2001). Political ecologists stress the unequal power relations among humans in the ways in which they interact with the biophysical world and access and exploit natural resources (Loftus, 2020).

While not all chapter authors use the language of systems or assemblage, all agree that researching processes of change and continuity in the Karoo (as elsewhere) requires attending to the enormous variety of social and natural forces that impact on each other at different, crosscutting scales. Simply identifying the most salient forces requires working across disciplinary divides, while analysing their interaction involves not only integrating but also interrogating the findings from disciplinary-based research in both the social and natural sciences. As discussions among the authors at our writers’ workshops have brought home, this important dialogical work is easier said than done. Natural scientists often ignore the social context except for its negative impacts on their research objects. For their part, social scientists are often ignorant about how the biophysical processes to which they may refer in passing actually work across different spatial and temporal scales. A major challenge is to navigate the crosscurrents resulting from the very different methodologies of the natural and social sciences, each with its own set of tools for measuring and classifying phenomena and understanding validity and ‘truth’. Yet the experience of engaging with these different approaches can be enormously creative. It extends intellectual horizons and, at its best, generates deeper insights into the workings of our world.

Defining the Karoo as an area of study

An important question to ask at this stage is what and where is the Karoo? Unsurprisingly, the answer to this question depends on where the viewer is based and the lenses through which this very large area of South Africa is viewed. In what follows, we set out the considerations that have informed our working understanding of the parameters that define this place, in conversation among ourselves and through engagement with different bodies of literature. Here we are especially indebted to the 2018 Karoo Special Issue of the *African Journal of Range & Forage Science*, in the introduction to which the Karoo is defined as follows:

The borders of the Karoo are blurred, with decisions as to its precise contours dependent on the purpose of the exercise. Contemporary understandings of subregions within the Karoo do not map precisely on historical definitions of place, while social and administrative considerations complicate more strictly environmental definitions. Fundamentally, however, the Karoo comprises two biomes, the Succulent Karoo and the Nama Karoo (Henschel et al., 2018:151).

In their treatment of the biomes and bioregions of South Africa, Rutherford et al. (2006) view a biome as a relatively large area with similar climatic and vegetation characteristics and shared disturbance features, such as grazing and fire. It is a high-level unit in a hierarchy comprising smaller entities such as bioregions, ecosystems, habitats, biological communities, and species. While the boundaries of these units are neither sharply defined nor unchanging, biomes are shaped by major geophysical and climatic features.¹

Critical here are geological substrates, rainfall and temperature gradients, as well as dominant vegetation types. These are key considerations in defining the Karoo in terms of its two interconnected biomes and the sustainable livelihoods they can support. Together these physical features constitute a hot, semi-arid region with steep temperature and rainfall gradients. The Nama Karoo, in the east, receives most of its rain in the summer months (September to March), while the Succulent Karoo in the west receives rain in winter (April to August). In general, rainfall in South Africa declines towards the west (Figure 1.2(a)). Historically this has set the Karoo apart from the eastern half of South Africa in terms of the human population densities and types of farming it can support – for the most part, extensive livestock farming on uncultivated rangeland. Today the Karoo's high solar radiation levels, which are at their most intense in the northwest, make it a significant site for solar energy (Figure 1.2(b)).

1 Although not captured on our maps, the Succulent and Nama Karoo biomes also extend into southern Namibia where, just as in South Africa, they jointly cover approximately one-third of the country (Henschel et al., 2018:151), with the Nama Karoo biome overwhelmingly dominant in Namibia.

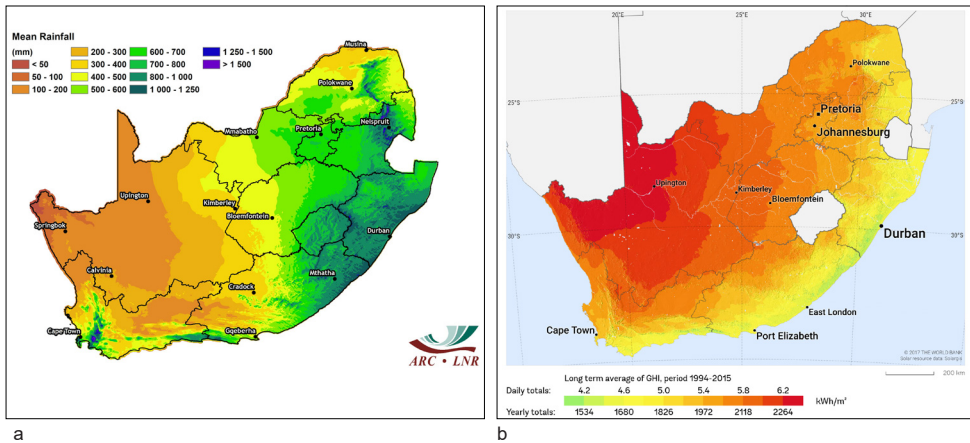


Figure 1.2 Rainfall distribution and global horizontal irradiation in South Africa: (a) Mean annual rainfall distribution, South Africa (Agricultural Research Council (ARC));² (b) Global horizontal irradiation, South Africa (World Bank)³

Most of the Nama Karoo biome is dominated by Beaufort Series shales and sandstones, while the Succulent Karoo biome comprises a complex array of relatively ancient geological substrates. The geology of the Karoo means it is rich in mineral resources. The history of mining in the Karoo stretches back into the colonial era, when first copper and then diamonds were extracted at great social and environmental cost. This was followed by asbestos mining in the twentieth century (discussed by Marcatelli in Chapter Three). Today, mining of the Karoo's iron resources and rare earth minerals is a major contributor to provincial gross domestic product (GDP) in the Northern Cape, while both the state and private investors are eyeing its layers of shale as a new but still speculative source of energy for exploitation in the form of shale gas (discussed by Xaba in Chapter Eleven).⁴ New applications for diamond and heavy mineral-sands mining extend across much of Namaqualand's coastal plain, while applications for the mining of uranium and base metals, such as zinc, lead and copper, cover significant parts of the Karoo interior.

² Reproduced with the kind permission of the ARC.

³ Reproduced from the World Bank's Global Solar Atlas 2.0, Solar resource data: Solargis (©2020 The World Bank).

⁴ Shale-gas potential is being investigated across the Karoo Basin, a geological name for an area of sedimentary rock that lies beneath and extends far beyond the Nama and Succulent Karoo biomes, which are the focus of this volume.

Although social scientists are increasingly having to recognise the importance of biophysical attributes in shaping human activity, they prioritise political, economic, and social features in determining the spatial units they study. These could be the ethnic or language identities that demarcate the territorial spread of social groups,⁵ or the hierarchically organised administrative boundaries of province, district and town, or the transport and communication networks that link population centres together or, as is often the case in the Karoo, pass them by. These features are historically shaped; the boundaries of the social spaces they demarcate shifting as a result of the interplay of political developments, economic trends and technological innovations, such as the invention of fencing and windmills, two significant nineteenth-century technologies in the case of the Karoo (Archer, 2000). Social boundaries are also porous, and important flows and linkages between people and communities extend far beyond formally proclaimed administrative borders. These considerations make historical comparisons and analyses that rely on time series data difficult, even for very simple metrics such as population trends and employment statistics.

Since the democratic transition of 1994 the Nama and Succulent Karoo biomes have straddled four provinces within South Africa – the Northern Cape, the Western Cape, the Eastern Cape and the Free State. Figure 1.3 below shows the overlay of current politico-administrative boundaries – those of provinces and local municipalities – on the Succulent Karoo biome in the west and south, and the larger Nama Karoo biome in the centre and east.

5 Terminology for ethnic and racial identities is the subject of intense political, theoretical, and orthographic debate. As far as possible, we have favoured the terms that people use or have used to describe themselves (e.g. |Xam, Baster) and, where racialised terms are required (e.g. white, black), we have not capitalised them. We have also used quotation marks for 'coloured' to signal the social and political ambiguities surrounding this term historically.



Figure 1.3 The Nama Karoo and Succulent Karoo biomes, showing provincial and local municipality boundaries and administrative centres

However, for most of the twentieth century, the Karoo biomes fell almost entirely within a single administrative unit, the Cape Province of both the Union of South Africa that came into being in 1910, and the Republic of South Africa (RSA) for the period 1961–1994. Before Union, and starting in the eighteenth century, this region was slowly but progressively incorporated into the Cape Colony as white *trekboers* [semi-nomadic pastoralists] pushed into the interior from the Dutch East India Company (DEIC) outpost at Cape Town, and southern Africa was drawn more and more tightly into the ambit of British imperialism. The northward shift of the colonial boundary across the Karoo in the nineteenth century, along with the violent subjugation of its indigenous people and the emergence of new social formations that this signalled, are addressed more fully in Chapters Three and Four. This was when the foundations of what many would consider the defining features of the contemporary Karoo, as an area dominated by white-owned commercial sheep farms and a thin network of small country towns, were laid down.

These historical and socio-political considerations have produced geographies that do not align neatly with those based on biophysical consideration alone. Bringing all these considerations together, the Karoo can thus be seen as a distinctive

biosocial space in South Africa, one marked out by history, climate and topography, and the plant and animal life these features can sustain. Walker et al. (2018:157) have further suggested that “aligning social and ecological considerations” produces five overlapping Karoo subregions, each with a particular mix of social, economic, and ecological features but blurring into the bioregions on their borders. These are Namaqualand in the north-west, the Great Karoo in the centre, the Upper Karoo in the north, the Little Karoo in the south, and the Grassy Karoo in the east.⁶

What working in a semi-arid region like the Karoo makes very clear is the authority of its geophysical environment in establishing the parameters within or against which human endeavours have taken shape. However, equally clear is that political decisions can make telling interventions. The extent to which the boundaries of the Karoo are subject to political considerations has recently been illustrated by an initiative of the Department of Agriculture, Land Reform and Rural Development (DALRRD) to define the Karoo as a special region for national planning purposes, in terms of the Spatial Planning and Land Use Management Act of 2015. The Karoo Regional Spatial Development Framework, which was formally gazetted in September 2023, outlines ambitious plans for the development of the Karoo, based on an assessment of its natural resource base, contemporary social features, and established and new land uses (DALRRD, 2023). While this represents a welcome recognition of the importance of holistic planning for a region as large but also as marginalised and under-served as the Karoo, it has also involved a political decision to include almost half the Free State Province within the borders of what is now officially recognised as ‘the Karoo Region’. According to this determination, the Karoo extends eastwards as far as the Mangaung Metropolitan region (which has Bloemfontein at its centre) (see Figure 1.4).

⁶ Walker et al. (2018) used the geographically descriptive ‘Northern Karoo’, but we have reverted to the more widely used ‘Upper Karoo’ in our labelling.

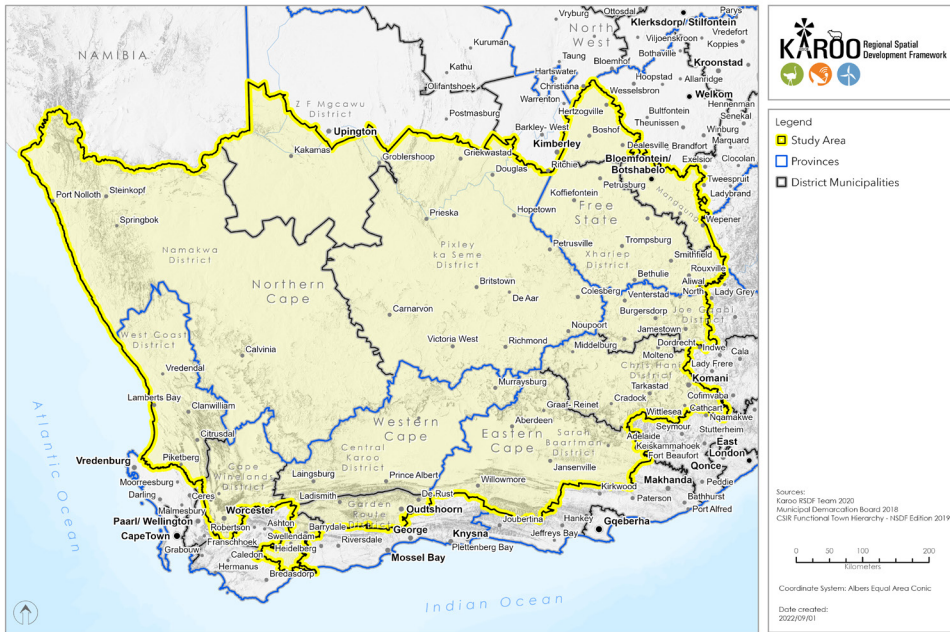


Figure 1.4 The Karoo Region according to the Karoo Regional Spatial Development Framework (DALRRD)⁷

This is much further east than the environmental and social considerations discussed above support. DALRRD’s newly gazetted ‘Karoo region’ not only includes bioregions that most ecologists would say are not ‘Karoo’ (such as the coastal plains of the Breede River valley in the southern Cape) or are transitional zones, but also incorporates new social and political dynamics into the mix. The prominence of Afrikaans is diluted, and the distribution of the population weighted more heavily towards the east.⁸ It also increases the area of the Karoo to some 40% of the country. Given that these boundaries were officially gazetted in October 2020 (Republic of South Africa, 2020), they are likely to acquire more force over time, and to influence regional debates on development priorities and where investments should be located. This is an issue for ongoing monitoring and further research.

7 Copied with kind permission from <https://gazettes.africa/archive/za/2020/za-government-gazette-dated-2020-10-19-no-43822.pdf>.

8 According to the 2011 Census, Afrikaans was the dominant language in 22 of 26 Karoo local municipalities; in 20 of them it was the first language of 70% of the population or more (Walker et al., 2018: Table 1).

Chapter overview

Most chapters in this volume offer case studies centred on particular small towns and their surrounding districts. The location of these towns in relation to the two biomes and the administrative overlay of provincial and local municipality boundaries is shown in Figure 1.5.

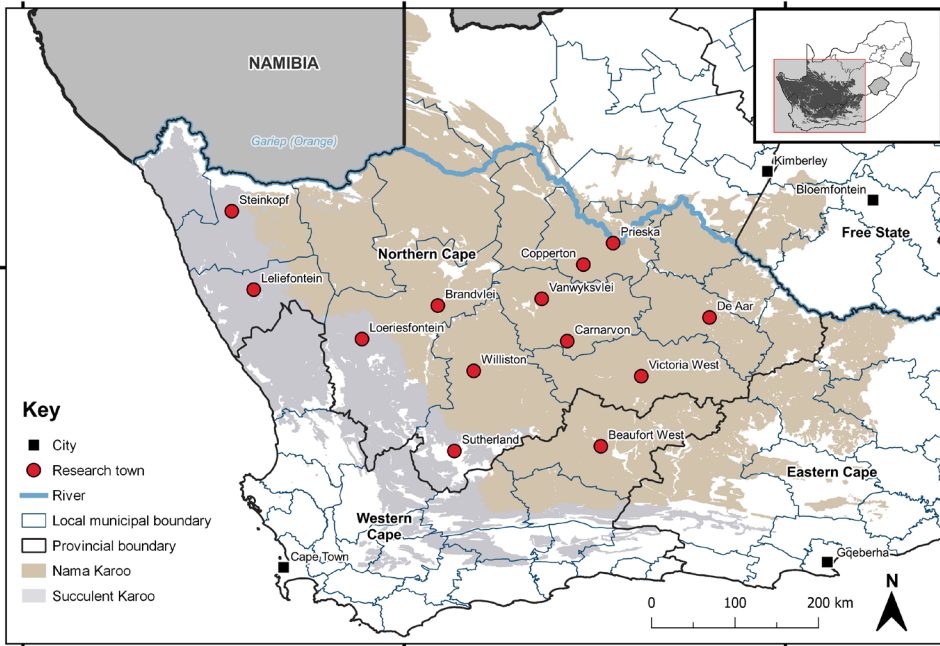


Figure 1.5 Location of the main case study sites discussed in this volume

Chapters are arranged in four loose clusters. The first cluster consists of this introductory overview and a review of the published scholarship on the Karoo between the early 1900s and 2020 in Chapter Two. This chapter by Hoffman and Petersen identifies notable trends within various disciplinary subfields in this time, as well as the growth of what might be called ‘Karoo Studies’, especially since the 1980s. Research has always been dominated by the natural sciences, although the social sciences have become more prominent in the last two decades. The authors’ bibliometric analysis of close on 3 000 publications shows that half (49%) of all items in this database were in the biological sciences, followed by the Earth sciences at 18%. Collectively, the human and social sciences made up 13% of the total, followed by the agricultural sciences at 8%, with the paleo, environmental and climate sciences together making up the remaining 12%.

The second cluster (Chapters Three and Four) provides important historical context for contemporary developments, with case studies of long-term trends in the region of Prieska (Marcatelli, Chapter Three) and the small towns of Sutherland, Vanwyksvlei and Loeriesfontein (Walker & Vorster, Chapter Four). Both chapters also point to contemporary land-use changes and the emergence of the Karoo as a new resource frontier in the districts around these towns today. Chapter Three traces the emergence of what Marcatelli theorises as a 'surplus population' from a mix of Khoisan and Xhosa-speaking groups who were progressively displaced in the Upper Karoo as a result of its incorporation within the Cape Colony in the nineteenth century. In the twentieth century, Prieska was an important centre of asbestos mining, with devastating impacts on human and environmental health. More recently, this region has seen major investments in renewable energy and copper mining, along with centre-pivot irrigation farming along the Gariep River. These developments have not, to date, heralded significant improvements in the lives of the majority of local residents, who still constitute a marginalised surplus population. However, whereas previously they were politically excluded but economically indispensable as cheap labour, today they find themselves economically excluded but politically indispensable as voters at periodic elections.

Chapter Four looks first at the intriguingly different origins of its three case-study towns in the colonial era and then at contemporary socio-economic conditions. This review is based on a comparison of findings from household surveys that were conducted in each settlement between 2016 and 2019. All three towns have seen major investments unfold around them, in astronomy (Sutherland and Vanwyksvlei) and in renewable energy (Loeriesfontein and Sutherland). In all three towns, however, extremely high levels of poverty as well as social challenges that include poor educational outcomes and high levels of alcohol and drug abuse severely limit the extent to which most local people can benefit from these projects. At the same time, respondents in the household surveys identify certain valued social attributes related to the intimate scale and relative peacefulness of these small-town 'dorpescapes'; these are positive qualities that need to be safeguarded.

The third cluster of chapters, Chapters Five to Eight, addresses developments in agriculture and conservation as historically significant land uses that are undergoing major processes of change. Chapter Five, by Cupido, Ellis and Samuels, explores the knowledge systems practised by Nama herders in the communal areas of Namaqualand, which show elements of both continuity and change. This chapter draws on research conducted with herders from the communal areas of Leliefontein and Steinkopf. The amalgamation of indigenous knowledge with scientific and what the authors describe as idiosyncratic forms of knowledge has produced an 'agrisyncretic' knowledge system that is both distinctive to the region and future adaptable, with important lessons for policymakers and agricultural practitioners concerned with the future of livestock production in a changing Karoo.

Chapters Six and Seven focus on commercial farmers and the major changes they are facing as their former social dominance in the Karoo erodes and they try to navigate a combination of economic, environmental and political challenges. Chapter Six, by Manyani, explores the views of white commercial farmers in the Ubuntu Local Municipality on the shift from livestock to game farming that is evident in their district. While this area is regarded as excellent for extensive sheep farming, a minority of farmers with access to the necessary capital are embracing game farming as an important part of their business plans. This is for a complex mix of reasons in which environmental considerations feature but are subordinated by concerns around economic security. The chapter includes a discussion of the views of black backyard and commonage farmers in Victoria West, for whom game farming is at this stage an unimaginable undertaking.

Chapter Seven, by Terblanche, looks at the long history of conflict between farmers and black-backed jackal in the Karoo, but locates this in a very new context: the construction of the major international radio astronomy project, the SKA, in the Upper Karoo. This has required the purchase of some 135 000 hectares of former farmland for the core site and the imposition of significant restrictions on certain everyday activities that interfere with the telescope's operations, thereby limiting the scientific value of the local array. These restrictions include the use of regular cell phones, petrol-powered cars, and electric fences. The chapter explores how, during the SKA's land acquisition programme between 2016 and 2019, the jackal and the SKA became fused as inter-related problems for affected farmers in the area around Carnarvon, Williston, Brandvlei and Vanwyksvlei, the small towns most directly affected by the SKA. The farmers felt that not only their needs but also their local knowledge were being disregarded by the powerful new landowner in their district. The declaration of the SKA core site as the Meerkat National Park in 2020 has ushered in a new era for this difficult but evolving set of relationships.

Chapter Eight, by Hoffman and Gillson, shifts the focus from farming to conservation, two long-entangled commitments in the Karoo. The authors describe the different types of Protected and Conservation Areas in the Succulent and Nama Karoo biomes and the history of their development, before exploring current and likely future conservation trajectories. Extractive land-use practices such as mining, but also unregulated commercial agriculture, have for decades impacted negatively on the unique and vulnerable biodiversity of the Karoo. The emergence of an active conservation community over the last three decades, comprising both state and non-statutory organisations, has created an important bulwark against this exploitation. However, these successes are having to contend with powerful criticisms of the conservation models that have been developed, along with calls for a more far-reaching redistribution of access to the natural resources of the Karoo than that which is currently in place.

The fourth cluster, Chapters Nine to Eleven, brings major developments around the Karoo as a significant site for the generation of energy into focus. Chapter Nine, by Malope, extends the national debate on the need for a 'just transition' in South Africa's coal-producing regions to the regions where renewable energy is being produced, by arguing that the needs of the marginalised communities hosting wind and solar farms in the Karoo deserve far more attention than they currently get in policy debates. The chapter explores the limited prospects for meaningful job creation in host communities, through a case study of the construction of two wind farms outside the town of Loeriesfontein, where the local jobs this generated were mostly low-skilled, low-waged and short-term. However, the chapter also points to the as-yet unrealised developmental potential of the community trusts and community development commitments the renewable energy sector is required to support, provided certain principles and institutional safeguards can be built into their operations.

Chapter Ten, by Borchardt, expands on the theme of the disconnect between the current investment in new land uses in the Karoo and local needs, with a case study of household energy poverty in De Aar, a major renewable energy hub. Here the electricity that is being produced is being fed into the national grid, while the local municipality is struggling both to maintain the town's grid for which it is responsible and to service its mounting debt to the national electricity utility, Eskom. At the same time, most residents cannot afford to buy sufficient electricity from the municipality to meet all their basic monthly needs. The management of domestic energy resources is also a source of tension within households, which plays out along gendered and generational lines.

Chapter Eleven, by Xaba, turns to the contestations around the prospect of shale-gas mining (commonly described as 'fracking') in the Karoo, which has brought to the fore long-simmering tensions around unequal land rights, weak local economies, conservation and who speaks for whom. An unexpected by-product of the SKA is that fracking has been ruled out in the Northern Cape, because its operations would be too disruptive of the operating environment this astronomy project requires. This has focused attention on the shale-gas potential of the Central Karoo District Municipality of the Western Cape and, most recently, the Eastern Cape. This chapter explores perceptions in the Beaufort West area of the costs and benefits associated with shale-gas mining as well as the deep divisions between those who favour fracking for the jobs and development it is projected to bring, and those who oppose it as a radical threat to the environment, in particular the Karoo's vulnerable underground water supply. These divisions track but also straddle the fault lines of race and class.

The book concludes with a final, reflective chapter in which we review five major themes that emerge from the preceding chapters and briefly discuss the implications

for social-ecological change and continuity in the region. The five themes are: 1) the Karoo as a newly reconfigured resource frontier, 2) the changing nature of farming, 3) the Karoo's isolated and struggling small towns as significant but neglected sites of social reproduction, 4) challenges to the ecological health of the region and the imperative of conserving its biodiversity, and 5) the power relations inherent in these concerns. While we acknowledge the importance of the region's contribution to national and global goals around mitigating climate change, protecting biodiversity and advancing scientific knowledge, we highlight the equally urgent need to address local needs and advance social justice in Karoo communities. This calls for a re-imagining of more diverse and inclusive local economies, in which the natural and social resources of the region are harnessed far more purposefully and sustainably than they have been to date in the service of human and environmental wellbeing.

Conclusion

This book is not claiming to offer a comprehensive evaluation of change and continuity in the Karoo. There are clearly important gaps. Underrepresented issues include a focused discussion of climate change and the likely future impacts of a drier and hotter Karoo on biodiversity, as well as on livelihoods that rely on agriculture. Also absent are sustained discussions of local politics, social identities, migration patterns and the state's land reform programme and their impacts on land use, livelihoods and poverty alleviation in this semi-arid region. Given the dynamic nature of the changes that are described, some of the data that is contained in these chapters will also need regular updating.

What this book does offer is a set of studies that challenges perceptions of the Karoo as a peripheral wasteland and, in that challenge, places developments in this region at the centre of major contemporary debates about land-use change, social justice and environmental sustainability. Furthermore, this collection highlights the value of a critically engaged, interdisciplinary scholarship that can both scrutinise and inform policy in different ways. Several chapters raise questions about the fit between public policy – on energy, on agriculture, on conservation – and what is happening on the ground. Others provide evidence of issues that deserve far more nuanced understanding than currently prevails, including the social dimensions of poverty and marginalisation, the challenges of farming and promoting biodiversity conservation in a semi-arid environment, and the limits of local government.

While the chapters do not offer a blueprint for policy development and implementation, they provide important commentary on issues that urgently need to be addressed. Relatively little research of this kind has been undertaken in the Karoo, but the need for such interdisciplinary work has never been more apparent. It is hoped this volume will encourage further work along these lines.

References

- Archer, S. 2000. Technology and Ecology in the Karoo: A Century of Windmills, Wire and Changing Farming Practice. *Journal of Southern African Studies*, 26(4):675–696. <https://doi.org/10.1080/03057070020008224>.
- Colding, J. & Barthel, S. 2019. Exploring the social-ecological systems discourse 20 years later. *Ecology and Society*, 24(1):2. <https://www.jstor.org/stable/26796920>. <https://doi.org/10.5751/ES-10598-240102>.
- Department of Agriculture, Land Reform and Rural Development (DALRRD). 2023. *Karoo Regional Spatial Development Framework*. Pretoria: Department of Agriculture, Land Reform and Rural Development.
- Harrington, R., C. Anton, T. P. Dawson, F. de Bello, C. K. Feld, J. R. Haslett, T. Kluvánková-Oravská, A. Kontogianni, S. Lavorel, G. W. Luck, M. D. A. Rounsevell, M. J. Samways, J. Settele, M. Skourtos, J. H. Spangenberg, M. Vandewalle, M. Zobel, and P. A. Harrison. 2010. Ecosystem services and biodiversity conservation: concepts and a glossary. *Biodiversity and Conservation* 19(10):2773-2790. <http://dx.doi.org/10.1007/s10531-010-9834-9>
- Henschel, J., Hoffman, M.T. & Walker, C. (eds). 2018. Karoo Special Issue: Trajectories of Change in the Anthropocene. *African Journal of Range & Forage Science*, 35(3&4):151–393. <https://doi.org/10.2989/10220119.2018.1535214>.
- Hoffman, M.T., Cowling, M.R., Petersen, H. & Walker, C. 2021. Karoo research update: Progress, gaps and threats. *South African Journal of Science*, 117(1–2). <http://dx.doi.org/10.17159/sajs.2021/8695>.
- Loftus, A. 2020. Political ecology II: Whither the state? *Progress in Human Geography*, 44(1):139–149. <https://doi.org/10.1177/0309132518803421>.
- Murdoch, J. 2001. Ecologising Sociology: Actor-Network Theory, Co-Construction and the Problem of Human Exemptionalism. *Sociology*, 35(1):111–133. <https://doi.org/10.1177/038038501035001008>.
- Republic of South Africa (RSA). 2020. Department of Agriculture, Land Reform and Rural Development, Notice in terms of Section 18 of the Spatial Planning and Land Use Management Act (Act No. 160 of 2013). *Government Gazette* No. 43822, no. 577, 19 October.
- Rutherford, M.C., Mucina, L. & Powrie, L.W. 2006. Biomes and Bioregions of Southern Africa. In: L. Mucina and M.C. Rutherford (eds). *The Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute. 31–51.
- Walker, C., Milton, S.J., O'Connor, T.G., Maguire, J.M. & Dean, W.R.J. 2018. Drivers and trajectories of social and ecological change in the Karoo, South Africa. *African Journal of Range & Forage Science*, 35(3–4):157–177. <http://dx.doi.org/10.2989/10220119.2018.1518263>.
- Walker, C., Chinigò, D. & Dubow, S. (eds). 2019. Karoo Futures: Astronomy in Place and Space. Special issue, *Journal of Southern African Studies*, 45(4):667–790. <https://doi.org/10.1080/03057070.2019.1654664>.
- World Bank. 2020. Global Solar Atlas 2.0, Solar resource data: Solargis.

Chapter 2

Karoo Studies: A selected overview of published research to 2020

M. Timm Hoffman and Hana Petersen

An overview of research for such a large and varied region as the Karoo serves several purposes. First, it brings together information about the region that is widely scattered in the literature and illustrates the progression of knowledge across major academic disciplines. In so doing, it shows how different themes and emphases have changed over time in response to local interests and the availability of appropriate expertise, as well as national and international research initiatives. It also illustrates how social, political, and infrastructural developments have influenced the kind of research that has been done in the Karoo over time. A review of this nature further recognises the influence that some publications, scholars, and programmes have had on a discipline or region and identifies emerging trends and approaches. Finally, an overview of research about the Karoo highlights the main knowledge gaps in the literature and can help to direct future funding initiatives and academic activities, especially in terms of bridging the disciplinary divides. This overview confirms the Karoo as a legitimate area of study and highlights its environmental and social diversity and long history of occupation and exploitation. It also provides a backdrop against which many of the chapters in this book can be examined.

This review expands on Hoffman et al. (2021), which provided a more limited overview of progress and gaps in Karoo research and identified emerging threats to the region. While this chapter remains focused on the Nama Karoo and Succulent Karoo biomes (*sensu* Mucina and Rutherford, 2006), it examines nearly twice the number of articles as Hoffman et al. (2021). We first explore how the volume of published research about the Karoo has changed over time, up to the end of 2020. We also show the proportion of items, relative to the total output, contributed by each of the main research groupings. Then we look at the disciplinary and sub-disciplinary emphases within each research grouping and draw attention to influential publications. We highlight the limitations of our approach, suggest a few new research directions, and emphasise the need for more large-scale syntheses, especially of interdisciplinary studies, which is a growing field of research (Walker et al., 2018).

Approach

The primary focus of this review is on the Karoo. Therefore, broader treatments of the region that deal, for example, with the histories of the Northern Cape or in which the Karoo forms part of a wider regional or national focus, fall outside of our analysis. To build a corpus of literature for the Karoo region, a search query containing eight terms ('Karoo', 'Karoo', 'Namaqualand', 'Richtersveld', 'Sperrgebiet', 'Bushmanland', 'Knersvlakte', 'Augrabies') and the Boolean operator 'OR' was entered into three online academic literature repositories: Dimensions, Scopus, and all databases on the Institute for Scientific Information (ISI) Web of Science. The search was filtered to include documents published in any year up until the end of 2020. We also manually included peer-reviewed articles from an existing unpublished database of Karoo literature from the early 1900s–2006, and from a recently compiled bibliography of articles commonly cited in the social sciences, and which refer to the Karoo. De-duplication of the full data set of over 12 000 articles and manual filtering based on relevance to the Karoo region resulted in a total of 2 939 documents. These included mainly journal articles, but also books, book chapters, conference proceedings and reports. A few key reports in the so-called 'grey' literature (e.g., Scholes et al., 2016), which are relevant to some of the chapters in this volume, were also included. Each item was manually assigned to one of eight primary research groupings: Palaeo Sciences, Earth Sciences, Environmental Sciences, Biological Sciences, Agricultural Sciences, Social Sciences, Humanities, and Health Sciences (Table 2.1).

Table 2.1 The controlled list of keywords used to organise articles within the database of Karoo literature into primary research groupings (capital letters), major disciplines (bold) and sub-disciplinary fields of research (italics)

PALAEO SCIENCES	Palaeontology (<i>plants, animals</i>); Palaeoecology
EARTH SCIENCES	Geology (<i>stratigraphy, mineralogy, petrology, geochemistry</i>); Geohydrology ; Geomorphology ; Soil ; Mining ; Fracking
ENVIRONMENTAL SCIENCES	Climate (<i>general, drought, climate change</i>); Environmental Change (<i>vegetation, soil, animals, general</i>); Hydrology
BIOLOGICAL SCIENCES	Plants (<i>systematics, communities, populations, conservation, ecophysiology, ethnobotany, biogeography, Invasive Alien Plants (IAPs), evolution, general</i>); Animals (<i>insects, reptiles & amphibians, birds, mammals: small, mammals: medium-large, mesopredators, conservation, fish, general</i>)
AGRICULTURAL SCIENCES	Range Management ; Animal Husbandry ; Agricultural Economics ; General
SOCIAL SCIENCES	Anthropology ; Sociology (<i>crime, demographics, education, planning, risk & resilience, socio-economics, water</i>); Development Studies (<i>astronomy-aligned development initiatives, sustainable development, land reform, fracking, conservation & tourism, energy</i>)
HUMANITIES	Archaeology ; History ; Art, Literature & Music
HEALTH SCIENCES	Health

These groupings are based largely on the findings reflected in the Hoffman et al. (2021) overview. However, for the analysis in this chapter, the Climate Sciences grouping was reclassified as a sub-disciplinary category within the Environmental Sciences, and the Human Sciences grouping was disaggregated into the Social Sciences, Humanities and Health Sciences. Keywords were used to denote the primary disciplinary focus of each article within the main research groupings. In some cases, articles were further assigned to sub-disciplinary fields of activity. In writing the narrative overview for each research grouping and discipline, we sorted the articles using keywords as well as citation scores. This set of references shaped the narrative overview and helped to identify the main trends and most-cited directions of research within a discipline. The workflow, which outlines our approach, is summarised in Figure 2.1.

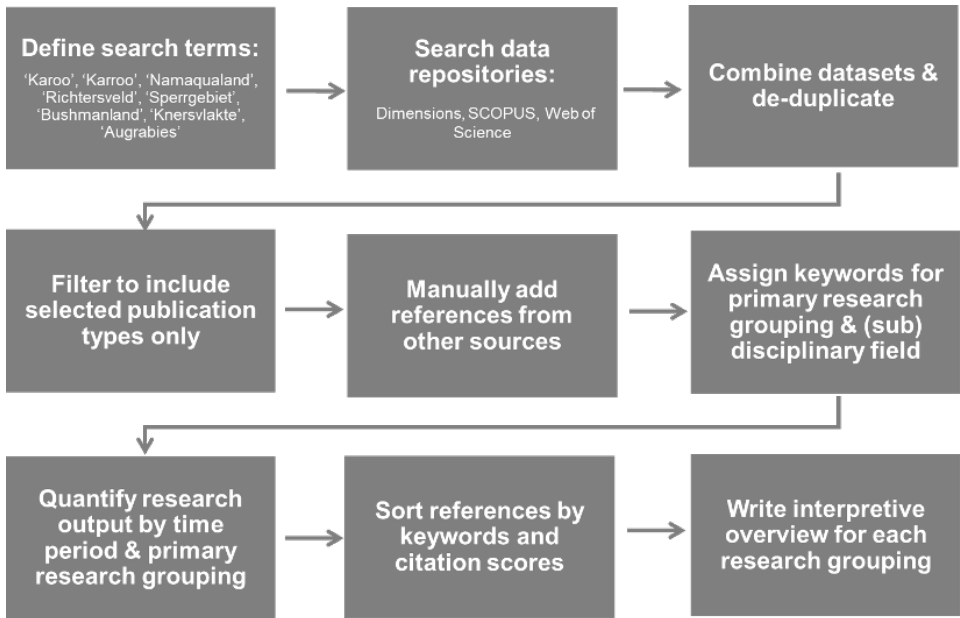


Figure 2.1 Workflow for building the database of Karoo literature used in this analysis and for writing the interpretive overview

Results

Research output over time and by primary research grouping

There has been a steady increase over time in publications on the Karoo (Figure 2.2(a)). There was a significant growth in output between the 1980s and 1990s, when the number of articles more than doubled. More than a third (36%) of all articles in the database have been published in the last 10 years and more than six times the number of items on the Karoo were published in the past decade (2011–2020) than emerged in all the years prior to 1980.

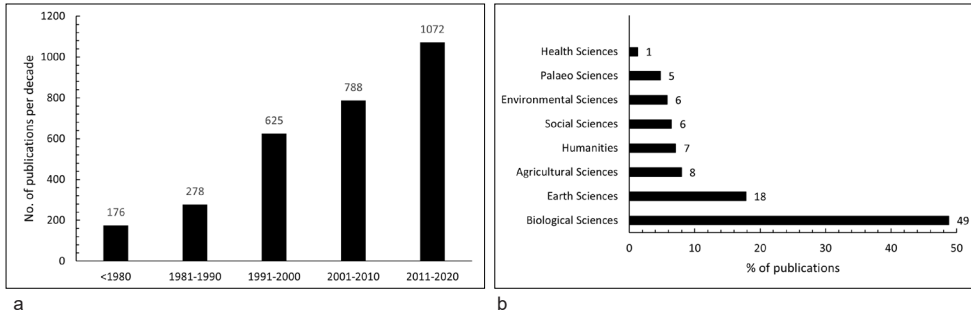


Figure 2.2 (a) Number of Karoo research publications (N = 2 939) from the 1850s to 2020; (b) Percentage contribution of each of the primary research groupings to the full Karoo literature corpus

Nearly half (49%) of all articles on the Karoo are concerned with the Biological Sciences, while 18% address various aspects of the Earth Sciences (Figure 2.2(b)). The Agricultural Sciences make up 8%, while the Humanities and Social Sciences together comprise 13%. The remaining three research groupings (Environmental Sciences, Palaeo Sciences, and Health Sciences) represent 12% of all publications. These results suggest that while there has been some research on issues affecting Karoo society, the overwhelming emphasis in the peer-reviewed literature has been on the natural environment. A more detailed breakdown of the kind of research undertaken in each main discipline and its relative weighting by sub-disciplines is presented later. This will show that despite the emphasis on the Biological and Earth Sciences, there has been an exponential increase in research in the Humanities and Social Sciences in the last two decades.

Main publication type and journal preference

Ninety-four per cent of all research examined in this review has been published as peer-reviewed journal articles (Table 2.2). Book chapters comprise 3.6% of all published material, while conference proceedings make up 1.2% of the database. The remainder are either books or reports. A greater proportion of articles in the Social Sciences and Humanities are listed as book chapters and books in the database when compared to other research groupings. For example, 83% of items are published as journal articles in the Social Sciences and Humanities, and nearly 13% are published as book chapters or books, with the remainder comprising conference proceedings and reports. The equivalent values for the Biological Sciences are approximately 97% for journal articles, and 3% for other forms of publications.

Table 2.2 The number of contributions of each type of publication (N = 2 939) to the main research groupings with the percentage contribution to the full Karoo literature corpus indicated in parentheses

Research grouping	Journal articles (93.8%)	Book chapters (3.6%)	Conference proceedings (1.2%)	Books (0.8%)	Reports (0.5%)
Palaeo Sciences	133	6	1	-	-
Earth Sciences	484	18	22	-	-
Environmental Sciences	158	8	3	-	1
Biological Sciences	1390	34	4	4	3
Agricultural Sciences	224	6	-	3	1
Social Sciences	151	22	5	4	8
Humanities	180	13	-	12	3
Health Sciences	37	-	1	-	-
TOTAL	2757	107	36	23	16

The seven most popular journals, each of which contains more than 50 publications on the Karoo, are the *South African Journal of Botany*, *Journal of Arid Environments*, *South African Journal of Geology*, *Bothalia*, *South African Journal of Science*, *African Journal of Range & Forage Science*, and *Koedoe*. Apart from the *Journal of Arid Environments*, all are local South African journals, and reflect the dominance in the database of journal articles concerned with the Biological and Earth Sciences. Articles in the Humanities and Social Sciences are scattered over a far larger range of publication outlets. The *South African Archaeological Bulletin*, *The Journal of African History* and the *South African Theatre Journal* are common titles in the Humanities, while the journal title with the greatest number of articles in the Social Sciences is the *Journal of Southern African Studies*, with 18 articles. Other titles that are relatively well represented in the Social Sciences include *Development Southern Africa* and the *Journal of Contemporary African Studies*. Several articles in the Humanities and Social Sciences have also been published in those outlets more commonly reserved for the Biological, Environmental or Agricultural Sciences, such as the *Journal of Arid Environments* or the *African Journal of Range & Forage Science*. This reflects the increased interest in interdisciplinary research within the broadly defined natural and social science disciplines. Few papers from any discipline have been published in the top 50 global science journals. Only six papers in the database have been published in *Nature* and only one in *Science*.

Interpretive overview of research within the primary research groupings

This section explores the disciplinary and sub-disciplinary focus within each of the primary research groupings. The order in which the research groupings are discussed is the same as listed in Table 2.2. For some research groupings, graphs are used to illustrate the emphasis that has been placed on different (sub-)disciplinary fields. Articles considered noteworthy by the authors, often those with high citations, or those that best represent the discipline, are highlighted in the text.

PALAEO SCIENCES

Articles in the Palaeo Sciences are divided into those that are concerned with Palaeontology, the study of fossil animals and plants, and those concerned with Palaeoecology, which investigate a broader suite of long-term ecological and environmental changes in the Karoo.

Vertebrate fossils are abundant in the Karoo Basin, which is a large sedimentary basin extending across much of South Africa and beyond the boundaries of the biosocial Karoo as defined in this book (see Walker & Hoffman, Chapter One). Researchers, primarily from the Iziko Museum (Smith & Botha-Brink, 2014) and University of the Witwatersrand (Rubidge, 2005) have been prolific in their analysis of these fossil assemblages that have contributed significantly to our understanding of the development of life on Earth. The Karoo Basin has the richest assemblage of mammal-like reptiles in the world and more than 90% of the 114 Palaeontology references in the database are concerned with animal fossils. The majority of the 11 articles that investigate fossil plants describe fossil woods in the Karoo Basin (Bamford, 2016).

Palaeoecologists use a range of terrestrial and marine proxies to reconstruct palaeoenvironments of the Karoo (Benito et al., 2011; Dewar et al., 2012; Neumann & Bamford, 2015). The most cited article in the database, with 365 citations, is that of Chase and Meadows (2007). These authors describe the expansion and contraction of the winter rainfall zone in southern Africa and link these dynamics to the glacial and interglacial periods of the Late Quaternary (the last 50 000 years). However, results from one of the few palynological studies in the Karoo (MacPherson et al., 2017) suggest that despite the potential changes in palaeoclimates, boundaries between fynbos and Succulent Karoo floras in the Kamiesberg, at least, have been relatively stable over approximately the last 5 500 years.

EARTH SCIENCES

Earth Sciences research dominated the Karoo literature until the 1990s, whereafter publications in the Biological Sciences became more numerous. The period 2011–2020, however, has seen a resurgence in Earth Sciences research in the Karoo. Articles on Geology comprise 438 of the publications (or 84%) in this research grouping (Figure 2.3(a)). Investigations into the geohydrology of Karoo aquifers, especially in terms of their hydrochemical characteristics and concentrations of uranium, fluoride, and lead, comprise 9% of the articles (Abiye & Leshomo, 2014). Several more recent geohydrological articles have been concerned with the potential impact of hydraulic fracturing (fracking) on groundwater resources (Vermeulen, 2013). All 16 articles on fracking listed under Earth Sciences have been published in the last decade, and detail the technical aspects of extracting gas from shale in the Karoo (De Kock et al., 2017). Articles dealing with the legal, economic, and social aspects of fracking are reflected under the Social Sciences. Almost 5% of all Earth Sciences research in the Karoo has been concerned with Geomorphology, Soil and Mining. General descriptions of the soils of Namaqualand (Francis et al., 2007) and field studies on the exchange of H₂ and CO between Karoo soils and the atmosphere (Conrad & Seiler, 1985) are well-cited.

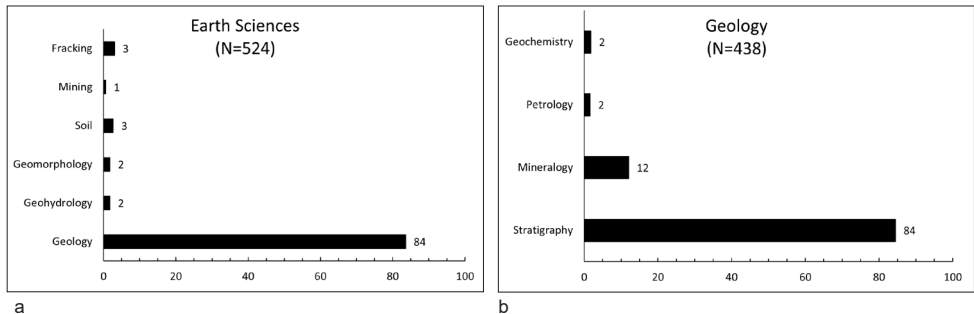


Figure 2.3 The percentage of articles on the Karoo that are concerned primarily with studies in (a) the Earth Sciences in general and (b) Geology in particular

Of the 438 articles on Geology, 85% are concerned with the stratigraphy of Karoo sediments (Figure 2.3(b)) and are among the most cited articles in the database (Johnson et al., 1996). The Karoo is known for its extraordinary mineral wealth and detailed accounts of the mineralogy and composition of important ore deposits in the Karoo, such as diamond, copper, uranium, and tungsten, make up 12% of all Geology articles (Raith & Stein, 2000). Articles on Petrology and Geochemistry comprise the remainder.

ENVIRONMENTAL SCIENCES

About a quarter (24%) of the 170 publications in the Environmental Sciences are concerned with aspects of climate in the Karoo and about 4% with hydrology. However, by far the majority of the articles in this discipline (72%), address aspects of environmental change (Figure 2.4).

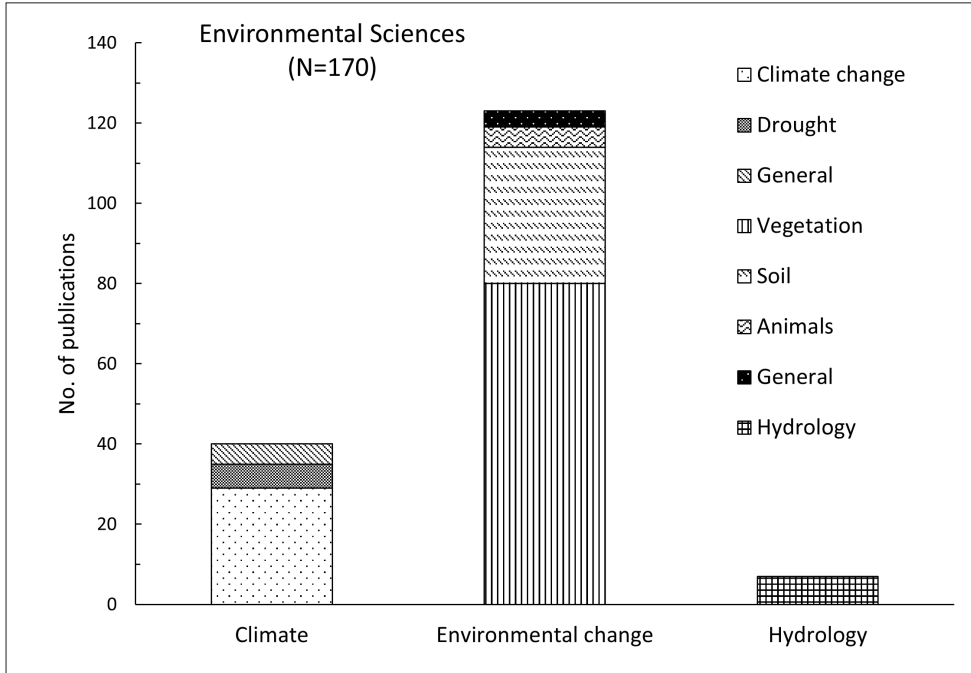


Figure 2.4 The number of articles on the Karoo that are concerned primarily with studies in the Environmental Sciences

Nearly half of all the articles concerned with Karoo climates have been published in the period 2011–2020. Just over a quarter of the 40 articles on this theme deal either with a general description of the Karoo climate (Desmet & Cowling, 1999) or with the effect of drought on Karoo vegetation (Hoffman et al., 2009; Vetter, 2009). Research into the impact of the recent drought in Namaqualand (Schmiedel & Oldeland, 2018) builds on the early work carried out in the Steytlerville Karoo (Milton et al., 1995). The remainder of the articles on climate use either the long-term climate record (MacKellar, Hewitson & Tadross, 2007; Davis, Hoffman & Roberts, 2016) or archival documentary sources (Kelso & Vogel, 2007) to explore emerging trends in rainfall and temperature. Most analyses show a warming trend but find little evidence for a decline in annual rainfall, with some studies even showing a

significant increase in rainfall, especially from the central (Harmse et al., 2020) and eastern parts (Du Toit & O'Connor, 2014) of the Karoo. However, data from the recent drought experienced across much of the western Karoo during the period 2015–2019 (Archer et al., 2022) have not been included in these investigations. A few studies, which either make use of bioclimatic envelope models (Midgley & Thuiller, 2007; Young et al., 2016) or warming experiments (Musil, Schmiedel & Midgley, 2005; Maphangwa et al., 2012), suggest that the vegetation of the Succulent Karoo biome is especially vulnerable to the impact of anthropogenic climate change. Birds are the only group of animals that have been investigated in terms of how they might respond to climate change in the Karoo (Simmons et al., 2004). Surprisingly, except for the work of Pattinson and Smit (2017), few detailed studies have been undertaken on this theme in the last decade despite the threat that climate change poses to the Succulent Karoo especially.

The majority of articles on environmental change consider how vegetation has responded to climate and the impact that different land-use practices, especially herbivory, have had on the vegetation (Figure 2.4). Amongst the most cited papers in this field are those that consider the cost of degradation (Milton et al., 1994) and its impact on plant diversity (Todd & Hoffman, 1999) as well as ecosystem services (Reyers et al., 2009). Desertification is a major theme in this field (Dean et al., 1995) and long-term data sets (Jürgens et al., 2012; Arena et al., 2018; Nenzhelele, Todd & Hoffman, 2018; Van Rooyen et al., 2018) and the use of repeat photography (Hoffman & Rohde, 2007, 2011; Masubelele et al., 2014) underpin many of the conclusions about environmental change in the Karoo. Only a handful of articles explore the use of satellite imagery in measuring environmental change (Thompson et al., 2009). However, this is set to change as data becomes more accessible (Venter et al., 2020) and as statistical approaches to measure degradation from remotely sensed images improve (Bell, Hoffman & Visser, 2021).

About 20% of the papers on environmental change consider its impact on Karoo soils (Figure 2.4). Most of what we know about the effect of land use on soil degradation in the Karoo comes from a set of long-term studies undertaken in the Sneeuwberg Mountains near Compassberg (Boardman & Foster, 2008; Boardman et al., 2017). The influence of land management on sediment dynamics and the development of badlands and gullies has been a central focus of this research. The impact of land degradation on landscape-scale hydrology has also been linked to a decline in ecosystem services (Le Maitre et al., 2007). A novel approach to testing John Acocks' Karoo desertification hypothesis was undertaken by Bond et al. (1994), who examined C_3/C_4 carbon isotope ratios from soils along a rainfall gradient in the eastern Karoo. Using this approach, they found evidence of a historical decline in grass cover in response to heavy grazing by domestic livestock.

The impact of environmental change on Karoo animals is rather poorly represented in the database. One of the most cited papers on the theme uses the historical decline in stocking rates of domestic livestock as a measure of Karoo degradation (Dean & Macdonald, 1994). Disruption of habitats by livestock is also used to explain changes in small mammal communities in the Knersvlakte (Bösing et al., 2014). More recent research addresses the potential impact of solar power installations (Rudman, Gauché & Esler, 2017) and fracking (Todd et al., 2016) on animal biodiversity, especially that of flying animals such as birds, bats, and many insects.

BIOLOGICAL SCIENCES

Two main disciplines are represented by this research grouping. These are the plant and animal sciences that are broadly reflective of research undertaken in what are (or were) commonly referred to as the departments of botany and zoology at most universities.

Plants

The bulk of the 724 articles that have been published on Karoo plants are concerned either with plant systematics (36%) or studies on plant communities (22%) and populations (19%) (Figure 2.5). The remaining articles, which comprise 23% of the total for the discipline, cover a wide range of sub-disciplinary fields, including plant conservation, ecophysiology, ethnobotany, biogeography, and invasive alien plants (IAPs). The most highly cited papers in the discipline are concerned either with systematics (Klak, Reeves & Hedderson, 2004; Verboom et al., 2009), conservation (Cowling et al., 1999), or with general accounts of Namaqualand's unique biodiversity (Cowling, Esler & Rundel, 1999). These contributions mostly reflect research that has been undertaken on the flora and environments of the Succulent Karoo biome rather than the Nama Karoo biome. The development of several research initiatives (Cowling, Esler & Rundel, 1999) and programmes in the Succulent Karoo biome in the late 1990s, such as BIOTA Southern Africa (Jürgens et al., 2012) and the Succulent Karoo Ecosystem Programmes (SKEP) (Critical Ecosystem Partnership Fund (CEPF), 2012), had an important influence on this.

Much of the work on Karoo plant systematics has been undertaken by researchers from the Compton Herbarium (Manning, Goldblatt & Forest, 2009; Snijman, 2012) and the University of Cape Town (Klak, Hanáček & Bruyns, 2018; Bruyns, Hanáček & Klak, 2019). Significant contributions, over decades, have also come from international institutions and individuals (Ihlenfeldt, 1994), often working in collaboration with local researchers (Goldblatt & Manning, 2017). Some of the

earliest work on plant communities and populations in the Karoo was undertaken by researchers from the University of Pretoria (Van Rooyen & Grobbelaar, 1982) and the Department of Agriculture at Middelburg (Vorster et al., 1987), although research into the phytosociology of different regions of the Karoo had been undertaken even earlier (Werger & Coetzee, 1977). The initiation of the Karoo Biome Project in the mid-1980s (Cowling, 1986) led to an explosion of interest in plant community and population ecology (Milton, 1990; Yeaton & Esler, 1990; Wiegand, Milton & Wissel, 1995), which has continued to the present (Todd, 2006; Saaed et al., 2018; Petersen et al., 2020).

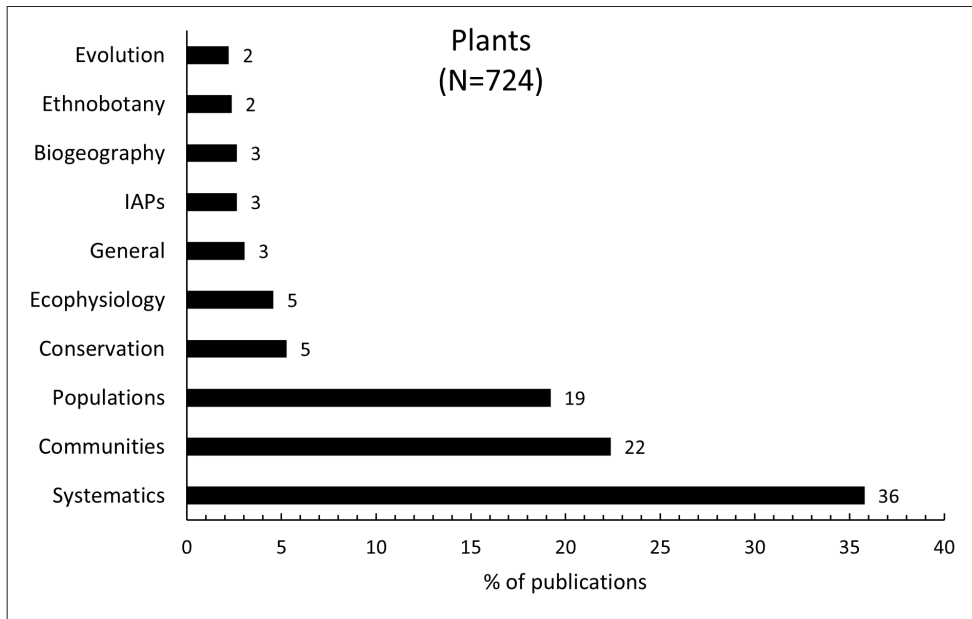


Figure 2.5 The percentage of articles on the Karoo that are concerned primarily with studies on plants

Articles on plant conservation include research on conservation planning (Cowling et al., 1999), on the conservation of ecosystem services (Egoh et al., 2010) and on single species protection (e.g., *Aloidendron dichotomum*) (Guo et al., 2016). Early ecophysiological work on Karoo plants focused on the role of Crassulacean Acid Metabolism in succulents (Von Willert et al., 1985; Rundel, Esler & Cowling, 1999). More recent research has addressed questions of water use by invasive alien plants (IAPs), such as *Prosopis* spp., relative to indigenous trees, such as *Vachellia karroo* (Dzikiti et al., 2017) and how frost acts to control the distribution

of species, such as *Portulacaria afra* (Duker et al., 2015). Ethnobotanical research has focused on both Khoisan and Cape Dutch medical ethnobotany (Van Wyk, 2008) with centres of interest both in Namaqualand (Nortje & Van Wyk, 2015) as well as the Little Karoo (Hulley & Van Wyk, 2019).

Research into IAPs in the Karoo has addressed problems related to specific taxa such as *Prosopis* (Ndhlovu, Milton & Esler, 2016), *Kalanchoe fedtschenkoi* (Smith & Figueiredo, 2017) and several species of Cactaceae (Dean & Milton, 2000). It has also been concerned with the role that road corridors might play in the dispersal of IAPs (Kalwij, Milton & McGeoch, 2008) and the economic cost related to the control of invasions (Mudavanhu et al., 2017).

Although only 16 articles directly address questions related to the evolution of plants in the Karoo, nearly all are concerned with taxa from the Succulent Karoo biome. This sub-disciplinary focus is noteworthy for the high-impact journals in which the work is published and their relatively large number of citations (Ellis, Weis & Gaut, 2006; De Waal, Anderson & Ellis, 2015), which, with a mean of 37 citations per article, is the highest for all sub-disciplines concerned with the study of plants in the Karoo.

Animals

For studies on animals (711 articles in total), most of the research effort (94%) has focused on the biology and systematics of animals within the main taxonomic groups such as insects, reptiles and amphibians, birds, small mammals, and medium to large mammals (Figure 2.6). Research on mesopredators, on general animal studies, and on conservation and fish reflect about 6% of the studies in this discipline.

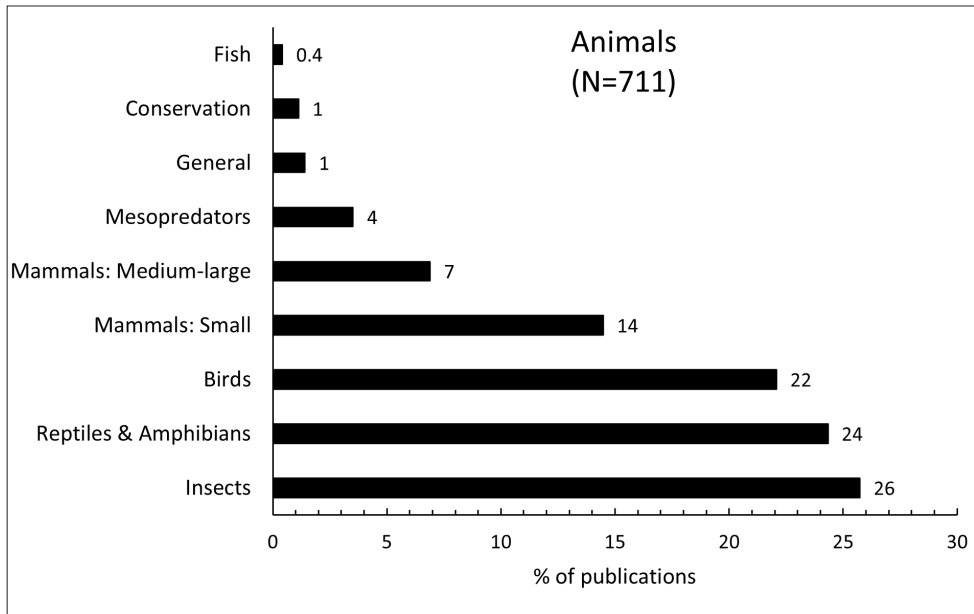


Figure 2.6 The percentage of articles on the Karoo that are concerned primarily with studies on animals

The most cited articles on insects cover a diverse array of orders although studies on ants (Botes et al., 2006; Dean, 2006), locusts and grasshoppers (Todd et al., 2002; Gebeyehu & Samways, 2003) and bees and wasps (Gess & Gess, 2004) are common. General accounts of insect diversity in Karoo environments also feature prominently (Milton, 1993; Lindsey & Skinner, 2001; Procheş & Cowling, 2006). The identification of what was initially thought to be a new order of insects, the Mantophasmatodea, which is unique to the winter rainfall region of South Africa and Namibia, has also attracted interest (Klass et al., 2003; Arillo & Engel, 2006). Approximately 60 articles have been published each decade for the last three decades on a diversity of subjects dealing with Karoo insects.

The Karoo supports a unique assemblage and high diversity of tortoises, lizards, and snakes. Behavioural studies on lizards, especially in the genera *Platysaurus* and *Cordylus* are among the most cited articles in the database (Mouton, Flemming & Kanga, 1999; Whiting et al., 2006). The ecology of the smallest tortoise in the world, the Namaqualand Speckled Padloper (Loehr, Henen & Hofmeyr, 2004), the Tent Tortoise (Zhao et al., 2020), as well as the significantly larger Leopard Tortoise, have also received attention (McMaster & Downs, 2006). More articles (N = 69)

have been published on Karoo reptiles and amphibians in the last decade than any other taxonomic group of animals.

Many of the studies on birds explore the factors affecting their diversity and abundance over space and time in response to temporal variation in rainfall (Lloyd, 1999), and other resources such as seed availability (Dean & Milton, 2001). The theme of nomadism and its importance for Karoo birds is explored extensively by Dean (1997) and expanded later, to cover desert birds from other drylands of the world (Dean, 2004). More recent themes include research on the impact that powerline collisions have on bustards and other large birds (Shaw et al., 2018) and the vulnerability of birds to contaminated water sources, such as might result from the wastewater of hydraulic fracking operations in the Karoo (Lee et al., 2019).

Research into small mammals in the Karoo has been consistent over the last three decades. Early research considered the diet and community structure of small mammals in the south-eastern Karoo (Kerley, 1992). The long-term research programme on the African striped mouse (*Rhabdomys pumilio*) in the Goegab Nature Reserve has been especially prolific and has covered several diverse topics in detail including the social and reproductive ecology, foraging behaviour and energy dynamics of the species (Schradin & Pillay, 2005). Research into medium and large mammals has focused on autecological studies of all the main species, but springbok (Skinner, 1993), Cape mountain zebra (Dalton et al., 2017) and aardvark (Taylor, Lindsey & Skinner, 2002) have received significant attention.

The main mesopredators in the Karoo are caracal and black-backed jackal, and several articles address the relative impact of these and other species on livestock production (Nattrass & Conradie, 2015) and how best to manage the problem (Nattrass, Drouilly & O’Riain, 2019; Nattrass et al., 2020). This underscores the interdisciplinary nature of some of the research within the Biological Sciences.

Only a few large syntheses of the general ecological role that animals play in the Karoo have been written. The last major attempt to do this was in 1999, when three useful chapters were produced as part of a comprehensive book on the Karoo (Dean & Milton, 1999a). These chapters concerned animal form and function (Lovegrove, 1999), animal foraging and food (Dean & Milton, 1999b) and the biogeography, endemism, and diversity of animals in the Karoo (Vernon, 1999). An updated review of these aspects would be a valuable addition to the literature.

Unlike in the case for plants, articles with an explicit conservation theme are quite rare in the database on animals, although some attention has been placed on species that appear on the International Union for Conservation of Nature (IUCN) Red List, such as the riverine rabbit (Collins et al., 2016).

AGRICULTURAL SCIENCES

Given that the Karoo has been used for extensive livestock production, it is not surprising that nearly 80% of the 234 articles published on agriculture are concerned with either range management (60%) or animal husbandry (18%) (Figure 2.7). Almost 38% of all articles on range management have been published in the *African Journal of Range & Forage Science* and a further 10% in the *Journal of Arid Environments*. Most of the well-cited range management articles are concerned with an evaluation of different grazing systems (Archer, 2004) and their impact on vegetation composition and species diversity (Hanke et al., 2014) as well as soil properties (Beukes & Cowling, 2003). Articles on the development of veld condition assessment techniques (Vorster, 1982) have also been widely cited. Research into the range management systems of the communal areas of Namaqualand and the Richtersveld has received considerable attention, especially over the last 20 years (Hendricks et al., 2005; Vetter, 2013), and shows little sign of abating (Samuels, Allsopp & Hoffman, 2019). Agricultural research in the Karoo has lagged behind international developments in that only a few models of the impact of livestock and rainfall on Karoo rangelands have been produced, whether for the Succulent Karoo (Hahn et al., 2005) or Nama Karoo biomes (Milton & Hoffman, 1994; O'Connor & Roux, 1995). The potential impact of land reform on the natural and social environments of Namaqualand and its implications for range management has also received only modest attention (Rohde et al., 2006), and not for a decade or longer. A popular book on the management of Karoo rangelands (Esler, Milton & Dean, 2006), published in both English and Afrikaans, has been widely used by both the academic and farming communities.

Articles on animal husbandry (Figure 2.7) focus either on the treatment of diseases and parasites of livestock such as West Nile virus (Jupp, 2001) and Karoo tick paralysis (Spickett & Heyne, 1988) or on how to improve productive performance of sheep, goats, and ostriches (Snyman & Olivier, 2002; Mugido, Kleynhans & Hoffman, 2012). Many of the general articles on agriculture, which comprise 16% of those published, address subjects as diverse as farmer extension, game farming as a supplementary source of income (Jooste, 1983), and marketing strategies for the sale of Karoo lamb (Du Plessis & Du Rand, 2012). A few historical accounts of the origins of the Dorper sheep (Milne, 2000), the mohair industry (Pringle, 1989) and the feral goat population of the Tankwa Karoo National Park (Kotzé et al., 2014) are also included in this category.

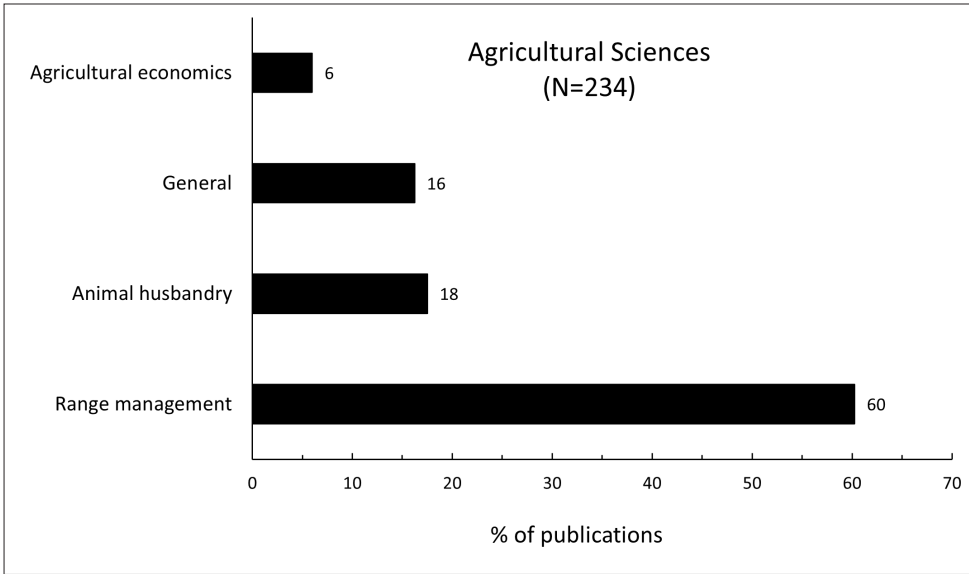


Figure 2.7 The percentage of articles on the Karoo that are concerned primarily with studies in the Agricultural Sciences

Only 14 papers in the Agricultural Sciences cover economic aspects of farming in the Karoo (Figure 2.7). They include an analysis of the financial costs of non-sustainable farming practices (Herling et al., 2009) and the potential economic impact and cost of different land redistribution scenarios (Conradie, 2019). Reasons for the decline in agricultural productivity in Karoo districts of the Western Cape, resulting from falling prices and rising input costs, have also been examined (Conradie et al., 2013).

SOCIAL SCIENCES

The Social Sciences comprise a diverse set of disciplines, each with their own theories, histories, research methods and journals. Most provide a critical perspective on the development of human society and culture, whether it concerns the past, present or future. We foreground the disciplines of Anthropology, Sociology and Development Studies in this analysis (Figure 2.8). Other overlapping disciplines within the Social Sciences such as Human Geography, Political Science or Economics could be added to this category but because of the limited number of publications they have not been separated in this analysis but subsumed within our chosen classificatory system.

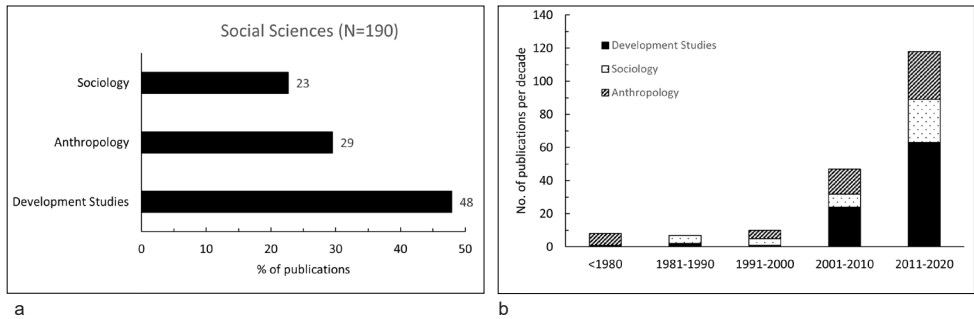


Figure 2.8 (a) The percentage contribution of each of the main disciplines concerned with the Social Sciences in the Karoo (N = 190); (b) The number of publications per decade in each of the main disciplines of the Social Sciences

About half of all publications in the Social Sciences concern matters of either Anthropology (29%) or Sociology (23%). The remainder (48%) comprise articles in the broadly constituted Development Studies literature (Figure 2.8(a)). There has been an exponential increase in the number of peer-reviewed articles in all three Social Science disciplines analysed here (Figure 2.8(b)). More than five times as many articles have been published in the Social Sciences in the last 20 years than in all prior years, and nearly three times as many in the last 10 years (2011–2020) than in the decade before this (2001–2010). This increase has been fairly evenly spread across all three disciplines we have assessed within the Social Sciences.

Anthropology

A few introductory or concluding papers to Special Issues on the Karoo provide a general synthesis of the important social and ecological considerations as they relate to the historical, political, and institutional practices in the region (Walker et al., 2018). However, the majority of the 56 Anthropology articles are concerned either with detailed ethnographic studies of specific communities (Carstens, 1966; Berzborn, 2007), or with how identity has been constructed, understood, and even manipulated by different groups of people over time (McGranaghan, 2014). The Bleek and Lloyd (1968) manuscripts and archives provide a rich source of material for folklorists who have used both !Xam and Khoekhoe orature to reconstruct stories about their mythologies (de Prada-Samper, 2018), and cultural practices (Wittenberg, 2014).

Several other papers in the anthropological literature focus on how different communities co-operate in managing common pool resources (Fabricius & Collins, 2007; Prediger, Vollan & Frölich, 2011), especially when resources are scarce, such as during drought (O’Farrell et al., 2009). Issues of environmental justice are

also foregrounded, largely in terms of how changes in landownership and land use affect indigenous peoples' right to land restitution (Everingham & Jannecke, 2006). The impact of converting white-owned, commercial farms to game farms, on farm dwellers' tenure security and experiences of dispossession, for example, has been explored by Brandt and Spierenburg (2014) and Mkhize (2014). Very little work on gender relations in rural communities has been undertaken in the Karoo. As Kleinbooi (2013) argues, despite the central role that women play in communal area households, they are largely excluded from having autonomy over the land by traditional, male-dominated systems of ownership and practices.

Sociology

There has been considerable interest in how the demography of both rural and urban areas have changed in the Karoo. Hill and Nel (2018) analysed the range of social, agricultural, economic, and environmental factors that influenced the shifts in Karoo populations over the last 100 years. They identify complex patterns of change, especially for the small Karoo towns, which may be differentiated based on their agriculture, trade, and tourism sectors (Toerien & Seaman, 2010). While there has been a net loss of people from the rural areas, nearly all urban areas in the Karoo have experienced an increase in population in the last 30 years. This influx has come not only from the surrounding rural areas, but also because of in-migration from across the wider southern African region (Hill & Nel, 2018). However, this is a complex issue that also includes out-migration from the Karoo. It is discussed in more detail in Walker and Vorster (Chapter Four). Several articles explore the sustainability of local government (Atkinson, 2002; Hoogendoorn & Nel, 2012), especially in terms of water use (Toerien & Seaman, 2011). Very few studies have investigated the social needs that have arisen because of the rapid urbanisation experienced by Karoo towns, such as improving the standard of education (De Villiers & Pretorius, 2011) and addressing the root causes of crime (Holtmann, 2008).

Despite the political marginalisation of the Karoo, there is evidence that the economies of some of the larger towns have grown (Nel & Hill, 2008). However, greater government investment (Atkinson, 2009) and more appropriate spatial planning and judicious infrastructural development (Atkinson, 2016) are needed to grow these economies further. Nattrass et al. (2015) provide an interesting evaluation of one such investment relating to a community-led fencing project in the Laingsburg area. They show how the government's public works programme led to the creation of jobs, which benefitted especially the poor. Farmer attitudes to risk, whether from predatory animals, such as jackal and caracal (Drouilly et al., 2018), or from labour and security (Wustro & Conradie, 2020), have also been explored in the Laingsburg area. Walker and Vorster (Chapter Four) provide a detailed analysis of social change and continuity in three small Karoo towns.

Development Studies

Development Studies research is interdisciplinary in nature and is difficult to separate from fields with which it is frequently associated, such as Sociology, Anthropology, Economics and Human Geography. In this analysis, Development Studies, comprising 91 articles (Figure 2.9), refers to research that is concerned with how the reorganisation of landownership and land use affects different groups of people within Karoo society. The most important ways in which land ownership and land use have changed has been through the land reform programme, and through the emergence of several new development initiatives such as astronomical and renewable energy installations. Tourism, which is linked to environmental and heritage conservation, has grown in the Karoo and the threat of fracking has also attracted considerable attention in the Development Studies literature.

One of the most significant investments in the Karoo in the last decade has come from the radio astronomy project of the Square Kilometre Array (SKA). A special issue of the *Journal of Southern African Studies* explores the scientific as well as the social and environmental impacts of this initiative for the Karoo, the wider African region, and the world (Walker, Chinigò & Dubow, 2019). The development mandate and impact of this investment has been examined in terms of the benefits and losses realised by different stakeholders (Gastrow & Oppelt, 2019). Key issues include the acquisition of large tracts of land for the SKA installation, restrictions on radio-frequency communication technologies in the region, and the relative weakness of local government institutions to capitalise on the opportunities provided by the SKA (Atkinson, 2019). In addition, the national imperatives that have driven these developments, are not necessarily congruent with local aspirations around 'development'. Another astronomical installation, the Southern African Large Telescope (SALT) near Sutherland, has expanded the opportunities for tourism in this relatively undeveloped region of the Karoo and has been assessed in terms of its potential benefits and drawbacks for local communities (Ingle, 2010).

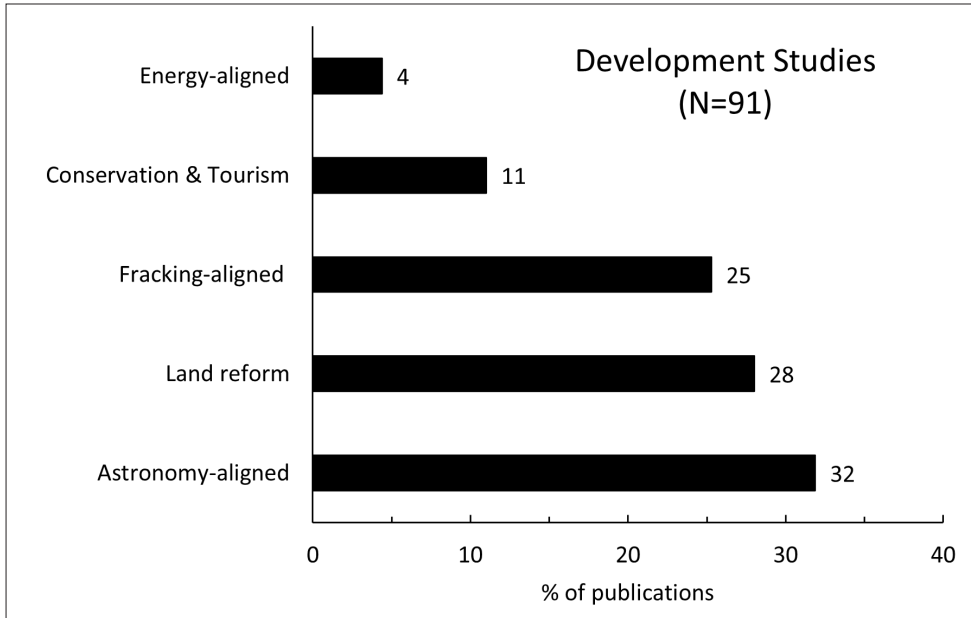


Figure 2.9 The percentage of articles on the Karoo that are concerned with different quantitative and qualitative aspects of Development Studies within the Social Sciences

Land reform provides significant opportunities for development in the Karoo. Atkinson and Ingle (2018) have shown how new commonage farms, purchased by the government in the Carnarvon and Williston areas of the Northern Cape, have benefitted some resource-poor, black and ‘coloured’ farmers. Most land-reform research in the Karoo, however, has been carried out in Namaqualand (May & Lahiff, 2007), where the communal area land base has been expanded by over 25% (Lebert & Rohde, 2007). Rather than benefitting poorer, disadvantaged communal farmers, new commonage farms, which are mostly leased and not bought, appear to have been occupied by wealthier individuals, often with close ties to local government institutions (Lebert, 2004). In Namaqualand, some ex-mining sector workers have transitioned successfully to commercial farming by making use of off-farm incomes and the natural resources of communal rangelands (Anseeuw & Laurent, 2007).

Apart from the threat to the environment posed by fracking, which is extensively covered by Scholes et al. (2016), the collection of book chapters in Glazewski and Esterhuysen (2016) provides the most comprehensive account of the impact of this practice on the social-ecological systems of the Karoo. More recent work by Wait

and Rossouw (2019) provides a comparative assessment of the economic benefits of fracking while Murcott and Webster (2020) examine the regulatory framework and the power that different state and non-state actors have in influencing the process.

Very few studies address the impact that conservation and tourism have had on livelihoods in the Karoo. Benjaminsen et al. (2008) point to an apparent tension between land reform and conservation, while the significant contribution made to the regional economy by recreational flower viewing in Namaqualand is highlighted by James et al. (2007). Saayman et al. (2009) also point to the contribution made by the Karoo National Park to the local business communities in Beaufort West. Relationships between local and more distant communities to protected areas are complex, and much more needs to be done to ensure that the benefits of conservation are received by those people who live near national parks (Simelane et al., 2006; Hoffman & Gillson (Chapter Eight)). The potential contribution that environmental and heritage tourism could make to the economies of small towns in the Karoo has been favourably reviewed by Atkinson (2016) and Proos and Hattingh (2019).

HUMANITIES

Of the 208 articles categorised as being in the Humanities, 42% are concerned with Archaeology, 34% with Art, Literature and Music, and 25% with History (Figure 2.10(a)). Each discipline appears to have had its own historical trajectory (Figure 2.10(b)). The number of publications in the fields of Archaeology as well as Art, Literature and Music have doubled in the last decade, while recent contributions to the historical literature have been more modest. Overall, recent changes in the number of publications in the Humanities have been lower than is evident in the Social Sciences (see Figure 2.8(b)).

Archaeology

Archaeological research in the Karoo, of which there are 87 articles in the database, covers a range of time periods from the early Stone Age to the Later Stone Age and is relatively evenly divided between studies in the Succulent Karoo and the Nama Karoo biomes. Excavations and surveys from a few locations in the Nama Karoo biome, such as Blydefontein Rock Shelter (Bousman, 2005) and the Seacow River Valley (Sampson et al., 2015) stand out for their contributions to our knowledge of the lifestyles and technological strategies of pre- and early-colonial hunter-gatherer societies. These long-term studies have also contributed significantly to our understanding of the chronology, dynamics, and spatial distribution of hunter-gatherers in the region. Investigations into the cultural tradition of rock engravings (Morris, 2017) as well as the use of a series of V-shaped rock structures or 'kites'

to funnel wild animals, such as springbok during organised hunts (Lombard et al., 2020), have also recently been undertaken.

Research in the Succulent Karoo has been concerned with both hunter-gatherer and herder societies and the interactions between the two (Orton, 2009). Several studies have reported dates for the earliest introduction of sheep (350 BCE–AD 115) (Sealy & Yates, 1994) and cattle (AD 421–559) (Orton et al., 2013) in Namaqualand to establish the onset of herding in southern Africa. The exact nature of how herders migrated through the region is complex but probably occurred in pulses that were influenced by prevailing climatic conditions (Dewar & Marsh, 2018). Recent work has also suggested that the dichotomy between hunter-gatherer and herder societies is not as distinct as previously proposed (Orton, 2016).

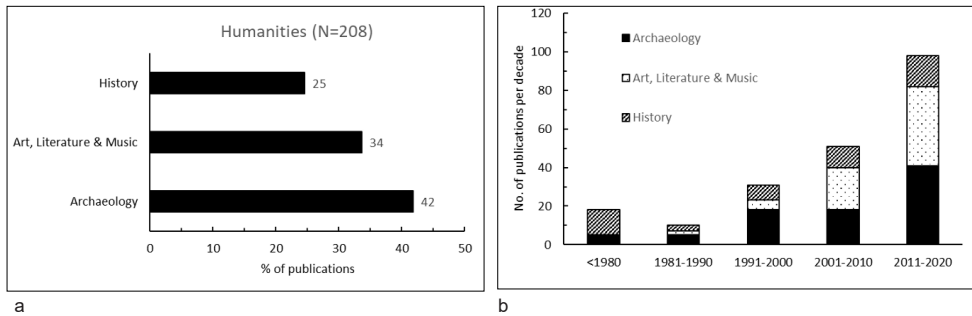


Figure 2.10 (a) The percentage contribution of each of the main disciplines concerned with the Humanities in the Karoo (N = 208); (b) The number of publications per decade in each of the main disciplines of the Humanities

History

Books and book chapters dominate the 51 references that are concerned with Karoo history. The oldest of these comprise the traveller accounts of journeys undertaken through the Karoo in the early colonial period (Waterhouse, 1924). Other highly influential works explore the impact that successive colonial governments and settler farmers had on Khoisan communities (Elphick, 1985; Penn, 2005), and the unfolding sequence of events on the often-violent eighteenth- and nineteenth-century Karoo frontier zone that helped to shape Southern Africa society at the time (Amschwand, 2017; Legassick, 1972; Penn, 1995). The genocide of hunter-gatherer communities by government-sanctioned Commando units, the restriction of access to land for Khoekhoe pastoralists, and the expansion of colonial *trekboers*,

or migrant farmers (Van der Merwe & Beck, 1995), characterise the consolidation of Karoo colonial society and the decline of Khoisan communities (Kelso & Vogel, 2015). Subsequent technological advances in the late nineteenth century, such as the introduction of windmills, fencing and rotational grazing systems, revolutionised land-use practices in the Karoo with important consequences for environmental change (Archer, 2000).

Several publications focus specifically on environmental history and the historical impact that keystone species such as the springbok, or disease, such as the rinderpest, had on the Karoo (Skinner, 1993). The relationship that early colonial farmers had with predators such as jackal and how this influenced conservation thinking is another important theme (Beinart, 2003). Much more could be made of the historical literature as has been done by Van Sittert (2016), who argues that the vermin extermination campaigns of commercial stock farmers in the nineteenth and twentieth centuries served to militarise the Karoo and symbolised a re-enactment of the 'original act of conquest' of the colonial institution over indigenous people.

Art, Literature and Music

Two main threads dominate the 70 articles in this field. The first concerns an evaluation of events such as the Klein Karoo National Arts Festival (KKNK) and AfrikaBurn, in terms of their economic impact and sustainability (Kruger, Saayman & Saayman, 2009), as well as their contribution to different art forms (Pretorius, Viviers & Botha, 2014; Steele, 2015). The second emphasis lies in an evaluation of both classic and more contemporary literary works, such as those of Pauline Smith (Geertsema, 2007), JM Coetzee (López, 2013) or Zoë Wicomb (Jacobs, 2016). Common themes in these analyses address issues of identity and poverty, as well as the relationship that different people and communities have to the land itself. Carol Campbell's novel about the *Karretjiemense* of the Karoo (Meyer, 2014), for example, provides a detailed characterisation of the complex ways in which a family, who are descendants of the Khoisan, navigate issues of identity, place, and displacement.

HEALTH SCIENCES

Most of the 38 articles in this field describe the prevalence of specific genetic disorders in Karoo populations, such as lipoid proteinosis (Van Hoogenhouck-Tullock et al., 2004) or more widespread diseases, such as tuberculosis (Casey et al., 2015). The risk of contracting mesothelioma (respiratory cancer) from being exposed to asbestos in communities such as those around Prieska (see Marcatelli, Chapter Three) has received far less attention. Another health-related problem that is recognised as being important, but which is also under-researched, is the high

incidence of alcohol abuse within the poorer communities of the Karoo and the impact that foetal alcohol spectrum disorder (FASD) has on children in the region (Bateman, 2010). Interdisciplinary research involving an analysis of the historical, social, and ethnographic components of these diseases is greatly needed. Overall, there are few studies that address general questions related to healthcare access and the role that poverty plays in people's health (Schoevers & Jenkins, 2015). Health care issues in the Karoo appear to have attracted relatively little attention in the peer-reviewed literature and the rate at which health-related articles are published has not increased over time.

Discussion

Limitations of the approach

This brief overview of Karoo research has been influenced both by how the database was compiled, as well as by the allocation of keywords to the articles. The use of the three online scholarly literature repositories, as well as the terms that were used in our initial search query, provided an initial filter on what was included in the database. For example, there are many thousands of reports and non-peer-reviewed articles written about the Karoo that were not identified in our search. The exclusion of these documents is especially prejudicial to the Agricultural Sciences, the Social Sciences, and the Humanities. Even though we manually added additional articles from sources that we knew about, the database is incomplete and biased towards our own areas of expertise, which lie in the broad fields of plant ecology, rangeland science and environmental change. Furthermore, the criteria we used for selection meant that some documents that did not focus exclusively on the Karoo, but which mentioned it in passing, were excluded.

The allocation of primary keywords to denote the main research groupings (Biological Sciences, Human Sciences, etc.), and then secondary or tertiary keywords to denote the disciplines (e.g., Plants, Development Studies, etc.), and fields of research (e.g. Systematics, Land Reform, etc.) within each research grouping (Table 2.1), also had a significant influence on the results contained in this overview. In following this approach, we were guided by Krishnan (2009), who outlines the main characteristics of a discipline. However, many publications were not exclusively focused on a single topic but spanned different disciplines within a research grouping, or even covered different research groupings. For example, across the Environmental and Social Sciences, some of the papers could more appropriately have been categorised as belonging to Rural Studies or to research concerned with Human Geography rather than to Sociology or Development Studies. Even though the creation of a controlled list of keywords

has historical precedence it is a difficult, subjective, and iterative process, which requires refinement and adjustment along the way. It is also dependent on the authors' level of expertise and knowledge across multiple disciplines, and other researchers may arrive at a somewhat differently weighted set of results.

Factors that have influenced research output in the Karoo

Despite these limitations, the database offers a way to summarise the research effort undertaken in the Karoo and provides a useful measure of the major patterns and trends that have occurred over time. It also highlights some of the factors that have influenced research in the region, such as the emergence and maturation of the Karoo Biome Project (Cowling, 1986). This national research programme was established as one of the last of South Africa's co-operative biome programmes (Huntley, 1987) and ran from 1985–1990. This initiative, together with the international recognition of the Succulent Karoo biome as a global biodiversity hotspot about a decade later (Cowling, Esler & Rundel, 1999), has led to a significant increase in drylands research over the last 30 years, focused primarily on the environment. Other initiatives, which have also made significant contributions to the Biological Sciences literature in particular, include the German-funded BIOTA programme (Jürgens et al., 2012). The contributions made by these co-ordinated programmes lie not so much in the publications as in the development of a cohort of researchers, several of whom have maintained their interest in the Karoo throughout their academic careers. In some cases, long-term research projects have started within these programmes and have continued for decades. For example, research undertaken since the mid-1980s, at the Long-Term Ecological Research (LTER) at Tierberg (Milton, Dean & Kerley, 1992; Arena et al., 2018), has contributed significantly to our knowledge of Karoo ecosystems. Also, the work undertaken on the African striped mouse (*Rhabdomys pumilio*) in the Goegap Nature Reserve (Schradin & Pillay, 2005) for more than 15 years, stands out as a key node of animal research activity in the Karoo.

Research in the Social Sciences and Humanities shows an exponential increase over the period of review. The increase has also been widespread across nearly all sub-disciplines within these two main groupings. While individual researchers have contributed significantly to our understanding of the history (Penn, 2005) and sociology (Atkinson, 2009) of the Karoo, research in the Social Sciences and Humanities has not been supported by well-funded, international initiatives as was the case for the Biological Sciences. We suggest, however, that recent interest in the Karoo from several government departments, and from both national and international actors external to the region, has accelerated the research output within the Social Sciences. For example, the impact of new infrastructural instal-

lations, such as the SKA or renewable energy towers on people living in the Karoo, has provided rich opportunities for research into issues around identity, land rights, governance, and justice (Walker, Chinigò & Dubow, 2019). Furthermore, the establishment of a Research Chair at Stellenbosch University in the *Sociology of Land, Environment and Sustainable Development* that has focused on the Karoo, as part of the National Research Foundation's (NRF) South African Research Chair Initiative (SARChI), has also contributed significantly to the body of postgraduate work undertaken in the region. Collaborative writing projects (e.g., Walker et al., 2018) and the establishment of networks and colloquia by people associated with this initiative have generated an interdisciplinary focus in Karoo research that was not as clearly evident before.

Other initiatives that have had an important influence on research impact include the publication of a few books (Dean & Milton, 1999a) and Special Issues in peer-reviewed journals. Most of these have been concerned with the environment (Cowling, Esler & Rundel, 1999) but a few have highlighted social issues (e.g., Walker et al., 2019) and also tried to span the divisions which exist between disciplines (Hoffman, Allsopp & Rohde, 2007; Henschel, Hoffman & Walker, 2018). More collections of papers and books such as these are needed, especially those that address issues of societal importance (Glazewski & Esterhuysen, 2016; Walker, Chinigò & Dubow, 2019).

Final thoughts

The Karoo has undergone significant changes in land use since the start of the twenty-first century (Hoffman et al., 2018). The region is no longer perceived as a place primarily for commercial livestock production. There has been an emerging emphasis on the Karoo as a location for the installation of renewable energy infrastructure and the establishment of astronomical observatories. There has also been a renewed interest in mining, and shale-gas extraction remains a possibility. Land-reform developments acquired momentum in the early 2000s, and are likely to receive greater attention in the future. The number of game and lifestyle farms have also increased substantially in the region, as has the area set aside for conservation, especially in the Succulent Karoo biome. Research output, however, has been strongly focused on rangelands and the biota of the Karoo. As valuable as this has been, this information cannot easily be translated to an understanding of the impacts that the change in other land uses will have on natural environments and on people living in the countryside and small towns of the Karoo.

Climate, too, has changed in the region, yet very little Karoo-specific research has been undertaken within this discipline. The extent of drought and severity of temperature rise will have an important impact on land use, livelihoods, and migration in the region. The long-term programmes that are in place need to be expanded to include social components as well. This will require a coordinated effort from national institutions but also from local researchers with an interest in the region. Far more coordinated effort needs to be placed on growing and supporting the next generation of researchers in the Karoo. An entirely new set of questions around the impact that the new developments in the Karoo will have on people and the environment will need to be developed and addressed in the next 20 years. We hope this overview will contribute to this effort.

Acknowledgements

We thank Cheryl Walker for helpful comments on the manuscript.

References

- Amschwand, N. 2017. *1847: Dispossession and Migration: Population Movement in the Northern Cape during the 19th Century*. Cape Town: Nigel Amschwand.
- Abiye, T. & Leshomo, J. 2014. Metal enrichment in the groundwater of the arid environment in South Africa. *Environmental Earth Sciences*, 72(11):4 587–4 598. <https://doi.org/10.1007/s12665-014-3356-9>.
- Anseeuw, W. & Laurent, C. 2007. Occupational paths towards commercial agriculture: The key roles of farm pluriactivity and the commons. *Journal of Arid Environments*, 70(4):659–671. <https://doi.org/10.1016/J.JARIDENV.2006.11.009>.
- Archer, E.R.M. 2004. Beyond the “climate versus grazing” impasse: using remote sensing to investigate the effects of grazing system choice on vegetation cover in the eastern Karoo. *Journal of Arid Environments*, 57(3):381–408. [https://doi.org/10.1016/S0140-1963\(03\)00107-1](https://doi.org/10.1016/S0140-1963(03)00107-1).
- Archer, S. 2000. Technology and Ecology in the Karoo: A Century of Windmills, Wire and Changing Farming Practice. *Journal of Southern African Studies*, 26(4):675–696. <https://doi.org/10.1080/03057070020008224>.
- Archer, E., Du Toit, J., Engelbrecht, C., Hoffman, M.T., Landman, W., Malherbe, J. & Stern, M. 2022. The 2015–19 multi year drought in the Eastern Cape, South Africa: Its evolution and impacts on agriculture. *Journal of Arid Environments*, 196:104 630. <https://doi.org/10.1016/j.jaridenv.2021.104630>.
- Arena, G., Van Der Merwe, H., Todd, S.W., Pauw, M.J., Milton, S.J., Dean, W.R.J. & Henschel, J.R. 2018. Reflections, applications and future directions of Long-Term Ecological Research at Tierberg. *African Journal of Range & Forage Science*, 35:257–265. <https://doi.org/10.2989/10220119.2018.1513072>.
- Arillo, A. & Engel, M.S. 2006. Rock Crawlers in Baltic Amber (Notoptera, Mantophasmatodea). *American Museum Novitates*, (3539):1–10. [https://doi.org/10.1206/0003-0082\(2006\)3539\[1:RCIBAN\]2.0.CO;2](https://doi.org/10.1206/0003-0082(2006)3539[1:RCIBAN]2.0.CO;2).
- Atkinson, D. (ed.). 2002. *Local Government, Local Governance and Sustainable Development: Getting the Parameters Right*. Cape Town: HSRC Press.
- Atkinson, D. 2009. Economic decline and gentrification in a small town: the business sector in Aberdeen, Eastern Cape. *Development Southern Africa*, 26(2):271–288. <https://doi.org/10.1080/03768350902899595>.
- Atkinson, D. 2016a. Thinking regionally: Aviation and development implications in the Karoo region, South Africa. *Development Southern Africa*, 33(2):129–144. <https://doi.org/10.1080/0376835X.2015.1120647>.
- Atkinson, D. 2016b. Is South Africa’s Great Karoo region becoming a tourism destination? *Journal of Arid Environments*, 127:199–210. <https://doi.org/10.1016/j.jaridenv.2015.12.006>.
- Atkinson, D. 2019. When Stars Collide: Competing Development Paradigms in the Central Karoo. *Journal of Southern African Studies*, 45(4):689–709. <https://doi.org/10.1080/03057070.2019.1645481>.
- Atkinson, D. & Ingle, M. 2018. By their own bootstraps: municipal commonage farmers as an emerging agrarian class in the Karoo. *African Journal of Range & Forage Science*. 35(3–4):233–243. <https://doi.org/10.2989/10220119.2018.1514653>.
- Bamford, M.K. 2016. Fossil Woods from the Upper Carboniferous to Lower Jurassic Karoo Basin and Their Environmental Interpretation. In: B. Linol and M.J. de Wit (eds). *Origin and evolution of the Cape Mountains and Karoo Basin*. 159–167. https://doi.org/10.1007/978-3-319-40859-0_16.

- Bateman, C. 2010. FASD – De Aar mums get beyond the “tipping point”. *South African Medical Journal*, 100(11):4 567. <https://doi.org/10.7196/samj.4567>.
- Beinart, W. 2003. *The Rise of Conservation in South Africa: Settlers, Livestock and the Environment 1770–1950*. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780199261512.001.0001>.
- Bell, W.D., Hoffman, M.T. & Visser, V. 2021. Regional land degradation assessment for dryland environments: The Namaqualand Hardeveld bioregion of the Succulent Karoo biome as a case-study. *Land Degradation and Development*, 32(7):2 287–2 302. <https://doi.org/10.1002/LDR.3900>.
- Benito, G., Thorndycraft, V.R., Rico, M.T., Sánchez-Moya, Y., Sopeña, A., Botero, B.A., Machado, M.J., Davis, M. & Pérez-González, A. 2011. Hydrological response of a dryland ephemeral river to southern African climatic variability during the last millennium. *Quaternary Research*, 75(3):471–482. <https://doi.org/10.1016/J.YQRES.2011.01.004>.
- Benjaminsen, T.A., Kepe, T. & Bråthen, S. 2008. Between Global Interests and Local Needs: Conservation and Land Reform in Namaqualand, South Africa. *Africa*, 78(2):223–244. <https://doi.org/10.3366/E0001972008000144>.
- Berzborn, S. 2007. The household economy of pastoralists and wage-labourers in the Richtersveld, South Africa. *Journal of Arid Environments*, 70(4):672–685. <https://doi.org/10.1016/J.JARIDENV.2006.09.011>.
- Beukes, P.C. & Cowling, R.M. 2003. Non-Selective Grazing Impacts on Soil-Properties of the Nama Karoo. *Journal of Range Management*, 56(5):547–552. <https://doi.org/10.2307/4003849>.
- Bleek, W.H.I. & Lloyd, L.C. 1968. *Specimens of Bushmen Folklore*. Cape Town: Struik Publishers.
- Boardman, J. & Foster, I. 2008. Badland and gully erosion in the Karoo, South Africa. *Journal of Soil and Water Conservation*, 63(4):121A–125A. <https://doi.org/10.2489/JSWC.63.4.121A>.
- Boardman, J., Foster, I.D.L., Rowntree, K.M., Favis-Mortlock, D.T., Mol, L., Suich, H. & Gaynor, D. 2017. Long-term studies of land degradation in the Sneeuberg uplands, eastern Karoo, South Africa: A synthesis. *Geomorphology*, 285:106–120. <https://doi.org/10.1016/J.GEOMORPH.2017.01.024>.
- Bond, W.J., Stock, W.D. & Hoffman, M.T. 1994. Has the Karoo spread? A test for desertification using carbon isotopes from soils. *South African Journal of Science*, 90(7):391–397. https://journals.co.za/doi/pdf/10.10520/AJA00382353_5901.
- Bösing, B.M., Haarmeyer, D.H., Dengler, J., Ganzhorn, J.U. & Schmiedel, U. 2014. Effects of livestock grazing and habitat characteristics on small mammal communities in the Knersvlakte, South Africa. *Journal of Arid Environments*, 104:124–131. <https://doi.org/10.1016/J.JARIDENV.2014.02.011>.
- Botes, A., McGeoch, M.A., Robertson, H.G., Van Niekerk, A., Davids, H.P. & Chown, S.L. 2006. Ants, altitude and change in the northern Cape Floristic Region. *Journal of Biogeography*, 33(1):71–90. <https://doi.org/10.1111/J.1365-2699.2005.01336.X>.
- Bousman, C.B. 2005. Coping with risk: Later stone age technological strategies at Blydefontein Rock Shelter, South Africa. *Journal of Anthropological Archaeology*, 24(3):193–226. <https://doi.org/10.1016/J.JAA.2005.05.001>.
- Brandt, F. & Spierenburg, M. 2014. Game fences in the Karoo: Reconfiguring spatial and social relations. *Journal of Contemporary African Studies*, 32(2):220–237. <https://doi.org/10.1080/02589001.2014.925300>.

- Bruyns, P. V., Hanáček, P. & Klak, C. 2019. *Crassula*, insights into an old, arid-adapted group of southern African leaf-succulents. *Molecular Phylogenetics and Evolution*, 131:35–47. <https://doi.org/10.1016/J.YMPEV.2018.10.045>.
- Carstens, P. 1966. *The social structure of a Cape Coloured reserve: a study of racial integration and segregation in South Africa*. Oxford: Oxford University Press.
- Casey, H., Smith, A., Parker, L., Dipper, M. & Gould, T. 2015. Pulmonary tuberculosis in a South African regional emergency centre: Can infection control be improved to lower the risk of nosocomial transmission? *South African Medical Journal*, 105(10):862–865. <https://www.ajol.info/index.php/samj/article/view/127004>.
- Chase, B.M. & Meadows, M.E. 2007. Late Quaternary dynamics of southern Africa's winter rainfall zone. *Earth-Science Reviews*, 84(3–4):103–138. <https://doi.org/10.1016/J.EARSCIREV.2007.06.002>.
- Collins, K., Bragg, C., Birss, C. & Child, M. 2016. A conservation assessment of *Bunolagus monticularis*. In: M. Child, L. Roxburgh, E. Do Linh San, D. Raimondo, & H. Davies-Mostert (eds). *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute, Endangered Wildlife Trust. 1–8.
- Conrad, R. & Seiler, W. 1985. Influence of temperature, moisture, and organic carbon on the flux of H₂ and CO between soil and atmosphere: Field studies in subtropical regions. *Journal of Geophysical Research: Atmospheres*, 90(D3):5 699–5 709. <https://doi.org/10.1029/JD090ID03P05699>.
- Conradie, B. 2019. Land Use and Redistribution in the Arid West: The case of Laingsburg Magisterial District. *Agrekon*, 58(3):281–291. <https://doi.org/10.1080/03031853.2019.1637591>.
- Conradie, B., Piesse, J., Thirtle, C., Vink, N. & Winter, K. 2013. Explaining declining agricultural total factor productivity in the Karoo districts of the Western Cape, 1952 to 2002. *Agrekon*, 52(SUPPL. 1):1–23. <https://doi.org/10.1080/03031853.2013.770950>.
- Cowling, R.M. 1986. *Description of the Karoo Biome project (SANSP Report 122)*. National Scientific Programmes Unit: CSIR. <http://hdl.handle.net/10204/2360>.
- Cowling, R.M., Esler, K.J. & Rundel, P.W. 1999. Namaqualand, South Africa – an overview of a unique winter-rainfall desert ecosystem. *Plant Ecology*, 142(1):3–21. <https://doi.org/10.1023/A:1009831308074>.
- Cowling, R.M., Pressey, R.L., Lombard, A.T., Desmet, P.G. & Ellis, A.G. 1999. From representation to persistence: Requirements for a sustainable system of conservation areas in the species-rich mediterranean-climate desert of southern Africa. *Diversity and Distributions*, 5(1–2):51–71. <https://doi.org/10.1046/J.1472-4642.1999.00038.X>.
- Critical Ecosystem Partnership Fund (CEPF). 2012. *Annual Portfolio Overview: Succulent Karoo Biodiversity Hotspot*. <https://www.cepf.net/sites/default/files/succulent-karoo-2012-annual-portfolio-overviewl.pdf>. [Online]. [Accessed 2 January 2024].
- Dalton, D.L., Zimmermann, D., Mnisi, C., Taplin, M., Novellie, P., Hrabar, H. & Kotzé, A. 2017. Hiding in Plain Sight: Evidence of Hybridization between Cape Mountain Zebra (*Equus zebra zebra*) and Plains Zebra (*Equus quagga burchelli*). *African Journal of Wildlife Research*, 47(1):59–64. <https://doi.org/10.3957/056.047.0059>.

- Davis, C.L., Hoffman, M.T. & Roberts, W. 2016. Recent trends in the climate of Namaqualand, a megadiverse arid region of South Africa. *South African Journal of Science*, 112(3–4):1–9. <https://doi.org/10.17159/SAJS.2016/20150217>.
- De Kock, M.O., Beukes, N.J., Adeniyi, E.O., Cole, D., Götz, A.E., Geel, C. & Ossa, F.G. 2017. Deflating the shale gas potential of South Africa's Main Karoo basin. *South African Journal of Science*, 113(9–10):1–12. <https://doi.org/10.17159/SAJS.2017/20160331>.
- De Prada-Samper, J.M. 2018. "I Have Already Seen in the Clouds": The Nature of the Water-Creature Among the !xam Bushmen and Their Modern Descendants. *Folkloristika*, 3(1):13–37. <https://doi.org/10.18485/folk.2018.3.1.1>.
- De Villiers, E. & Pretorius, S.G.F. 2011. Democracy in schools: are educators ready for teacher leadership? *South African Journal of Education*, 31(4):574–589. <https://doi.org/10.15700/saje.v31n4a453>.
- De Waal, C., Anderson, B. & Ellis, A.G. 2015. Relative density and dispersion pattern of two southern African Asteraceae affect fecundity through heterospecific interference and mate availability, not pollinator visitation rate. *Journal of Ecology*, 103(2):513–525. <https://doi.org/10.1111/1365-2745.12358>.
- Dean, W.R.J. 1997. The distribution and biology of nomadic birds in the Karoo, South Africa. *Journal of Biogeography*, 24(6):769–779. <https://doi.org/10.1046/J.1365-2699.1997.00163.X>.
- Dean, W.R.J. 2004. *Nomadic Desert Birds*. Berlin: Springer. <https://doi.org/10.1007/978-3-662-08984-2>.
- Dean, W.R.J. 2006. Longevity and survival of colonies of *Messor capensis* (Formicidae: Myrmicinae) in the Karoo, South Africa. *African Entomology*, 14(2):381–383. <https://doi.org/10.10520/EJC32684>.
- Dean, W.R.J. & Macdonald, I.A.W. 1994. Historical changes in stocking rates of domestic livestock as a measure of semi-arid and arid rangeland degradation in the Cape Province, South Africa. *Journal of Arid Environments*, 26(3):281–298. <https://doi.org/10.1006/jare.1994.1030>.
- Dean, W.R.J. & Milton, S.J. (eds). 1999a. *The Karoo: Ecological Patterns and Processes*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511541988>.
- Dean, W.R.J. & Milton, S.J. 1999b. Animal foraging and food. In: W.R.J. Dean & S.J. Milton (eds). *The Karoo: Ecological patterns and processes*. Cambridge: Cambridge University Press. 165–177. <https://doi.org/10.1017/cbo9780511541988.014>.
- Dean, W.R.J. & Milton, S.J. 2000. Directed dispersal of *Opuntia* species in the Karoo, South Africa: are crows the responsible agents? *Journal of Arid Environments*, 45(4):305–314. <https://doi.org/10.1006/JARE.2000.0652>.
- Dean, W.R.J. & Milton, S.J. 2001. Responses of birds to rainfall and seed abundance in the southern Karoo, South Africa. *Journal of Arid Environments*, 47(1):101–121. <https://doi.org/10.1006/JARE.2000.0693>.
- Dean, W.R.J., Hoffman, M.T., Meadows, M.E. & Milton, S.J. 1995. Desertification in the semi-arid South Africa: review and reassessment. *Journal of Arid Environments*, 30:247–264. [https://doi.org/10.1016/S0140-1963\(05\)80001-1](https://doi.org/10.1016/S0140-1963(05)80001-1).
- Desmet, P.G. & Cowling, R.M. 1999. The climate of the Karoo – a functional approach. In: W.R.J. Dean & S. Milton (eds). *The Karoo: ecological patterns and processes*. Cambridge: Cambridge University Press. 3–16. <https://doi.org/10.1017/CBO9780511541988.004>.

- Dewar, G. & Marsh, E.J. 2018. The Comings and Goings of Sheep and Pottery in the Coastal Desert of Namaqualand, South Africa. *Journal of Island and Coastal Archaeology*, 14(1):17–45. <https://doi.org/10.1080/15564894.2018.1438538>.
- Dewar, G., Reimer, P.J., Sealy, J. & Woodborne, S. 2012. Late-Holocene marine radiocarbon reservoir correction (ΔR) for the west coast of South Africa. *The Holocene*, 22(12):1 481–1 489. <https://doi.org/10.1177/09596836124449755>.
- Drouilly, M., Tafani, M., Natrass, N. & O’Riain, J. 2018. Spatial, temporal and altitudinal dimensions of conflict between predators and small-livestock farmers in the Central Karoo. *African Journal of Range & Forage Science*, 35(3–4):245–255. <https://doi.org/10.2989/10220119.2018.1522669>.
- Du Plessis, H.J. & Du Rand, G.E. 2012. The significance of traceability in consumer decision making towards Karoo lamb. *Food Research International*, 47(2):210–217. <https://doi.org/10.1016/J.FOODRES.2011.05.029>.
- Du Toit, J.C.O. & O’Connor, T.G. 2014. Changes in rainfall pattern in the eastern Karoo, South Africa, over the past 123 years. *Water SA*, 40(3):453–460. <https://doi.org/10.4314/wsa.v40i3.8>.
- Duker, R., Cowling, R.M., Du Preez, D.R. & Potts, A.J. 2015. Frost, *Portulacaria afra* Jacq., and the boundary between the Albany Subtropical Thicket and Nama-Karoo biomes. *South African Journal of Botany*, 101:112–119. <https://doi.org/10.1016/J.SAJB.2015.05.004>.
- Dzikiti, S., Ntshidi, Z., Le Maitre, D.C., Bugan, R.D.H., Mazvimavi, D., Schachtschneider, K., Jovanovic, N.Z. & Pienaar, H.H. 2017. Assessing water use by *Prosopis* invasions and *Vachellia karroo* trees: Implications for groundwater recovery following alien plant removal in an arid catchment in South Africa. *Forest Ecology and Management*, 398:153–163. <https://doi.org/10.1016/J.FORECO.2017.05.009>.
- Egoh, B.N., Reyers, B., Carwardine, J., Bode, M., O’Farrell, P.J., Wilson, K.A., Possingham, H.P., Rouget, M., De Lange, W., Richardson, D.M. & Cowling, R.M. 2010. Safeguarding Biodiversity and Ecosystem Services in the Little Karoo, South Africa. *Conservation Biology*, 24(4):1 021–1 030. <https://doi.org/10.1111/J.1523-1739.2009.01442.X>.
- Ellis, A.G., Weis, A.E. & Gaut, B.S. 2006. Evolutionary radiation of “stone plants” in the genus *Argyroderma* (Aizoaceae): Unraveling the effects of landscape, habitat, and flowering time. *Evolution*, 60(1):39–55. <https://doi.org/10.1111/J.0014-3820.2006.TB01080.X>.
- Elphick, R. 1985. *Khoikhoi and the Founding of White South Africa*. Johannesburg: Ravan Press.
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld – Ecology and Management*. Pretoria: Briza Press.
- Everingham, M. & Jannecke, C. 2006. Land Restitution and Democratic Citizenship in South Africa. *Journal of Southern African Studies*, 32(3):545–562. <https://doi.org/10.1080/03057070600830508>.
- Fabricius, C. & Collins, S. 2007. Community-based natural resource management: governing the commons. *Water Policy*, 9(S2):83–97. <https://doi.org/10.2166/WP.2007.132>.
- Francis, M.L., Fey, M. V., Prinsloo, H.P., Ellis, F., Mills, A.J. & Medinski, T. V. 2007. Soils of Namaqualand: Compensations for aridity. *Journal of Arid Environments*, 70(4):588–603. <https://doi.org/10.1016/J.JARIDENV.2006.12.028>.
- Gastrow, M. & Oppelt, T. 2019. The Square Kilometre Array and Local Development Mandates in the Karoo. *Journal of Southern African Studies*, 45(4):711–728. <https://doi.org/10.1080/03057070.2019.1642679>.

- Gebeyehu, S. & Samways, M.J. 2003. Responses of grasshopper assemblages to long-term grazing management in a semi-arid African savanna. *Agriculture, Ecosystems and Environment*, 95(2–3):613–622. [https://doi.org/10.1016/S0167-8809\(02\)00178-0](https://doi.org/10.1016/S0167-8809(02)00178-0).
- Geertsema, J. 2007. A “vast, unmysterious landscape”. *Journal of Postcolonial Writing*, 43(3):297–309. <https://doi.org/10.1080/17449850701669633>.
- Gess, S.K. & Gess, F.W. 2004. Distributions of flower associations of pollen wasps (Vespididae: Masarinae) in southern Africa. *Journal of Arid Environments*, 57(1):17–44. [https://doi.org/10.1016/S0140-1963\(03\)00093-4](https://doi.org/10.1016/S0140-1963(03)00093-4).
- Glazewski, J. & Esterhuysen, S. (eds). 2016. *Hydraulic fracturing in the Karoo: Critical legal and environmental perspectives*. Cape Town: Juta.
- Goldblatt, P. & Manning, J.C. 2017. A review of the Geissorhiza namaquensis (Iridaceae: Crocoideae) group with the new species G. namaquamontana from Northern Cape, South Africa. *South African Journal of Botany*, 111:299–301. <https://doi.org/10.1016/J.SAJB.2017.03.041>.
- Guo, D., Arnolds, J.L., Midgley, G.F., Foden, W.B., Guo, D., Arnolds, J.L., Midgley, G.F. & Foden, W.B. 2016. Conservation of quiver trees in Namibia and South Africa under a changing climate. *Journal of Geoscience and Environment Protection*. 4(7):1–8. <https://doi.org/10.4236/GEP.2016.47001>.
- Hahn, B.D., Richardson, F.D., Hoffman, M.T., Roberts, R., Todd, S.W. & Carrick, P.J. 2005. A simulation model of long-term climate, livestock and vegetation interactions on communal rangelands in the semi-arid Succulent Karoo, Namaqualand, South Africa. *Ecological Modelling*, 183:211–230. <https://doi.org/10.1016/j.ecolmodel.2004.07.028>.
- Hanke, W., Böhner, J., Dreber, N., Jürgens, N., Schmiedel, U., Wesuls, D. & Dengler, J. 2014. The impact of livestock grazing on plant diversity: an analysis across dryland ecosystems and scales in southern Africa. *Ecological Applications*. 24(5):1 188–1 203. <https://doi.org/10.1890/13-0377.1>.
- Harmse, C.J., Du Toit, J.C.O., Swanepoel, A. & Gerber, H.J. 2020. Trend analysis of long-term rainfall data in the Upper Karoo of South Africa. *Transactions of the Royal Society of South Africa*, 76(1):1–12. <https://doi.org/10.1080/0035919X.2020.1834467>.
- Hendricks, H.H., Bond, W.J., Midgley, J.J. & Novellie, P.A. 2005. Plant species richness and composition a long livestock grazing intensity gradients in a Namaqualand (South Africa) protected area. *Plant Ecology*, 176(1):19–33. <https://doi.org/10.1007/S11258-003-0009-6>.
- Henschel, J.R., Hoffman, M.T. & Walker, C. 2018. Introduction to the Karoo Special Issue: Trajectories of change in the Anthropocene. *African Journal of Range & Forage Science*, 35(3–4):151–156. <https://doi.org/10.2989/10220119.2018.1535214>.
- Herling, M.C., Cupido, C.F., O’Farrell, P.J. & Du Plessis, L. 2009. The financial costs of ecologically unsustainable farming practices in a semiarid system. *Restoration Ecology*, 17(6):827–836. <https://doi.org/10.1111/J.1526-100X.2008.00419.X>.
- Hill, T. & Nel, E. 2018. Population change in the Karoo. *African Journal of Range & Forage Science*, 35(3–4):203–208. <https://doi.org/10.2989/10220119.2018.1529705>.
- Hoffman, M.T. & Rohde, R.F. 2007. From pastoralism to tourism: The historical impact of changing land use practices in Namaqualand. *Journal of Arid Environments*, 70(4):641–658. <https://doi.org/10.1016/J.JARIDENV.2006.05.014>.

- Hoffman, M.T. & Rohde, R.F. 2011. Rivers through time: Historical changes in the Riparian vegetation of the semi-arid, winter rainfall region of South Africa in response to climate and land use. *Journal of the History of Biology*, 44(1):59–80. <https://doi.org/10.1007/S10739-010-9246-4>.
- Hoffman, M.T., Allsopp, N. & Rohde, R.F. 2007. Sustainable land use in Namaqualand, South Africa: Key issues in an interdisciplinary debate. *Journal of Arid Environments*, 70(4):561–569. <https://doi.org/10.1016/J.JARIDENV.2006.11.021>.
- Hoffman, M.T., Carrick, P.J., Gillson, L. & West, A.G. 2009. Drought, climate change and vegetation response in the succulent karoo, South Africa. *South African Journal of Science*, 105:54–60. <https://doi.org/10.4102/sajs.v105i1/2.40>.
- Hoffman, M.T., Skowno, A., Bell, W. & Mashele, S. 2018. Long-term changes in land use, land cover and vegetation in the Karoo drylands of South Africa: Implications for degradation monitoring. *African Journal of Range & Forage Science*, 35:209–221. <https://doi.org/10.2989/10220119.2018.1516237>.
- Hoffman, M.T., Cowling, R.M., Petersen, H. & Walker, C. 2021. Karoo research update: Progress, gaps and threats. *South African Journal of Science*, 117(1–2):1–3. <https://doi.org/10.17159/SAJS.2021/8695>.
- Holtmann, B. 2008. Why law enforcement is not enough: Lessons from the Central Karoo on breaking the cycle of crime and violence. *SA Crime Quarterly*, 2008(23):13–20. <https://journals.co.za/doi/abs/10.10520/EJC47613>.
- Hoogendoorn, G. & Nel, E. 2012. Exploring small town development dynamics in rural South Africa. In: R. Donaldson & L. Marais (eds). *Small Town Geographies in Africa: Experiences from South Africa and Elsewhere*. New York: Nova Press.
- Hulley, I.M. & Van Wyk, B.E. 2019. Quantitative medicinal ethnobotany of Kannaland (western Little Karoo, South Africa): Non-homogeneity amongst villages. *South African Journal of Botany*, 122:225–265. <https://doi.org/10.1016/J.SAJB.2018.03.014>.
- Huntley, B.J. 1987. Ten years of cooperative ecological research in South Africa. *South African Journal of Science*, 83:72–79. https://journals.co.za/doi/pdf/10.10520/AJA00382353_6163.
- Ihlenfeldt, H. 1994. Diversification in an arid world: The Mesembryanthemaceae. *Annual Review of Ecology and Systematics*, 25(1):521–546. <https://doi.org/10.1146/ANNUREV.ES.25.110194.002513>.
- Ingle, M. 2010. Making the most of “nothing”: astro-tourism, the sublime, and the Karoo as a “space destination”. *Transformation: Critical Perspectives on Southern Africa*, 74(1):87–111. <https://doi.org/10.1353/TRN.2010.0013>.
- Jacobs, J.U. 2016. Home and (un) belonging in October by Zoë Wicomb. *Scrutiny2*, 21(3):94–109. <https://doi.org/10.1080/18125441.2016.1255248>.
- James, I., Hoffman, T., Munro, A., O’farrell, P. & Smart, R. 2007. The economic value of flower tourism at the Namaqua National Park, South Africa. *South African Journal of Economic and Management Sciences*, 10(4):442–456. <https://doi.org/10.4102/sajems.v10i4.1058>.
- Johnson, M.R., Van Vuuren, C.J., Hegenberger, W.F., Key, R. & Shoko, U. 1996. Stratigraphy of the Karoo Supergroup in southern Africa: an overview. *Journal of African Earth Sciences*, 23:3–15. [https://doi.org/10.1016/S0899-5362\(96\)00048-6](https://doi.org/10.1016/S0899-5362(96)00048-6).

- Jooste, J.F. 1983. Game farming as a supplementary farming activity in the Karoo. *Proceedings of the Annual Congresses of the Grassland Society of Southern Africa*, 18(1):46–49. <https://doi.org/10.1080/00725560.1983.9648980>.
- Jupp, P.G. 2001. The Ecology of West Nile Virus in South Africa and the Occurrence of Outbreaks in Humans. *Annals of the New York Academy of Sciences*, 951(1):143–152. <https://doi.org/10.1111/J.1749-6632.2001.TB02692.X>.
- Jürgens, N., Schmiedel, U., Haarmeyer, D.H., Dengler, J., Finckh, M., Goetze, D., Gröngroft, A., Hahn, K., et al. 2012. The BIOTA Biodiversity Observatories in Africa—a standardized framework for large-scale environmental monitoring. *Environmental Monitoring and Assessment*, 184(2):655–678. <https://doi.org/10.1007/S10661-011-1993-Y>.
- Kalwij, J.M., Milton, S.J. & McGeoch, M.A. 2008. Road verges as invasion corridors? A spatial hierarchical test in an arid ecosystem. *Landscape Ecology*, 23(4):439–451. <https://doi.org/10.1007/s10980-008-9201-3>.
- Kelso, C. & Vogel, C. 2007. The climate of Namaqualand in the nineteenth century. *Climatic Change*, 83(3):357–380. <https://doi.org/10.1007/S10584-007-9264-1>.
- Kelso, C. & Vogel, C. 2015. Diversity to decline-livelihood adaptations of the Namaqua Khoikhoi (1800–1900). *Global Environmental Change*, 35:254–268. <https://doi.org/10.1016/J.GLOENVCHA.2015.09.005>.
- Kerley, G.I.H. 1992. Small mammal seed consumption in the Karoo, South Africa: further evidence for divergence in desert biotic processes. *Oecologia*, 89(4):471–475. <https://doi.org/10.1007/BF00317151>.
- Klak, C., Reeves, G. & Hedderson, T. 2004. Unmatched tempo of evolution in Southern African semi-desert ice plants. *Nature*, 427(6969):63–65. <https://doi.org/10.1038/nature02243>.
- Klak, C., Hanáček, P. & Bruyns, P. V. 2018. A recircumscription of *Jacobsonia* (Aizoaceae): Re-instating *Drosanthermopsis*, with two new quartz-endemics from Namaqualand, South Africa and sinking *Knersia*. *South African Journal of Botany*, 116:67–81. <https://doi.org/10.1016/J.SAJB.2018.02.402>.
- Klass, K.-D., Picker, M.D., Damgaard, J., Van Noort, S. & Tojo, K. 2003. The taxonomy, genitalic morphology, and phylogenetic relationships of southern African Mantophasmatodea (Insecta). *Entomologische Abhandlungen*, 61(1):3–67.
- Kleinbooi, K. 2013. Reshaping women's land rights on communal rangeland. *African Journal of Range & Forage Science*, 30(1–2):17–21. <https://doi.org/10.2989/10220119.2013.797027>.
- Kotzé, A., Grobler, J.P., Van Marle-Köster, E., Jonker, T. & Dalton, D.L. 2014. The Tankwa Karoo National Park feral goat population: A unique genetic resource. *South African Journal of Animal Science*, 44(1):43–48. <https://doi.org/10.4314/sajas.v44i1.6>.
- Krishnan, A. 2009. *What Are Academic Disciplines? Some Observations on the Disciplinarity vs. Interdisciplinarity Debate [NCRM Working Paper]*.
- Kruger, M., Saayman, M. & Saayman, A. 2009. Sociodemographic and Behavioral Determinants of Visitor Spending at the Klein Karoo National Arts Festival. *Event Management*, 13(1):53–68. <https://doi.org/10.3727/152599509789130593>.

- Le Maitre, D.C., Milton, S.J., Jarman, C., Colvin, C.A., Saayman, I. & Vlok, J.H.J. 2007. Linking ecosystem services and water resources: Landscape-scale hydrology of the Little Karoo. *Frontiers in Ecology and the Environment*, 5(5):261–270. [https://doi.org/10.1890/1540-9295\(2007\)5\[261:LESAWR\]2.0.CO;2](https://doi.org/10.1890/1540-9295(2007)5[261:LESAWR]2.0.CO;2).
- Lebert, T. 2004. *Municipal commonage as a form of land redistribution: A case study of the new farms of Leliefontein, a communal reserve in Namaqualand, South Africa*. Institute for Poverty, Land and Agrarian Studies, University of the Western Cape. <http://repository.uwc.ac.za/xmlui/handle/10566/4380> [Accessed 17 January 2022].
- Lebert, T. & Rohde, R. 2007. Land reform and the new elite: Exclusion of the poor from communal land in Namaqualand, South Africa. *Journal of Arid Environments*, 70(4):818–833. <https://doi.org/10.1016/J.JARIDENV.2006.03.023>.
- Lee, A.T.K., Geary, C., Wright, D.R. & Dean, W.R.J. 2019. Vulnerability of birds to contaminated water sources in the Karoo region of South Africa. *Journal of African Ornithology*, 90(4):397–406. <https://doi.org/10.2989/00306525.2019.1638846>.
- Legassick, M. 1972. The frontier tradition in South African historiography. *Collected Seminar Papers. Institute of Commonwealth Studies*, 12:1–33. <https://api.core.ac.uk/oai/oai:sas-space.sas.ac.uk:3648>.
- Lindsey, P.A. & Skinner, J.D. 2001. Ant composition and activity patterns as determined by pitfall trapping and other methods in three habitats in the semi-arid Karoo. *Journal of Arid Environments*, 48(4):551–568. <https://doi.org/10.1006/JARE.2000.0764>.
- Lloyd, P. 1999. Rainfall as a breeding stimulus and clutch size determinant in South African arid-zone birds. *Ibis*, 141(4):637–643. <https://doi.org/10.1111/J.1474-919X.1999.TB07371.X>.
- Loehr, V.J.T., Henen, B.T. & Hofmeyr, M.D. 2004. Reproduction of the smallest tortoise, the Namaqualand speckled padloper, *Homopus signatus signatus*. *Herpetologica*, 60(4):444–454. <https://doi.org/10.1655/03-59>.
- Lombard, M., Caruana, M. V., Walt, J. Van der & Högborg, A. 2020. The Keimoes 3 desert kite site, South Africa: an aerial lidar and micro-topographic exploration. *Antiquity*, 94(373):197–211. <https://doi.org/10.15184/AQY.2019.99>.
- López, M.J. 2013. J.M. Coetzee's "Summertime": Mistranslation, Linguistic Unhousedness, and the Extraterritorial Literary Community. *Atlantis*, 35(1):51–67.
- Lovegrove, B.G. 1999. Animal form and function. In: W.R.J. Dean & S.J. Milton (eds). *The Karoo: Ecological patterns and processes*. Cambridge University Press. 145–163. <https://doi.org/10.1017/cbo9780511541988.013>.
- MacKellar, N.C., Hewitson, B.C. & Tadross, M.A. 2007. Namaqualand's climate: Recent historical changes and future scenarios. *Journal of Arid Environments*, 70(4):604–614. <https://doi.org/10.1016/J.JARIDENV.2006.03.024>.
- MacPherson, A.J., Gillson, L. & Hoffman, M.T. 2017. Climatic buffering and anthropogenic degradation of a Mediterranean-type shrubland refugium at its semi-arid boundary, South Africa: *The Holocene*, 28(4):651–666. <https://doi.org/10.1177/0959683617735582>.
- Manning, J.C., Goldblatt, P. & Forest, F. 2009. A revision of Fumariaceae (Fumarioideae) in southern Africa, including naturalized taxa. *Bothalia*, 39:47–65. <https://doi.org/10.4102/abc.v39i1.229>.
- Maphangwa, K.W., Musil, C.F., Raitt, L. & Zedda, L. 2012. Experimental climate warming decreases photosynthetic efficiency of lichens in an arid South African ecosystem. *Oecologia*, 169(1):257–268. <https://doi.org/10.1007/s00442-011-2184-9>.

- Masubelele, M.L., Hoffman, M.T., Bond, W.J. & Gambiza, J. 2014. A 50 year study shows grass cover has increased in shrublands of semi-arid South Africa. *Journal of Arid Environments*, 104:43–51. <https://doi.org/10.1016/J.JARIDENV.2014.01.011>.
- May, H. & Lahiff, E. 2007. Land reform in Namaqualand, 1994–2005: A review. *Journal of Arid Environments*, 70(4):782–798. <https://doi.org/10.1016/J.JARIDENV.2006.08.015>.
- McGranaghan, M. 2014. 'Different people' coming together: representations of alterity in !Xam Bushman (San) narrative. *Critical Arts*, 28(4):670–688. <https://doi.org/10.1080/02560046.2014.929223>.
- McMaster, M.K. & Downs, C.T. 2006. Population Structure and Density of Leopard Tortoises (*Geochelone Pardalis*) on Farmland in the Nama-Karoo. *Journal of Herpetology*, 40(4):495–502. [https://doi.org/10.1670/0022-1511\(2006\)40\[495:psadol\]2.0.co;2](https://doi.org/10.1670/0022-1511(2006)40[495:psadol]2.0.co;2).
- Meyer, S. 2014. "We are people. My children have faces." The natural environment and the conceptualising of the self in *My Children Have Faces* (Carol Campbell). *Journal of the Humanities*, 54(4):675–692.
- Midgley, G.F. & Thuiller, W. 2007. Potential vulnerability of Namaqualand plant diversity to anthropogenic climate change. *Journal of Arid Environments*, 70(4):615–628. <https://doi.org/10.1016/J.JARIDENV.2006.11.020>.
- Milne, C. 2000. The history of the Dorper sheep. *Small Ruminant Research*, 36(2):99–102. [https://doi.org/10.1016/S0921-4488\(99\)00154-6](https://doi.org/10.1016/S0921-4488(99)00154-6).
- Milton, S.J. 1990. Above-ground biomass and plant cover in a succulent shrubland in the southern Karoo, South Africa. *South African Journal of Botany*, 56:587–589. [https://doi.org/10.1016/S0254-6299\(16\)31028-6](https://doi.org/10.1016/S0254-6299(16)31028-6).
- Milton, S.J. 1993. Insects from the shrubs *Osteospermum sinuatum* and *Pteronia pallens* (Asteraceae) in the southern Karoo. *African Entomology*, 1(2):257–261.
- Milton, S.J. & Hoffman, M.T. 1994. The application of state-and-transition models to rangeland research and management in arid succulent and semi-arid grassy Karoo, South Africa. *African Journal of Range & Forage Science*, 11(1):18–26. <https://doi.org/10.1080/10220119.1994.9638349>.
- Milton, S.J., Dean, W.R.J. & Kerley, G.I.H. 1992. Tierberg Karoo Research Centre: History, physical environment, flora and fauna. *Transactions of the Royal Society of South Africa*. 48(1):15–46. <https://doi.org/10.1080/00359199209520254>.
- Milton, S.J., Dean, W.R.J., Du Plessis, M.A. & Roy, W. 1994 A Conceptual Model of Arid Rangeland Degradation: The escalating cost of declining productivity. *BioScience*, 44:70–76. <https://doi.org/10.2307/1312204>.
- Milton, S.J., Dean, W.R.J., Marincowitz, C.P. & Kerley, G.I.H. 1995. Effects of the 1990/91 drought on rangeland in the Steytlerville Karoo. *South African Journal of Science*, 91:78–83. <https://doi.org/10.2989/10220119.2021.1992501>.
- Mkhize, N. 2014. Game farm conversions and the land question: unpacking present contradictions and historical continuities in farm dwellers' tenure insecurity in Cradock. *Journal of Contemporary African Studies*, 32(2):207–219. <https://doi.org/10.1080/02589001.2014.925303>.
- Morris, D. 2017. The vultures of Kalabasput: On the interpretation of a series of unusual Karoo rock engravings. *Journal of Arid Environments*, 143:44–49. <https://doi.org/10.1016/J.JARIDENV.2016.11.010>.

- Mouton, P. le F.N., Flemming, A.F. & Kanga, E.M. 1999. Grouping behaviour, tail-biting behaviour and sexual dimorphism in the armadillo lizard (*Cordylus cataphractus*) from South Africa. *Journal of Zoology*, 249(1):1–10. <https://doi.org/10.1111/J.1469-7998.1999.TB01055.X>.
- Mucina, L. & Rutherford, M.C. (eds). 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute.
- Mudavanhu, S., Blignaut, J.N., Vink, N., Crookes, D.J. & Nkambule, N. 2017. An economic analysis of different land-use options to assist in the control of the invasive Prosopis (Mesquite) tree. *African Journal of Agricultural and Resource Economics*, 12:366–411. <https://repository.up.ac.za/handle/2263/64686>.
- Mugido, W., Kleynhans, T.E. & Hoffman, W. 2012. Effect of selection on the production of day-old ostrich chicks in the Klein Karoo. *Agrekon*, 51(3):117–127. <https://doi.org/10.1080/03031853.2012.749572>.
- Murcott, M. & Webster, E. 2020. Litigation and regulatory governance in the age of the Anthropocene: the case of fracking in the Karoo. *Transnational Legal Theory*, 11(1–2):144–164. <https://doi.org/10.1080/20414005.2020.1777037>.
- Musil, C.F., Schmiedel, U. & Midgley, G.F. 2005. Lethal effects of experimental warming approximating a future climate scenario on southern African quartz-field succulents: a pilot study. *New Phytologist*, 165(2):539–547. <https://doi.org/10.1111/J.1469-8137.2004.01243.X>.
- Natrass, N. & Conradie, B. 2015. Jackal Narratives: Predator Control and Contested Ecologies in the Karoo, South Africa. *Journal of Southern African Studies*, 41(4):753–771. <https://doi.org/10.1080/03057070.2015.1049484>.
- Natrass, N., Conradie, B. & Conradie, I. 2015. The Koup fencing project: Community-led job creation in the Karoo. *African Journal of Agricultural and Resource Economics*, 10(2):131–145. <https://doi.org/10.22004/AG.ECON.208924>.
- Natrass, N., Drouilly, M. & O’Riain, M.J. 2019. Learning from science and history about black-backed jackals *Canis mesomelas* and their conflict with sheep farmers in South Africa. *Mammal Review*, 50(1):101–111. <https://doi.org/10.1111/MAM.12179>.
- Natrass, N., Conradie, B., Stephens, J. & Drouilly, M. 2020. Culling recolonizing mesopredators increases livestock losses: Evidence from the South African Karoo. *Ambio*, 49(6):1 222–1 231. <https://doi.org/10.1007/s13280-019-01260-4>.
- Ndhlovu, T., Milton, S.J. & Esler, K.J. 2016. Effect of *Prosopis* (mesquite) invasion and clearing on vegetation cover in semi-arid Nama Karoo rangeland, South Africa. *African Journal of Range & Forage Science*, 33(1):11–19. <https://doi.org/10.2989/10220119.2015.1036460>.
- Nel, E. & Hill, T. 2008. Marginalisation and demographic change in the semi-arid Karoo, South Africa. *Journal of Arid Environments*, 72(12):2 264–2 274. <https://doi.org/10.1016/j.jaridenv.2008.07.015>.
- Nenzhelele, E., Todd, S.W. & Hoffman, M.T. 2018. Long-term impacts of livestock grazing and browsing in the Succulent Karoo: a 20-year study of vegetation change under different grazing regimes in Namaqualand. *African Journal of Range & Forage Science*, 35(3–4):277–287. <https://doi.org/10.2989/10220119.2018.1519640>.

- Neumann, F.H. & Bamford, M.K. 2015. Shaping of modern southern African biomes: Neogene vegetation and climate changes. *Transactions of the Royal Society of South Africa*, 70(3):195–212. <https://doi.org/10.1080/035919X.2015.1072859>.
- Nortje, J.M. & Van Wyk, B.E. 2015. Medicinal plants of the Kamiesberg, Namaqualand, South Africa. *Journal of Ethnopharmacology*, 171:205–222. <https://doi.org/10.1016/J.JEP.2015.04.049>.
- O'Connor, T.G. & Roux, P.W. 1995. Vegetation Changes (1949-71) in a Semi-Arid, Grassy Dwarf Shrubland in the Karoo, South Africa: Influence of Rainfall Variability and Grazing by Sheep. *The Journal of Applied Ecology*, 32(3):612. <https://doi.org/10.2307/2404657>.
- O'Farrell, P.J., Anderson, P.M.L., Milton, S.J. & Dean, W.R.J. 2009. Human response and adaptation to drought in the arid zone: lessons from southern Africa. *South African Journal of Science*, 105(1–2):34–39. <https://rebrand.ly/4gxpx3>.
- Orton, J. 2009. Hunters or herders? Evidence from the cultural assemblages at Bakoond, Western Cape, South Africa Related papers. *Before Farming*, 4:1–16. <http://dx.doi.org/10.3828/bfarm.2009.4.1>.
- Orton, J. 2016. Late Holocene Artifact Patterns and the Introduction of Herding to Semi-Arid Coastal Namaqualand, South Africa. *Journal of Island and Coastal Archaeology*, 12(1):78–94. <https://doi.org/10.1080/15564894.2016.1228719>.
- Orton, J., Mitchell, P., Klein, R., Steele, T. & Horsburgh, K.A. 2013. An early date for cattle from Namaqualand, South Africa: implications for the origins of herding in southern Africa. *Antiquity*, 87(335):108–120. <https://doi.org/10.1017/S0003598X00048651>.
- Pattinson, N.B. & Smit, B. 2017. Seasonal behavioral responses of an arid-zone passerine in a hot environment. *Physiology and Behavior*, 179:268–275. <https://doi.org/10.1016/J.PHYSBEH.2017.06.018>.
- Penn, N. 1995. The Northern Cape frontier zone, 1700 – c.1815. PhD thesis. University of Cape Town, Cape Town. <https://open.uct.ac.za/handle/11427/19713>
- Penn, N. 2005. *The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century*. Cape Town: Juta.
- Petersen, H., Jack, S.L., Hoffman, M.T. & Todd, S.W. 2020. Patterns of plant species richness and growth form diversity in critical habitats of the Nama-Karoo Biome, South Africa. *South African Journal of Botany*, 135:201–211. <https://doi.org/10.1016/J.SAJB.2020.08.028>.
- Prediger, S., Vollan, B. & Frölich, M. 2011. The impact of culture and ecology on cooperation in a common-pool resource experiment. *Ecological Economics*, 70(9):1599–1608. <https://doi.org/10.1016/J.ECOLECON.2010.08.017>.
- Pretorius, S.C., Viviers, P. & Botha, K. 2014. Is it still about the arts? The perceived contribution of KKNK to the arts. *South African Theatre Journal*, 27(3):159–182. <https://doi.org/10.1080/10137548.2014.910964>.
- Pringle, T. 1989. A history of the South African mohair industry 1838-1971. *South African Journal of Economic History*, 4(2):55–77. <https://doi.org/10.1080/20780389.1989.10417162>.
- Procheş, Ş. & Cowling, R.M. 2006. Insect diversity in Cape fynbos and neighbouring South African vegetation. *Global Ecology and Biogeography*, 15(5):445–451. <https://doi.org/10.1111/J.1466-822X.2006.00239.X>.

- Proos, E. & Hattingh, J. 2019. Advancing heritage tourism in the central Karoo: The South African War Battlefields Route. *Development Southern Africa*, 37(4):678–693. <https://doi.org/10.1080/0376835X.2019.1698409>.
- Raith, J.G. & Stein, H.J. 2000. Re-Os dating and sulphur isotope composition of molybdenite from tungsten deposits in western Namaqualand, South Africa: Implications for ore genesis and the timing of metamorphism. *Mineralium Deposita*, 35(8):741–753. <https://doi.org/10.1007/S001260050276>.
- Reyers, B., O'Farrell, P.J., Cowling, R.M., Egoh, B.N., Le Maitre, D.C. & Vlok, J.H. 2009. Ecosystem Services, Land-Cover Change, and Stakeholders: Finding a Sustainable Foothold for a Semiarid Biodiversity Hotspot. *Ecology and Society*, 14(1). <https://www.jstor.org/stable/26268036>. <https://doi.org/10.5751/ES-02867-140138>.
- Rohde, R.F., Moleele, N.M., Mphale, M., Allsopp, N., Chanda, R., Hoffman, M.T., Magole, L. & Young, E. 2006. Dynamics of grazing policy and practice: environmental and social impacts in three communal areas of southern Africa. *Environmental Science and Policy*, 9(3):302–316. <https://doi.org/10.1016/J.ENVSCI.2005.11.009>.
- Rubidge, B.S. 2005. 27th Du Toit Memorial Lecture: Re-uniting lost continents – Fossil reptiles from the ancient Karoo and their wanderlust. *South African Journal of Geology*, 108(1):135–172. <https://doi.org/10.2113/108.1.135>.
- Rudman, J., Gauché, P. & Esler, K.J. 2017. Direct environmental impacts of solar power in two arid biomes: An initial investigation. *South African Journal of Science*, 113(11–12):1–13. <https://doi.org/10.17159/SAJS.2017/20170113>.
- Rundel, P.W., Esler, K.J. & Cowling, R.M. 1999. Ecological and phylogenetic patterns of carbon isotope discrimination in the winter-rainfall flora of the Richtersveld, South Africa. *Plant Ecology*, 142(1):133–148. <https://doi.org/10.1023/A:1009878429455>.
- Saaed, M.W.B., Jacobs, S.M., Masubelele, M.L., Samuels, I., Khomo, L. & El-Barasi, Y.M. 2018. The composition of the soil seedbank and its role in ecosystem dynamics and rehabilitation potential in the arid Tankwa Karoo Region, South Africa. *African Journal of Range & Forage Science*, 35(3–4):351–361. <https://doi.org/10.2989/10220119.2018.1526824>.
- Saayman, M., Saayman, A. & Ferreira, M. 2009. The socio-economic impact of the Karoo National Park. *Koedoe*, 51(1):1–10. <https://doi.org/10.4102/koedoe.v51i1.158>.
- Sampson, C.G., Moore, V., Bousman, C.B., Stafford, B., Giordano, A. & Willis, M. 2015. A GIS Analysis of the Zeekoe Valley Stone Age Archaeological Record in South Africa. *Journal of African Archaeology*, 13(2):167–185. <https://doi.org/10.3213/2191-5784-10277>.
- Samuels, M.I., Allsopp, N. & Hoffman, M.T. 2019. Traditional Mobile Pastoralism in a Contemporary Semiarid Rangeland in Namaqualand, South Africa. *Rangeland Ecology and Management*, 72(1):195–203. <https://doi.org/10.1016/J.RAMA.2018.08.005>.
- Schmiedel, U. & Oldeland, J. 2018. Vegetation responses to seasonal weather conditions and decreasing grazing pressure in the arid Succulent Karoo of South Africa. *African Journal of Range & Forage Science*, 35(3–4):303–310. <https://doi.org/10.2989/10220119.2018.1531926>.
- Schoevers, J. & Jenkins, L. 2015. Factors influencing specialist outreach and support services to rural populations in the Eden and Central Karoo districts of the Western Cape. *African Journal of Primary Health Care and Family Medicine*, 7(1):1–9. <https://doi.org/10.4102/PHCFM.V7I1.750>.

- Scholes, B., Lochner, P., Schreiner, G., Snyman-Van Der Walt, L. & De Jager, M. 2016. *Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks*. Pretoria: CSIR. <https://researchspace.csir.co.za/dspace/handle/10204/8988>. <https://doi.org/10.17159/caj/2016/26/2.7002>.
- Schradin, C. & Pillay, N. 2005. Demography of the striped mouse (*Rhabdomys pumilio*) in the succulent karoo. *Mammalian Biology*, 70(2):84–92. <https://doi.org/10.1016/J.MAMBIO.2004.06.004>.
- Sealy, J. & Yates, R. 1994. The chronology of the introduction of pastoralism to the Cape, South Africa. *Antiquity*, 68(258):58–67. <https://doi.org/10.1017/S0003598X00046196>.
- Shaw, J.M., Reid, T.A., Schutgens, M., Jenkins, A.R. & Ryan, P.G. 2018. High power line collision mortality of threatened bustards at a regional scale in the Karoo, South Africa. *Ibis*, 160(2):431–446. <https://doi.org/10.1111/IBI.12553>.
- Simelane, T.S., Kerley, G.I.H. & Knight, M.H. 2006. Reflections on the relationships between communities and conservation areas of South Africa: the case of five South African national parks. *Koedoe*, 49(2):85–102. <https://doi.org/10.4102/KOEDOE.V49I2.121>.
- Simmons, R.E., Barnard, P., Dean, W.R.J., Midgley, G.F., Thuiller, W. & Hughes, G. 2004. Climate change and birds: perspectives and prospects from southern Africa. *Ostrich – Journal of African Ornithology*, 75(4):295–308. <https://doi.org/10.2989/00306520409485458>.
- Skinner, J.D. 1993. Springbok (*Antidorcas marsupialis*) treks. *Transactions of the Royal Society of Southern Africa*, 48(2):291–305. <https://doi.org/10.1080/00359199309520276>.
- Smith, G.F. & Figueiredo, E. 2017. *Kalanchoe fedtschenkoi* Raym.-Hamet & H.Perrier (Crassulaceae) is spreading in South Africa's Klein Karoo. *Bradleya*, 2017(35):80–86. <https://doi.org/10.25223/BRAD.N35.2017.A7>.
- Smith, R.M.H. & Botha-Brink, J. 2014. Anatomy of a mass extinction: Sedimentological and taphonomic evidence for drought-induced die-offs at the Permo-Triassic boundary in the main Karoo Basin, South Africa. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 396:99–118. <https://doi.org/10.1016/J.PALAEO.2014.01.002>.
- Snijman, D.A. 2012. A revision of the *Brunsvigia radula*-group (Amaryllidaceae: Amaryllideae) of species in South Africa, including the description of *Brunsvigia gariepensis* a new species from Bushmanland in Northern Cape. *South African Journal of Botany*, 79:106–116. <https://doi.org/10.1016/J.SAJB.2011.12.005>.
- Snyman, M.A. & Olivier, W.J. 2002. Productive performance of hair and wool type Dorper sheep under extensive conditions. *Small Ruminant Research*, 45(1):17–23. [https://doi.org/10.1016/S0921-4488\(02\)00116-5](https://doi.org/10.1016/S0921-4488(02)00116-5).
- Spickett, A.M. & Heyne, H. 1988. A survey of Karoo tick paralysis in South Africa. *Onderstepoort Journal of Veterinary Research*, 55:89–92. <https://repository.up.ac.za/handle/2263/42341>.
- Steele, J. 2015. Sculpting with fire: celebrating ephemerality at AfrikaBurn 2015 in the Tankwa Karoo, South Africa. *South African Journal of Art History*, 30:187–200. <http://hdl.handle.net/11260/957>.
- Taylor, W.A., Lindsey, P.A. & Skinner, J.D. 2002. The feeding ecology of the aardvark *Orycteropus afer*. *Journal of Arid Environments*, 50(1):135–152. <https://doi.org/10.1006/JARE.2001.0854>.

- Thompson, M., Vlok, J., Rouget, M., Hoffman, M.T., Balmford, A. & Cowling, R.M. 2009. Mapping Grazing-Induced Degradation in a Semi-Arid Environment: A Rapid and Cost Effective Approach for Assessment and Monitoring. *Environmental Management*, 43:585–596. <https://doi.org/10.1007/s00267-008-9228-x>.
- Todd, S.W. 2006. Gradients in vegetation cover, structure and species richness of Nama-Karoo shrublands in relation to distance from livestock watering points. *Journal of Applied Ecology*, 43(2):293–304. <https://doi.org/10.1111/J.1365-2664.2006.01154.X>.
- Todd, S.W. & Hoffman, M.T. 1999. A fence-line contrast reveals effects of heavy grazing on plant diversity and community composition in Namaqualand, South Africa. *Plant Ecology*, 142(1):169–178. <https://doi.org/10.1023/A:1009810008982>.
- Todd, M.C., Washington, R., Cheke, R.A. & Kniveton, D. 2002. Brown locust outbreaks and climate variability in southern Africa. *Journal of Applied Ecology*, 39(1):31–42. <https://doi.org/10.1046/J.1365-2664.2002.00691.X>.
- Todd, S., Hoffman, M.T., Henschel, J.R. & Cardoso, A. 2016. The potential impacts of fracking on biodiversity of the Karoo Basin, South Africa. In: J. Glazeweski & S. Esterhuysen. *Hydraulic Fracturing in the Karoo: Critical Legal and Environmental Perspectives*. Cape Town: Juta & Company. 278–301.
- Toerien, D.F. & Seaman, M.T. 2010. The enterprise ecology of towns in the Karoo, South Africa. *South African Journal of Science*, 106(5). <https://doi.org/10.4102/sajs.v106i5/6.182>.
- Toerien, D.F. & Seaman, M.T. 2011. Ecology, water and enterprise development in selected rural South African towns. *Water SA*, 37(1):47–56. <https://doi.org/10.4314/wsa.v37i1.64106>.
- Van der Merwe, P.J. & Beck, R. 1995. *The migrant farmer in the history of the Cape Colony, 1657–1842*. Athens: Ohio University Press.
- Van Hoogenhouck-Tulleken, W., Chan, I., Hamada, T., Thornton, H., Jenkins, T., McLean, W.H.I., McGrath, J.A. & Ramsay, M. 2004. Clinical and molecular characterization of lipoid proteinosis in Namaqualand, South Africa. *British Journal of Dermatology*, 151(2):413–423. <https://doi.org/10.1111/J.1365-2133.2004.06076.X>.
- Van Rooyen, M.W., Le Roux, A., Van der Merwe, H., Van Rooyen, N. & Geldenhuys, C. 2018. Long-term vegetation change (>20 years) in the plains habitat on the Goegap Nature Reserve, Succulent Karoo, South Africa. *African Journal of Range & Forage Science*, 35(3–4):289–302. <https://doi.org/10.2989/10220119.2018.1498802>.
- Van Rooyen, M.W. & Grobbelaar, N. 1982. Saadbevolkings in die grond van die Hester Malan-natuurreservaat in die Namakwalandse Gebroke Veld. *South African Journal of Botany*, 1(3):41–50. [https://doi.org/10.1016/S0022-4618\(16\)30175-9](https://doi.org/10.1016/S0022-4618(16)30175-9).
- Van Sittert, L. 2016. Routinising genocide: the politics and practice of vermin extermination in the Cape Province c.1889–1994. *Journal of Contemporary African Studies*, 34(1):111–128. <https://doi.org/10.1080/02589001.2016.1200243>.
- Van Wyk, B.E. 2008. A review of Khoi-San and Cape Dutch medical ethnobotany. *Journal of Ethnopharmacology*, 119(3):331–341. <https://doi.org/10.1016/J.JEP.2008.07.021>.
- Venter, Z.S., Scott, S.L., Desmet, P.G. & Hoffman, M.T. 2020. Application of Landsat-derived vegetation trends over South Africa: Potential for monitoring land degradation and restoration. *Ecological Indicators*, 113(July 2019):1–9. <https://doi.org/10.1016/j.ecolind.2020.106206>.

- Verboom, G.A., Archibald, J.K., Bakker, F.T., Bellstedt, D.U., Conrad, F., Dreyer, L.L., Forest, F., Galley, C., et al. 2009. Origin and diversification of the Greater Cape flora: Ancient species repository, hot-bed of recent radiation, or both? *Molecular Phylogenetics and Evolution*, 51(1):44–53. <https://doi.org/10.1016/J.YMPEV.2008.01.037>.
- Vermeulen, P.D. 2013. Preliminary assessment of water-supply availability with regard to potential shale-gas development in the Karoo region of South Africa. In: J. Cobbing, S. Adams, I. Dennis, & K. Riemann (eds). *Assessing and Managing Groundwater in Different Environments*. 1st Edition. Leiden: CRC Press. 251. <https://doi.org/10.1201/b15937-18>.
- Vernon, C.J. 1999. Biogeography, endemism and diversity of animals in the Karoo, in W.R.J. Dean & S.J. Milton (eds). *The Karoo: Ecological patterns and processes*. Cambridge: Cambridge University Press. 57–85. <https://doi.org/10.1017/cbo9780511541988.008>.
- Vetter, S. 2009. Drought, change and resilience in South Africa's arid and semi-arid rangelands. *South African Journal of Science*, 105:29–33. <https://doi.org/10.4102/sajs.v105i1/2.35>.
- Vetter, S. 2013. Development and sustainable management of rangeland commons – aligning policy with the realities of South Africa's rural landscape. *African Journal of Range & Forage Science*, 30(1–2):1–9. <https://doi.org/10.2989/10220119.2012.750628>.
- Von Willert, D.J., Brinckmann, E., Scheitler, B. & Eller, B.M. 1985. Availability of water controls Crassulacean acid metabolism in succulents of the Richtersveld (Namib desert, South Africa). *Planta*, 164(1):44–55. <https://doi.org/10.1007/BF00391024>.
- Vorster, M. 1982. The development of the ecological index method for assessing veld condition in the Karoo. *Proceedings of the Annual Congresses of the Grassland Society of Southern Africa*, V. 17. 84–89. <https://doi.org/10.1080/00725560.1982.9648962>.
- Vorster, M., Becker, H.R., Greyling, J.S. & Bosch, O.J.H. 1987. Ordination of land types in the karoo region into reasonably homogeneous farming areas based on vegetation and environmental factors. *Journal of the Grassland Society of Southern Africa*, 4(1):13–17. <https://doi.org/10.1080/02566702.1987.9648062>.
- Wait, R. & Rossouw, R. 2019. A comparative assessment of the economic benefits from shale gas extraction in the Karoo, South Africa. *Southern African Business Review*, 18(2):1–34. <https://doi.org/10.25159/1998-8125/5651>.
- Walker, C. & Chinigò, D. 2018. Disassembling the Square Kilometre Array: astronomy and development in South Africa. *Third World Quarterly*, 39(10):1 979–1 997. <https://doi.org/10.1080/01436597.2018.1447374>.
- Walker, C., Milton, S.J., O'Connor, T.G., Maguire, J.M. & Dean, W.R.J. 2018. Drivers and trajectories of social and ecological change in the Karoo, South Africa. *African Journal of Range & Forage Science*, 35(3–4):157–177. <https://doi.org/10.2989/10220119.2018.1518263>.
- Walker, C., Chinigò, D. & Dubow, S. (eds). 2019. Karoo Futures: Astronomy in Place and Space. Special issue, *Journal of Southern African Studies*, 45(4):667–790. <https://doi.org/10.1080/03057070.2019.1654664>.

- Waterhouse, G. 1924. Simon van der Stel's Expedition to Namaqualand, 1685. *The Geographical Journal*, 64(4):298. <https://doi.org/10.2307/1781812>.
- Werger, M.J.A. & Coetzee, B.J. 1977. A phytosociological and phytogeographical study of Augrabies Falls National Park, Republic of South Africa. *Koedoe*, 20(1):11–51. <https://doi.org/10.4102/KOEDOE.V2011.929>.
- Whiting, M.J., Stuart-Fox, D.M., O'Connor, D., Firth, D., Bennett, N.C. & Blomberg, S.P. 2006. Ultraviolet signals ultra-aggression in a lizard. *Animal Behaviour*, 2(72):353–363. <https://doi.org/10.1016/J.ANBEHAV.2005.10.018>.
- Wiegand, T., Milton, S.J. & Wissel, C. 1995. A simulation model for a shrub ecosystem in the semiarid Karoo, South Africa. *Ecology*, 76:2 205–2 221. <https://doi.org/10.2307/1941694>
- Wittenberg, H. 2014. Critical Arts: south-north cultural and media studies. The boer and the jackal: satire and resistance in Khoi orature. *Critical Arts*, 28:593–609. <https://doi.org/10.1080/02560046.2014.929218>.
- Wustro, I. & Conradie, B. 2020. How stable are farmers' risk perceptions? A follow-up study of one community in the Karoo. *Agrekon*, 59(1):30–45. <https://doi.org/10.1080/03031853.2019.1653204>.
- Yeaton, R.I. & Esler, K.J. 1990. The dynamics of a succulent karoo vegetation – A study of species association and recruitment. *Vegetatio*, 88:103–113. <https://doi.org/10.1007/BF00044827>.
- Young, A.J., Guo, D., Desmet, P.G. & Midgley, G.F. 2016. Biodiversity and climate change: Risks to dwarf succulents in Southern Africa. *Journal of Arid Environments*, 129:16–24. <https://doi.org/10.1016/J.JARIDENV.2016.02.005>.
- Zhao, Z., Heideman, N., Bester, P., Jordaan, A. & Hofmeyr, M.D. 2020. Climatic and topographic changes since the Miocene influenced the diversification and biogeography of the tent tortoise (*Psammobates tentorius*) species complex in Southern Africa. *BMC Evolutionary Biology*, 20(1):1–33. <https://doi.org/10.1186/S12862-020-01717-1>.

Chapter 3

Surplus populations in the Upper Karoo: A historical perspective from Prieska

Michela Marcatelli

Prieska is a small town (with a population of about 14 000 people in 2011 (Statistics South Africa (StatsSA), n.d.) on the southern bank of the middle Gariep River (also known as the Orange), some 200 kilometres south-west of Kimberley, the provincial capital of Northern Cape. This is a true borderlands region on the edge of the Upper Karoo: historically, being drawn into the Cape Colony's northern frontier zone from the mid-eighteenth century; socially, being inhabited by different groups of people whose mixed and fluid identities were progressively fixed in the course of the twentieth century; and ecologically, sitting on the border between the Nama Karoo and Savanna biomes, with the river providing an uncharacteristic source of perennial surface water in an otherwise semi-arid environment.

This chapter narrates the history of 'surplus populations' in the Upper Karoo from the vantage point of Prieska and its rural surroundings, roughly equivalent to the area covered by today's Siyathemba Local Municipality. To consider surplus populations from this specific location is revealing because it allows one to look beyond the bantustan system that has become a synonym for 'surplus people' within the South African context. More specifically, the chapter adopts a longer-term perspective to investigate how, in this area of the Upper Karoo, different groups of people regarded historically as 'non-white' were rendered superfluous *before*, *during*, and to some extent even *after* apartheid. To be sure, the ways in which this process took place (especially who was made surplus and why) have changed over time.

In this account, I focus on two key events within the history of the Prieska region: first, its incorporation within the Cape Colony, which led to the dispossession and displacement of several groups, along with complex dynamics of identity making and remaking, and second, the development of asbestos mining that, in the southern asbestos belt where Prieska is located, followed a somewhat different route from that of diamond and gold mining in South Africa. Here it is worth noting that while

the role of the northern frontier within the history of South African colonialism has received some attention through the work of Martin Legassick (2004, 2010) and Nigel Penn (2005), asbestos mining, despite some important yet scattered contributions (McCulloch, 2002, 2005; Allen, 2003a, 2003b; Waldman, 2016), tends to remain absent from the country's public discourse and memory – to the point where asbestos is even erased from the 'official' history of mining in the Northern Cape as told by the Northern Cape Mining Community of the Minerals Council South Africa (Northern Cape Mining Community, n.d.).⁹

The chapter is based on an extensive literature review, supplemented by archival research and exploratory fieldwork conducted in 2019 (the latter hampered by the outbreak of the COVID-19 pandemic in 2020).¹⁰ The discussion is organised in four sections. It starts by reviewing the uses of the term 'surplus populations' in the literature and, given the centrality of the concept in the apartheid system of separate development, its particular applications to the South African context. This is also where I clarify how I deploy the term in the chapter. Thereafter I offer a detailed description of how surplus populations emerged in and around Prieska, first in relation to colonial conquest and then to asbestos mining. This is followed by a brief consideration of certain post-apartheid dynamics in the Prieska region and their limited contribution to the 'unmaking' of local people as superfluous. Key developments here include investments in a former copper mine and several renewable energy projects (solar and wind) in the Siyathemba Local Municipality. (See Figure 3.1 below.) In concluding, I restate my main argument and point to future research directions.

9 I am grateful to Cheryl Walker for drawing my attention to this.

10 Fieldwork included discussions with a range of informants in the Prieska area; those that are explicitly drawn on in this chapter are recorded as interviews in footnotes. Names and the positions of individuals are not given, to protect informants' privacy.

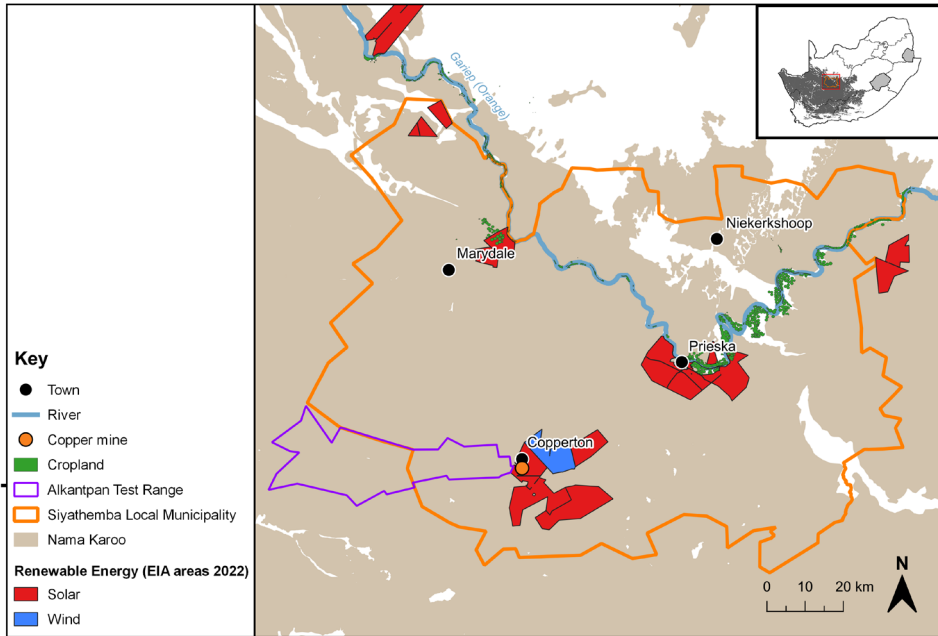


Figure 3.1 Prieska within the Siyathemba Local Municipality, showing selected land uses as of 2022

On surplus populations

The term ‘surplus population’ originates in the Marxist tradition of political economy. Marx introduces it in Volume 1 of *Capital* (1976 [1867]:782), where he argues that:

...it is capitalist accumulation itself that constantly produces, and produces indeed in direct relation with its own energy and extent, a relatively redundant working population, i.e. a population which is superfluous to capital’s average requirements for its own valorization, and is therefore a surplus population.

According to Marx, this is a fundamental “law of population” that is intrinsic to the capitalist mode of production. Capitalism in fact needs to set workers free (in varying degrees, which Marx distinguishes between floating, latent, and stagnant), in that it depends on a disposable industrial reserve army to reproduce its own conditions of existence and to control (that is, exploit) labour.

Over the last twenty years, several scholars have revived and expanded the notion of surplus populations by applying it to other social groups besides disposable workers (Bauman, 2003; Li, 2009, 2011; McIntyre & Nast, 2011; Tyner, 2013; Sassen, 2014; Ferguson, 2015; Bernards & Soederberg, 2021). This scholarship has pointed out that rendering superfluous, and hence prone to marginalisation and exploitation, is a racialised and gendered process that transcends relations of production and extends to the realm of social reproduction. In other words, it is not only a matter of jobs being made redundant, but also, and more broadly, of everyday life becoming increasingly commodified and, therefore, of survival becoming more and more precarious. Geographical difference also plays a role here. For instance, political ecology analysis (Li, 2009; Lesutis, 2019) tends to use surplus populations to describe those population groups, mostly in the Global South, that have been dispossessed and displaced in relation to new processes of commodification and extraction of natural resources – something that makes both their work *and* their life expendable.

In South Africa, the idea that the reach of surplus populations goes beyond the sphere of production has been present, if not widespread, for much longer. To be sure, the forced relocation of millions of people classified as 'black Africans' to rural bantustans under apartheid has been interpreted through the lens of a reserve army of labour (Legassick & Wolpe, 1976). And yet the work of the Surplus People Project has shown that within this context, 'surplus people' had a double meaning, both economic *and* political (Platzky & Walker, 1985). From this perspective, bantustans should be understood not only as 'dumping grounds' that were meant to accommodate blacks who were superfluous to the needs of white capital, including women and children, but also as spatio-political configurations that were instrumental in the maintenance of white minority rule in the country – by expelling black Africans from the 'white' republic and imposing on them the citizenship of manufactured ethnic territories that were expected to become politically 'independent'.

In the post-apartheid order, this conceptualisation of surplus populations has only partially changed. On the one hand, the term has continued to be used in relation to rural settings, especially to describe the plight of farm workers who run the risk of becoming "superfluous to the formal economy, [and then] swell the ranks of the 'surplus people' without land or jobs in the overcrowded ex-Bantustans, and on the peripheries of towns and cities" (Hall et al., 2013:48). The phenomenon of farm evictions in particular signals a certain continuity with state-sponsored forced removals of black workers, tenants, and 'squatters' from white-owned farms under apartheid. On the other hand, some scholars have noted a fundamental tension inherent in the characterisation of the surplus people of the democratic era, namely that they are, "at one and the same time economically redundant and politically

central” (Du Toit & Neves, 2014:847). This definition encompasses the masses of citizens, rural and urban, who are poor, unemployed, and marginalised,¹¹ and, still, largely black (used here with the broader meaning of ‘not white’).

Their “dispensable indispensability”, to turn a phrase by Jennifer Wenzel (2018:186), serves as the foundation of the political legitimacy of the African National Congress (ANC) and has prompted a situation whereby the post-apartheid state has simultaneously abandoned the black poor (by failing to stimulate job creation, for example) and protected them. The latter process materialises first and foremost in the provision of social grants (in the form of cash transfers), which aim at guaranteeing the survival of the most vulnerable within a national and global tendency – as noted above – towards the commodification of everyday life. The fact that most of the rural poor in the Karoo today reside on the margins of small towns and base their livelihoods on social grants is explored in more detail by Walker and Vorster in the next chapter (Chapter Four).

My use of the term ‘surplus populations’ in what follows reflects the debates described above. I thus consider both its economic and political dimensions, in different and fluid combinations according to the specific historical context, and refer to the dispensability of labour as well as life. I also trace the specific history of surplus populations in the Prieska region of the Upper Karoo not from the introduction of the bantustan policy in South Africa from the 1950s (in fact there were no bantustans in the Karoo), but from the process of colonial conquest in the second half of the 1800s.

Dispensability through colonial conquest

The area south of, and including, present-day Prieska was officially incorporated in the Cape Colony in December 1847, when Governor Harry Smith moved the northern border from the Kareeberg to the Gariep River, thus adding to the colonial territories some 80 million hectares of what was then referred to as Bushmanland (Legassick, 2004:10). (See Figure 3.2 below.)

11 Forty per cent of the South African population live below the so-called lower-bound poverty line (StatsSA, 2017:14) and in 2021 the unemployment rate was above 30% (StatsSA, 2021).

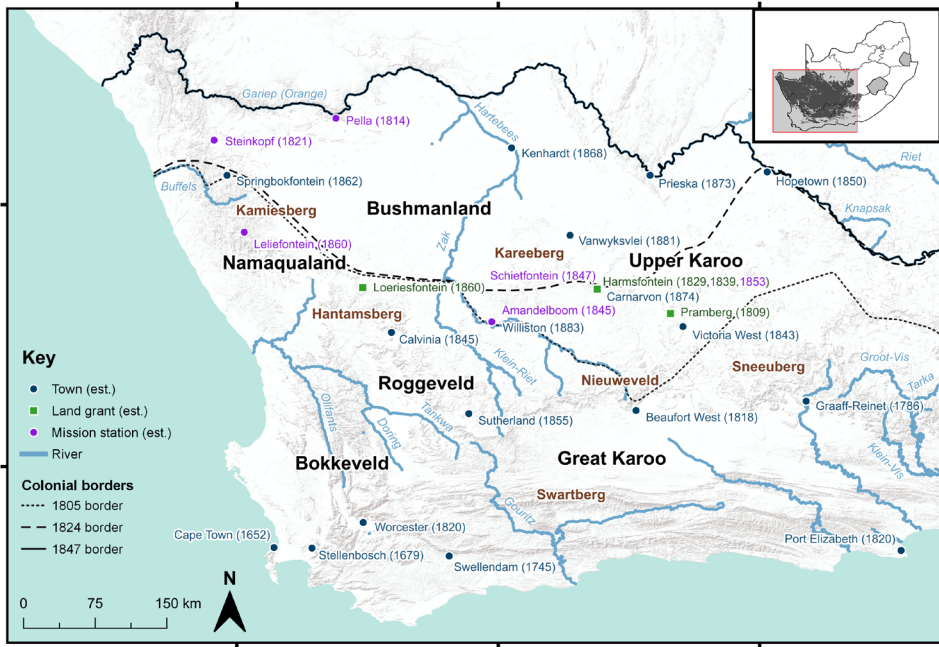


Figure 3.2 Northward shift of the border of the Cape Colony: 1805, 1824, 1847

Prieska (also spelt ‘Brieska’, ‘Brieschap’, or ‘Priskab’ after a Khoekhoe name meaning ‘place of the lost ewe’; Nienaber & Raper, 1983:197)¹² was a ford over the river, located on the eastern margins of the middle Gariep River valley. Although the place name seems to indicate an original Khoekhoe settlement, |Xam hunter-gatherers were in fact the earliest inhabitants of this region, but they were progressively displaced, many brutally killed (de Prada-Samper, 2012), by other groups who moved into the area over the years, including those variously identified as Khoekhoen, Tswana speakers, Koranas, Griquas, Basters, Xhosa speakers, and finally white colonists (initially *trekboers*).¹³

In 1795, Xhosa-speaking pastoralists settled at the Prieska ford – although the term ‘Prieska Xhosa’ has been used in the scholarship to identify not a single and exclusive settlement, but, rather, a number of small, racially and ethnically fluid communities in the vicinity of the ford (Anderson, 1985; Zachariou, 2013). These pastoralists were part of a migration of smaller Xhosa-speaking polities from the

12 I am grateful to José de Prada-Samper for pointing this out to me.

13 The Basters were a social group with mixed black and white ancestry, who emerged in the Northern Cape during the eighteenth century, while the *trekboers* were semi-nomadic pastoralists.

Cape Colony's eastern frontier to the Gariep River to escape the armed conflicts between the colonial government and larger Xhosa-speaking chiefdoms for control of the land between the Bushman's and Fish Rivers. By migrating north-westward, these groups aimed to "survive both politically and economically", especially by diversifying their livelihoods into hunting and trading in the lands to the north of the then colonial frontier (Kallaway, 1982:144).

Prieska became the northernmost trading post along a route between the Gariep River and the Cape Colony's eastern frontier region. By 1810 there were two more Xhosa settlements to its south, in the Kareeberg (near present-day Carnarvon) and at the Pramberg (near present-day Victoria West). The presence of Xhosa-speaking groups in Bushmanland (at the time still outside the Cape Colony and supposedly reserved for |Xam occupation) was tolerated, if not actually promoted, by colonial authorities in that they were seen as providing a buffer against |Xam raids on white *trekboers*. For instance, in exchange for their military support, the Xhosa-speaking groups in the Kareeberg and at the Pramberg received land grants from the colonial government in 1829 (Kallaway, 1982:159), which were adjusted and formally recognised in 1839 (Anderson, 1985:48). Elizabeth Anderson (1985:48) specifies that Xhosa speakers in the Kareeberg were granted access to land around three perennial springs (Schietfontein, Harmsfontein, and Rhenosterpoort) while those at the Pramberg received access to 17 600 hectares of land. (See Figure 3.2.)

The moving of the northern colonial border in 1847, and hence the incorporation of Bushmanland up to Prieska as 'New Territory' within the Cape Colony, must be contextualised within the so-called merino revolution that dramatically changed farming in the Karoo from the 1840s (Beinart, 2003; Chinigò, 2019). This term refers to the period when wool became a valuable commodity for export within the British Empire and commercial sheep farming a major land use in the Karoo region. The merino revolution began in the better watered eastern districts of the Karoo (around Graaff-Reinet) and expanded into the Upper Karoo in the second half of the nineteenth century. The concomitant process of land enclosure through fencing only started in the Prieska region after 1900 (Roche, 2008). Nonetheless, this revolution accelerated the competition for land and other natural resources in the Northern Cape well before then – including between white *trekboers* and white settler farmers – and raised the issue, for the colonial authorities, of regulating the presence of independent groups such as the Xhosa speakers and Basters within the New Territory.

This is when the role of Christian missionaries in the area became politically crucial (Penn, 2005). In 1845, the Rhenish Mission Society had established a mission station among a group of Basters who were settled on the Zak River at Amandelboom (Anderson, 1985:70), followed, in 1847, by another mission station at Schietfontein, among the Xhosa-speaking residents of the Kareeberg. In 1850,

Reverend CW Alheit, head of the Schietfontein mission station, made a request to the colonial government for a 'ticket of occupation', for a 42-kilometre-long stretch of land on the southern bank of the Gariep River that included the Prieska ford (Anderson, 1985:81). Alheit's plan was to move all the Xhosa-speaking people from the Kareeberg and the Pramberg to the area around Prieska, where, in his view, the Gariep River would allow them to develop irrigation agriculture and settle permanently within a mission reserve, independent from colonial rule. The missionary also suggested that the land for the new mission reserve on the river could be granted in exchange for the two Kareeberg and Pramberg land grants that could, in turn, be sold to white colonists.

Initially Governor Smith agreed to Alheit's proposal, with 80 farms surveyed and offered for auction in the Kareeberg and Pramberg land grant areas in 1852. However, no buyers were forthcoming at the time (Anderson, 1985:85), and the proposed swap with land at Prieska was not implemented. Instead, in 1855, following an escalation of tensions between the Xhosa-speaking settlers in the Pramberg and white *trekboers*, the former were forcibly relocated to Schietfontein. By 1857, this settlement accommodated more than 1 500 people: in addition to 350 Xhosa speakers who already resided there, there were the 460 Xhosa speakers who had been moved from the Pramberg, along with 742 Basters who had left Amandelboom because their land claims there had not been recognised by the colonial government (Anderson, 1985:115–116).

In 1860, thanks in part to the further mediation of Alheit, the Xhosa-speaking and Baster people residing around Schietfontein and Harmsfontein were the beneficiaries of two further land grants (Anderson, 1985; Chinigò, 2019). This was connected to a decision by the colonial authorities to transform the settlement around Harmsfontein into a surveyed village. With extensive townlands in the form of an inner and an outer commonage around it, this land was meant also as (minimal) compensation for the land the Xhosa speakers had lost at Pramberg. However, the 1860 land dispensation had the effect of pushing many Basters and Xhosa-speaking people away from Schietfontein. This was because they found the conditions around settlement attached to the grants too onerous and costly (Chinigò, 2019:757). Those who left had three options: 1) finding employment and accommodation on white-owned farms, 2) settling in the new urban 'location' at Victoria West¹⁴ or 3) moving to the remaining, unsurveyed land along the Gariep River (Anderson, 1985:138).

14 The town of Victoria West (founded in 1843) was the centre of wool commercial farming in the Upper Karoo and its 'location', intended as a residential area reserved for black people, was established around 1857/1861 (Legassick, 2004:12).

According to Anderson (1987: 141), the Xhosa “exodus” from Schietfontein¹⁵ increased the population of the small settlements scattered on the southern banks of the Gariiep River, between the Hartbees River and Prieska, to more than 500 people by 1868. As already mentioned, these were racially and ethnically mixed communities, consisting of Xhosa speakers, Basters, Koranas, and |Xam who had survived the genocide of the mid-1800s. This influx of people coincided with a period of severe drought, which increased pressure on the land and intensified conflicts among the resident groups as well as with white colonists who were also moving into the area. Hostilities were further aggravated by the discovery of diamonds on the Gariiep River in 1867 (near Hopetown, some 140 kilometres east of Prieska) – the beginning of the mineral revolution in southern Africa that would have such enormous consequences for the whole of the region. Following the discovery of alluvial diamonds, the colonial northern frontier became attractive not only to wool farmers, but also to a larger and more differentiated group of mineral prospectors. This is the context in which the so-called Korana Wars of 1868 and 1878 were fought in the middle Gariiep River valley (Ross, 1975; Anderson, 1985; Legassick, 2004). Despite the name, it was not only Korana groups settled along the river who participated in these acts of armed resistance against white colonisation, although the exact role of Basters appears more ambiguous (see Legassick, 2004:16–18). Thus, the second Korana War was initiated by a rebellion in Griqualand West¹⁶ that was caused by the annexation of the diamond fields by the British.

Between the two wars, in 1870, the colonial government tried to promote permanent settlement on the colony’s northern border by offering to lease 200 farms between Pella and Prieska to suitable applicants – “men capable of bearing arms, not over 45 years of age, and possessing not less than 500 sheep or goats,” who could be called upon to provide military service at any time, along with “at least three other armed men” per farm (Cape of Good Hope, 1870). Although there were no applicants at first, white colonists started to lease farms in this area in the years that followed while new villages were laid out, one of which was Prieska. As explained by Anderson (1985:149):

15 Legassick (2004:13) notes that the Basters from Schietfontein were actually moving further north to Pella and De Tuin.

16 At the beginning of the nineteenth century, groups of Basters and Khoisan had founded Griqualand West as a (semi-) independent frontier state beyond the Gariiep River, to the north of Prieska. This state was annexed to the British Empire in 1871 as a separate colony, subdivided into three magisterial districts (Hay, Barkly, and Kimberley), and then incorporated into the Cape Colony in 1880 (Thompson, 2001:117; see also Legassick, 2010).

White settlement was also encouraged by rumours that the islands of the Orange River were diamondiferous. In 1872 there was a minor rush to Prieska itself. Though no diamonds were found, people stayed, and in 1873 the government gave permission for Prieska to become a village, with erven and commonage rights at prices affordable for poor white farmers.¹⁷

The second Korana War ended with the complete defeat of those resisting the extension of colonial authority over the middle Gariep River valley. This helped the colonial government clear the land of people whose independence and mobility were superfluous, if not in opposition, to the political and economic project of white colonisation of the Northern Cape. At the same time, demand for black labour was becoming more pressing, especially with the establishment of mining. Therefore, the Special Northern Border Magistracy, which had been established in Kenhardt in 1868, began to send indentured labour further south in the colony and “this convenient method of eliminating unwanted people, enemies and prisoners, on the northern border, became common practice” (Anderson, 1985: 146; see also Ross, 1975:573). Still, some black people were allowed to remain in the region as “illegal squatters” on the land (Legassick, 2004:19), including on the edges of new colonial villages such as Prieska. In 1882, local residents complained that “a population of over two thousand Whites and fifteen hundred Natives, scattered over a large extent of country, ... all suffer greatly from want of a permanent Residency Magistrate” (subsequently instituted in 1883).¹⁸

Dispensability through asbestos mining

Although diamonds were held out as an inducement to attract white settlers to the area, it was another mineral that defined the political economy and ecology of Prieska and its surroundings for the next hundred years: asbestos. Blue asbestos (crocidolite) was ‘discovered’ by the German explorer MHC Lichtenstein near Prieska as early as 1805 (McCulloch, 2002:4). However, prospecting only started in the Hay District (north of the Gariep River) in the early 1880s, while mining became operational in the whole of the so-called asbestos belt from the early 1890s. This belt stretches for about 450 kilometres along the Asbestos Mountains, from Prieska in the south to Pomfret, close to the Botswana border, in the north, with Koegas, Niekerkshoop, Griquatown, Danielskuil, and Kuruman¹⁹ in between (see illustrative

17 The village consisted of 134 erven and ca. 18 000 hectares of commonage (Western Cape Archival Records Service (hereafter WCARS), Note from the Colonial Secretary's Office, Cape Town (5 July 1877), KAB CO 4196 539; Government Notice No. 632, 1876 (26 October 1876), KAB CSC 2/6/1/359 371).

18 WCARS, Prieska Inhabitants Magistracy – Petition for Submitting (16, 21 March 1882), KAB CO 4226 P6.

19 Kuruman (inhabited by Tswana-speaking groups) was part of the Crown Colony of British Bechuanaland, which was annexed to the Cape Colony in 1895 (see Jacobs, 2003).

outline in Figure 3.3 below). Asbestos mining followed copper and diamond extraction (in Springbok in the 1850s and Kimberley in the 1860s respectively) in the development of a commercial mining industry in the Cape Colony, with the Northern Cape at its centre.

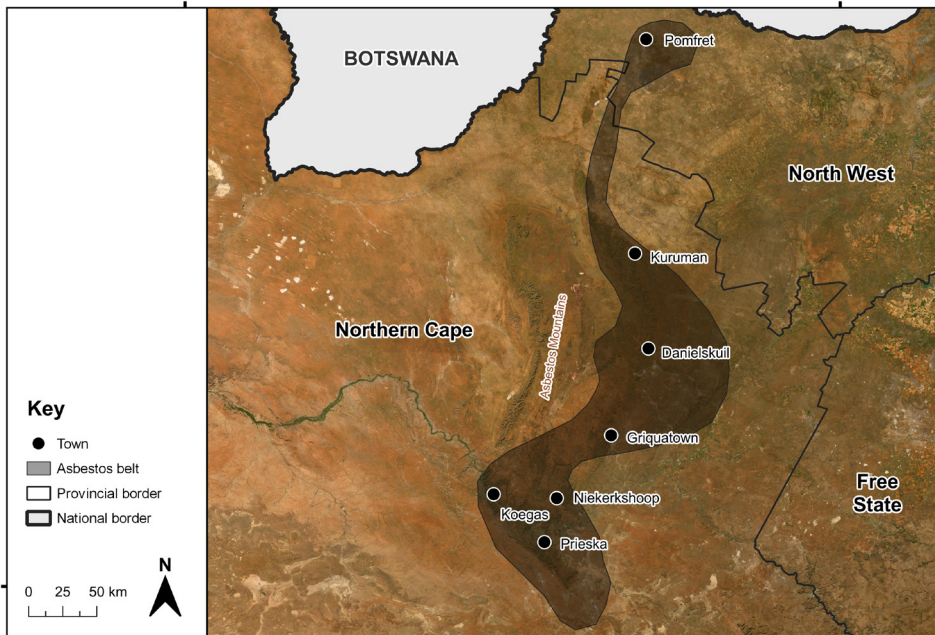


Figure 3.3 The Northern Cape’s asbestos belt (illustrative)

The first asbestos mine in the Prieska District, Kheikamspoor, opened in 1892 (McCulloch, 2002:19). By that time, the village of Prieska, officially proclaimed in 1882, had become a municipality (in 1891).²⁰ It was white farmers, not mineral prospectors, who requested municipal status from the colonial government. They were attracted to the area, not only because the land was suitable for grazing, but also because the Gariep River held prospects for irrigation agriculture. The Cape government supported both local farming and mining materially, building an irrigation scheme aimed at improving grain production as well as a railway line to the junction town of De Aar, to transport cereal crops and asbestos further south

20 WCARS, Prieska Inhabitants: Petition – Proclamation re-election of Board of Management for Village (21 February 1882), KAB CO 4226 P3; Proclamation by His Excellency Sir Henry Brougham Loch, Governor of the Cape (4 December 1891), KAB CSC 2/6/1/359 371.

(both after the South African War of 1899–1902).²¹ However, the relationships between farmers, on the one hand, and prospectors and mining companies, on the other, were often fraught with tensions, particularly around the control of the land and who should occupy it. For instance, in 1909, the Prieska Municipality, which arguably represented the interests of local farmers, took the colonial government to court over its lease of a portion of the town's commonage for asbestos mining purposes.²² At the time, the commonage was still Crown land but under municipal control, and in this case the Cape government had granted mining rights to a portion of this land without consulting the municipality. What farmers complained about was not only the loss of access to grazing land. They also feared the presence of 'native' mining labour and, more specifically, an additional location being established on the commonage, which farmers saw as a haven for stock thieves and potentially more harmful to the veld than mining itself.²³

The reference to an additional location indicates that racial segregation was being entrenched in Prieska by the beginning of the twentieth century. Also significant, urban locations in Northern Cape towns like Prieska or Upington were places where ethnic distinctions among the various groups inhabiting the Gariep River valley were becoming more fixed during that period (see also Legassick, 2004). For instance, a report by the Prieska Chief Constable from 1911 describes the location as sub-divided into a 'Hottentot' section and a 'Kaffir' one.²⁴ When linguist and anthropologist Dorothea Bleek and journalist Olga Racster visited Prieska in the same year, they noted that the location accommodated up to 500 residents, including Koranas, Griquas, "over twenty Bushmen and their families" and "an endless variety of Kafirs" (Bank, 2006:90).

The fact that asbestos miners were able to take up residence on the Prieska commonage is related to the material conditions around the extraction of this mineral. The asbestos ores were found close to the surface and scattered over the countryside. This favoured the development of a system of small-scale and

21 WCARS, Correspondence between Mr DJ van Niekerk, Mayor of Prieska, and the Under Secretary for Agriculture, the Secretary for Public Works, and the General Manager of Cape Government Railways (1902), KAB LND 1/829 L14696.

22 WCARS, Correspondence in the matter between the Municipal Council of Prieska (Applicant) and the Colonial Government (Respondent) in the Supreme Court of the Colony of the Cape of Good Hope (1909), KAB CSC 2/6/1/359 371.

23 This type of complaint on the part of white farmers was not exclusive to Prieska. Davide Chinigò (2019) shows how, in the 1880s, commercial merino farmers in Carnarvon were complaining about the fact that Xhosa speakers were 'squatting' on and overcrowding the Outer Commonage of the town. According to Chinigò, this was one among various strategies used by farmers to dispossess Xhosa-speaking people of the land that had been granted to them in 1860 and to reduce them to farm labourers.

24 WCARS, Correspondence between Prieska Chief Constable's Office and Resident Magistrate (13 July 1911), KAB PAS 2/345 L81C.

labour- rather than capital-intensive mining known as tributary mining (McCulloch, 2002:26). This was a type of subcontracting in which white 'tributors' would lay claim to asbestos ores, manage the mining operations performed by black labour, and then sell the semi-processed asbestos to larger British companies such as Cape Asbestos, which controlled asbestos production between Prieska and Danielskuil from 1893 until 1979 (McCulloch, 2002:56).²⁵ In contrast to diamond mining, asbestos mining was thus not dependent on the exploitation of a rigidly controlled male and migrant labour force.²⁶ Instead, it relied largely on family labour that was under very little, if any, company control. While men extracted the asbestos fibres from the rocks, women and children sorted and processed the fibres by hand, through a process known as cobbing. Miners therefore tended to live as families close to the mines, either in villages located inside 'native reserves', such as those established for Tswana speakers in the Kuruman District in 1886 (Jacobs, 2003:81),²⁷ or on state and private (company) land, such as in the Prieska District. Jock McCulloch (2002:22) notes that in this district "families were careful to place their huts between mines, presumably to escape the control of white managers and to be able to bargain for the best pay and conditions among competing owners."

Although asbestos miners could keep some livestock and sometimes sell their labour to white farmers, mining kept them impoverished while also making many seriously if not fatally ill. In order to keep production costs low, mining companies refused to recognise miners as their employees and hence to provide them with living quarters, food rations, and medical assistance. Moreover, most asbestos miners did not receive wages. Instead, they were paid piece rates, often not even in cash but in 'good-for' slips that were only accepted at company stores and were of such low value as to leave many in debt (McCulloch, 2002:96, 105). As a result, the living conditions of asbestos miners and their families were extremely poor, which contributed to the spread of diseases such as typhus, tuberculosis, scurvy, and pellagra. In addition, many of them suffered from (blue) asbestos-related diseases like asbestosis, lung cancer, and lethal mesothelioma. Despite the fact that asbestos mining was partly industrialised in the 1950s, when international demand

25 After World War Two, Cape Asbestos became controlled by South African Anglo American Corporation first and later by Charter Consolidated, a British registered mining finance company, but in fact another major holding company within the Oppenheimer group (Tweeddale & Flynn, 2007:274). More generally, asbestos mining in South Africa (in the Cape and Transvaal) was largely controlled by foreign and national conglomerates (Allen, 2003a: 102). Besides Charter Consolidated, these included Swiss and Belgian Eternit and South African General Mining and Finance Corporation. However, there were also numerous small mining companies that owned and operated small asbestos mines.

26 See also Peter Alexander (2008), who shows how coal mining in Natal and Transvaal in the first half of the twentieth century relied on black miners who settled, with their families, close to the collieries. (With thanks to Boitumelo Malope for this reference.)

27 Under apartheid the Kuruman reserves were consolidated in the bantustan of Bophuthatswana.

for asbestos fibres skyrocketed, tributary mining continued largely unabated, with the asbestos industry defending its exceptionalism within the mining sector to lower its costs and avoid more stringent state regulations, especially concerning the presence of women at mines (McCulloch, 2002:93, 154).

More research is needed on the extent to which apartheid's policy of separate development was implemented in the Prieska region, especially in relation to the forced relocation of black people classified as 'Bantu' to rural bantustans and the application of the Coloured Labour Preference Policy, which regulated access to the labour market according to a hierarchy of 'coloured', resident black, and migrant black workers in the Cape Province. Just before the start of the apartheid era, in 1947, the miners who were working in the southern asbestos fields were still described by the Deputy Chief Health Officer of Native Affairs as constituting a mix of "Cape Coloureds, Bastards, Griquas, Bechuanas, Hottentots, Damaras, Hereros and Bantus recruited from Transkei Mines."²⁸ Almost 10 years later, in 1955, the labour force at Prieska and Koegas asbestos mines included migrant workers from Botswana, Zimbabwe, and Malawi (McCulloch, 2002:154). According to VL Allen (2003a:104), at the peak of production, in 1977, 92% of asbestos mineworkers in the whole of South Africa were black Africans. About half of them worked underground and "were recruited over a wide area". By then, 'coloured' mineworkers represented only 3% of the total asbestos mining workforce, concentrated in the Northern Cape.

While cheap labour was clearly indispensable for the profitability of asbestos mining, many workers were made dispensable by Cape Asbestos and other mining companies as soon as they started to show symptoms of asbestos-related diseases – something that often happened only decades after initial exposure. Indeed, mining companies found it more convenient to replace sick workers than invest in improving working conditions on their mines and mills, in particular by suppressing dust levels. Cape Asbestos even went as far as evicting superfluous ex-workers and their families from the land around the mines and forcibly relocating them (apparently without state support), as shown in the following example of forced removals from the Koegas mine to Marydale town in the 1960s:

After 1950, a number of the older black and Coloured workers at Koegas became ill and could no longer work. They had nowhere to go and so they stayed at the mine. Many had the same illness, which was probably asbestosis, and over time their numbers swelled. Initially Cape issued food coupons for R1 or R2, which the sick could redeem at the company store. In the mid-1960s a manager from Penge [an asbestos mine in north-eastern Transvaal] named Hoertswat was transferred to Koegas. His brief was to remove the widows of men who had died or husbands and wives who were

28 Memo: AL Ferguson, Dep. Chief Health Officer, Bloemfontein, 21/7/1947, Native Affairs, NTS 10011 33/209, cited in McCulloch (2002:110).

disabled to the nearby town of Marydale. The site chosen by management was a place of misery the miners called 'the Lung Lakarse', the lung location. There was little water and few services, and eventually the Marydale council would accept no more of the sick from Koegas. (McCulloch 2002:114)

However, it was not only the sick bodies of black miners that were rendered superfluous. Already in 1930, Cape Asbestos opened an asbestos mill in the middle of Prieska, which made the demand for unskilled labour, and particularly female labour, surge. Between its last renovation in 1957 and its closure in 1964, the mill became the largest employer in town (McCulloch, 2002:130). Because of the mill, Prieska was regularly enveloped in dust, while many of its buildings and infrastructure were literally built with asbestos tailings. This meant that all the residents of the town, including whites, were exposed to the risk of asbestos-related diseases. Indeed, a 1962 survey administered by the Johannesburg-based Pneumoconiosis Research Unit showed that Prieska (along with other asbestos-mining towns, such as Koegas and Kuruman) suffered from a pandemic of asbestosis and mesothelioma. And yet, the asbestos industry, which had commissioned the survey, stopped the publication of the results, with the support of the apartheid government, to enable continued production (McCulloch, 2002:187).

Following the global crisis of the asbestos industry in the late 1970s, asbestos mines across the Northern Cape started closing in the 1980s, with the last one closing as late as 1996 (McCulloch, 2002:30). This period coincided with a new, but short-lived, phase of mineral extraction in the Prieska District – that of copper. In 1971, Prieska Copper Mine Ltd, a subsidiary of Anglo-Transvaal Consolidated Investment Company Limited, opened the Prieska copper mine about 50 kilometres south-west of Prieska. Here, the mine workforce was rigidly segregated. While a newly established private company town, Copperton, provided houses, services, and amenities for white workers and managers and their families, black workers (about 2 000 men classified as "indigenous") were accommodated in a single-sex compound.²⁹ In addition, local 'coloured' labour was drawn from the town of Vanwyksvlei. When the Prieska copper mine closed in 1991, more people were rendered surplus as unemployed. They joined not only the retrenched and often sick ex-asbestos miners, but also ex-farm workers who were being made redundant by the mechanisation of irrigation agriculture along the Gariep River in the 1980s.³⁰ Things have only partially changed in the post-apartheid period, as the next section briefly illustrates.

29 WCARS. Department of Co-operation and Development, Inspection of mine or works at Prieska Copper Mine (13 January 1986), CDN 137 (16)N3/12/2/9 D7.

30 Interview, local commercial farmer, 10 September 2019. See also Atkinson (2007:53–58).

(Un)making people superfluous in the post-apartheid period

The simultaneous closure of the asbestos and copper mines between the late 1980s and early 1990s contributed to rising unemployment and likely also to depopulation due to outward migration from Prieska. For instance, unemployment rose from 23% in 1996 to 46% in 2001 (Moses & Yu, 2009:124),³¹ while the town's population went from a peak of 26 144 in 1980 down to 11 515 in 2001 (Hill & Nel, 2018:206). The official unemployment rate in the Siyathemba Local Municipality decreased in the course of the 2000s, but nonetheless stood at a high 24% in 2011 (StatsSA, n.d.). The extension of social welfare, which followed the demise of apartheid was, and still is, crucial to the survival of many of the local poor and unemployed (see also Walker & Vorster, Chapter Four). In Prieska, however, compensation for asbestos-related diseases also offered some ex-mineworkers an additional means of support. Sick ex-mineworkers could submit claims for compensation to the Medical Bureau of Occupational Diseases in Johannesburg. Yet obtaining the necessary radiological evidence proved difficult, largely because of the lack of diagnostic medical facilities in the rural areas where asbestos mines were located (Allen, 2003b:693). Furthermore, the compensation amounts that were awarded were typically too small to support ex-mineworkers and their families (Braun & Kisting, 2006).

From the second half of the 1990s, litigation began to offer ex-mineworkers a vehicle for accessing non-state resources by claiming compensation from the asbestos mining companies themselves, not only for occupational diseases but also for environmental exposure to the dangers of asbestos. In 1997 Rachel Lubbe and four other plaintiffs took Cape Asbestos to court – in this case to an English court, because the parent company was headquartered in the United Kingdom (House of Lords, 2000);³² Lubbe lived in Prieska and was married to a Schalk Lubbe who had been an employee of Cape Asbestos at the Koegas mine. Over the years, the case (*Schalk Willem Burger Lubbe et al (Appellants) and Cape Plc (Respondent)*) turned into a class action lawsuit with over 7 000 plaintiffs, most of them former Cape Asbestos mineworkers. In 2001, the company finally agreed

31 These figures refer to the Prieska Magisterial District and the Siyathemba Local Municipality respectively. Note, however, that Statistics South Africa puts the local unemployment rate at 36% in 2001 (StatsSA, n.d.).

32 This marked the first time a British parent company was to appear before an English court of law for the actions of a South African subsidiary and it was made possible by a combination of factors, including the interest the work of journalist Laurie Flynn generated among the British public in British-controlled asbestos mining in apartheid South Africa, and the involvement of both the South African National Union of Mineworkers and the post-apartheid government.

to an out-of-court settlement, whereby it would pay GBP21 million into a trust.³³ However, Cape Asbestos failed to make the first payment, citing financial problems. In the meantime, in what Linda Waldman (2016:957) has referred to as a “political economy of claims”, ex-asbestos miners were taking another mining company, Gencor, to court; these miners had worked for one of Gencor’s subsidiaries, the Griqualand Exploration and Finance Company, which had purchased mines in the southern asbestos belt from Cape Asbestos before the closures of the 1980s (McCulloch, 2005:72). In light of this connection, the two lawsuits were joined to maximise the claimants’ chances of receiving compensation.

In 2003, a second out-of-court settlement, which replaced the first one, was reached. This time, however, Cape Asbestos agreed to pay only GBP7.5 million to its ex-workers, to which was added a further GBP3.2 million from Gencor.³⁴ At the same time, Gencor set up the Asbestos Relief Trust, a trust worth ZAR448 million, for people who had worked in or lived in the vicinity of their asbestos mines and had contracted asbestos-related diseases (McCulloch, 2005:73; Waldman, 2016:957).³⁵ Although the Asbestos Relief Trust formally recognises environmental exposure to asbestos, in practice it has been more onerous and costly for local residents to submit a successful claim compared to ex-workers (Ndlovu, Naude & Murray, 2013), to the point that, according to Waldman (2016:962), the “present bodies” of sick residents have been rendered “effectively expendable”.

What is also important to note is that one of the conditions of the settlement was that the mining companies would not be responsible for the rehabilitation of former asbestos mines. In fact, mine rehabilitation is a responsibility of the Department of Mineral Resources and Energy (DMRE), operating through Mintek, a national mineral research organisation (Cornelissen et al., 2019). However, the process has been extremely slow and costly, with ecological conditions in the asbestos belt making rehabilitation particularly difficult and transient, as Waldman (2016:959) clearly explains:

33 This was the first time that trust settlements were introduced in South Africa as a mechanism for compensation in relation to occupational diseases. For a critical overview of their role within the history of compensation for silicosis, also in relation to elite capture, see Albert Mushai (2020).

34 According to one well-informed Prieska resident, 6 000 plaintiffs received compensation in the form of a once-off payment of between ZAR2 000 and ZAR48 000, while the original trust, called the Hendrik Afrika Trust, was never set up (Interview, 25 October 2021).

35 The Asbestos Relief Trust also targets ex-mineworkers who worked for other asbestos mining companies: Msauli, African Chrysotile Asbestos Limited and Hanova Mining Holdings (Ndlovu, Naude & Murray, 2013). Since 2006, it also administers the Kgalagadi Relief Trust, which was set up on behalf of the former Swiss and Belgian Eternit Group to compensate sick ex-workers who were employed at the Kuruman Cape Blue and Danielskuil Cape Blue asbestos mines.

Asbestos mines in the Northern Cape are in semi-arid regions where plant growth is very sparse. Asbestos tailings are not conducive to plant growth, even once covered with topsoil, because of mineral deficiencies, heavy metal concentrations, high salinity, and moisture stress. Wind and water erosion is common and further spreads asbestos fibres. Finally, damage to rehabilitation structures is caused by everyday human activity, by overgrazing and, on some occasions, theft or vandalism.³⁶

Thus, by the end of 2019, the DMRE had rehabilitated only 27 asbestos sites out of 245 identified across the country, at a cost of between ZAR40 and ZAR60 million per site (Gilliland, 2019). It remains unclear how many of the rehabilitated sites are located in the Prieska region.

Crucially, it is not only ex-asbestos mines that need to be rehabilitated, but ex-asbestos mining towns as well. Prieska is a case in point. For instance, a 2006 study, based on an audit of all stands and buildings in the town, showed that the risk of asbestos exposure was still very significant (Nel, 2006). This was caused by a combination of two factors. First, most of the buildings and roads in Prieska had been built with material containing asbestos and poor maintenance was resulting in asbestos fibres being released into the general environment. Second, although the asbestos mill site in town and some mine dumps to the north, across the Gariep River, had been rehabilitated, the cover material used in the rehabilitation was being eroded by rain.

Mine rehabilitation is framed by the South African government as an opportunity for economic growth and job creation in rural communities close to abandoned mines (SA Government, n.d.). Prieska, however, is following a different economic strategy, while trying to sever its historical connection with asbestos. This strategy emphasises the continued importance of agriculture within the district (which was consolidated into the Siyathemba Local Municipality in 2001). Currently, there are about 100 white commercial farmers in the area (including both irrigated crop and livestock farmers), along with an additional 70 'coloured' emerging farmers (mostly livestock) who have access to commonage land comprising some 20 farms redistributed through the state's land reform programme, and a few privately owned farms.³⁷ In addition to the promotion of agriculture, a new phase in the extraction

36 Informal conversations that I had in Prieska revealed that livestock grazing at ex-asbestos mines was also responsible for spreading asbestos fibres around, as were informal miners digging for tiger-eye, a semi-precious stone, around Niekerkshoop.

37 Interview, Griekwaland Wes Koöperasie, 11 September 2019; interview, Northern Cape Department of Agriculture, Land Reform and Rural Development, Pixley Ka Seme District Municipality, 13 September 2019. Some 23 000 hectares of restituted land around the former Koegas asbestos mine are also being farmed by the Koegas Communal Property Association (see Waldman, 2016).

of natural resources has taken hold. In the remainder of this section, I make some preliminary remarks on how the latter is contributing to the process of (un)making local people surplus.

Since 2011, several mineral and energy companies have invested in new projects concentrated in the Copperton area. These projects include the reopening of the old Prieska copper mine by Australian company Orion Minerals Ltd (which will quarry zinc along with copper), as well as the building of a number of wind and solar farms by the South African company Mulilo and two transnational corporations, Elawan and Enel³⁸ (see Figure 3.1 above). Along with similar initiatives in other parts of the Karoo (see Borchardt, Chapter Ten, also Malope, Chapter Nine, this volume), these investments confirm the importance of the Northern Cape as a key site of renewable energy production within the country. What is specific to the Prieska area is that, like lithium, cobalt, and nickel, copper is a so-called transition mineral, meaning it is essential for producing the infrastructure that is needed to support a low-carbon economy. From this perspective, copper mining in Copperton can be conceptualised as a concrete manifestation of ‘green extractivism’ in the Karoo – what Daniel Voskoboynik and Diego Andreucci (2022:802) have described as “a new phase in the complex relationship between mining and the environment, whereby extraction and valorisation of mineral resources is rendered not only compatible with ‘sustainable development’, but *necessary* to it and the possibility of a ‘lowcarbon’ future” (see also Dunlap & Jakobsen, 2019).

Although the new copper-zinc mine at Copperton will be more capital- and technology-intensive than its predecessor, Orion estimates it will create about 850 permanent jobs.³⁹ Mining should, therefore, be able to absorb some unemployed local workers. However, low levels of skills and education in the municipality, exemplified by only 18% of local residents aged 20 and older having matric in 2011 and 12% with no form of schooling at all (StatsSA, n.d.), are a barrier to employability. At the time of writing, the renewable energy companies had not disclosed any projections for job creation, but research elsewhere has shown that this is usually small and largely limited to temporary jobs during the construction phase (see Malope, Chapter Nine).

There is, however, another way in which the local population of Prieska is supposed to benefit from what appears will be a new stage of largely jobless economic growth. This is through the establishment of community development trusts, whereby local communities are made minority shareholders in the new

38 At the time of writing, Mulilo was operating three solar farms with a total capacity of 170 MW, while Elawan was building the 102 MW Copperton Wind Farm and Enel the 140 MW Garob Wind Farm.

39 Interview, Orion Minerals, 28 October 2021.

projects. Both mining and renewable energy companies are required by the state to establish such trusts, to comply with the Mining Charter and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) respectively. At the time of writing, the Mulilo Prieska Solar Community Trust was the only one that was fully operational, while Orion was in the process of setting its trust up, with Elawan and Enel expected to follow suit.

These trusts fit with what Judith Verweijen and Alexander Dunlap (2021) have described as techniques in the “social engineering of extraction” that are designed to “manufacture consent”. Three issues need to be raised about their potential to ‘unmake’ the forces that have rendered people economically superfluous in the Prieska region. First, these trusts use a particular definition of community. Typically, the beneficiaries of community development trusts are black residents living within a 50-kilometre radius of a mine or renewable energy project site, but in this case the community has been extended to include all black people residing within the Syiathemba Local Municipality, hence within the towns of Prieska, Marydale, and Niekerkshoop.⁴⁰ This means that the dividends deriving from what has remained a fixed minority share (5%) will be employed to address the needs of a larger number of people (about 20 000). Second, rather than making direct transfers to cash-strapped households, the dividends paid into the trust are being used to fund local projects and organisations that provide public and semi-public goods and services (water connections, Wi-Fi networks, computers, for example) (see also Malope, Chapter 9, this volume). Third, the way in which the trust funds are disbursed makes them vulnerable to elite capture in which powerful local actors can appropriate most of the resources. The last two points in particular suggest that unless the redistributive elements of the policy framework are strengthened, the contribution of these trusts to improving the lives of the poor and unemployed in the Prieska region is likely to be limited.

Conclusion

The chapter has traced the production of racialised surplus populations in Prieska and its rural surroundings from the period of colonial conquest until today. What it has shown is that the process of making superfluous did not start or end with apartheid but was initiated long before and has been prolonged by several events thereafter, with complex and concatenating effects. Thus, the colonisation of the

40 This is different from the situation in Loeriesfontein, described by Malope in Chapter Nine of this volume. Apparently, the decision to include Marydale and Niekerkshoop was taken informally in consideration of the fact that the two smaller towns are much poorer than Prieska, but also to acknowledge that local people tend to move regularly between the three towns to look for work, housing, and other services (interview, Copperton Wind Farm, 26 October 2021).

Upper Karoo in the second half of the nineteenth century rendered black inhabitants politically dispensable but economically indispensable, as their labour was needed on white-owned farms and mines. During the long era of asbestos mining, which stretched across the colonial and apartheid periods, the labour of black asbestos miners was necessary for the profitability of the asbestos mining industry, while their lives, along with those of local residents (both black and white), became expendable. In the post-apartheid era, some recognition of and redress for the damage inflicted on ex-asbestos miners and their descendants were achieved, but compensation and its effects have been limited and so have efforts to rehabilitate the local environment. Now the majority of residents are superfluous to the needs of the local economy, yet, as enfranchised citizens, they have become central to the current political dispensation. It is their political centrality that has made it possible for them to access social grants, currently the main state-sponsored mechanism through which the South African state is rescuing the rural poor and unemployed – a mechanism that, however, is limited to ensuring mere survival.

The discussion has also noted the new phase of mineral extraction and renewable energy production around Prieska that is promising to improve the living conditions of local residents by means of limited job creation, accompanied by community shareholding in the trusts set up by the mining and energy companies. Monitoring how these developments will unfold in the future will be very important to establish whether these new structures of redistribution can contribute to reversing the long-term processes whereby the local population has been rendered surplus or, by contrast, whether they might introduce new forms of dispossession.

Acknowledgements

I am grateful to Cheryl Walker and Timm Hoffman for their numerous insightful comments, which helped me improve the chapter. I am also grateful to José de Prada-Samper, who kindly agreed to read and generously commented on an initial draft. A special thank you to Lucinda Raath, the faculty librarian at Stellenbosch University Library, and to the librarians at the Western Cape Archives and Records Service, for their kind assistance with historical sources. This work is based on research supported by the South African Research Chairs Initiative of the Department of Science and Innovation (DSI) and National Research Foundation (NRF) of South Africa (Grant No. 98765). The financial assistance of the NRF towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the author and are not necessarily to be attributed to the NRF.

References

- Alexander, P. 2008. Challenging cheap-labour theory: Natal and Transvaal coal miners, ca 1890–1950. *Labor History*, 49(1): 47-70. <https://doi.org/10.1080/00236560701740085>.
- Allen, V.L. 2003a. *The History of Black Mineworkers in South Africa. Volume II: Dissent and repression in the mine compounds*. Keighley: The Moor Press.
- Allen, V.L. 2003b. *The History of Black Mineworkers in South Africa. Volume III: The rise and struggles of the National Union of Mineworkers, 1982–1994*. Keighley: The Moor Press.
- Anderson, E. 1985. A history of the Xhosa of the Northern Cape 1795–1879. MA thesis. Cape Town: University of Cape Town.
- Atkinson, D. 2007. *Going for Broke: The fate of farmworkers in arid South Africa*. Cape Town: HSRC Press.
- Bank, A. 2006. Anthropology and Fieldwork Photography: Dorothea Bleek's Expedition to the Northern Cape and the Kalahari, July to December 1911. *Kronos*, 32:77–113. <https://www.africabib.org/http.php?RID=305157310>.
- Bauman, Z. 2003. *Wasted Lives: Modernity and Its Outcasts*. Cambridge: Polity.
- Beinart, W. 2003. *The Rise of Conservation in South Africa: Settlers, Livestock, and the Environment 1770–1950*. Oxford: Oxford University Press. <https://doi.org/10.1093/oso/9780199261512.001.0001>.
- Bernards, N. & Soederberg, S. 2021. Relative surplus populations and the crises of contemporary capitalism: Reviving, revisiting, recasting. *Geoforum*, 126:412–419. <http://dx.doi.org/10.1016/j.geoforum.2020.12.009>.
- Braun, L. & Kisting, S. 2006. Asbestos-Related Disease in South Africa: The Social Production of an Invisible Epidemic. *American Journal of Public Health*, 96(8):1 386–1 396. <https://doi.org/10.2105/AJPH.2005.064998>.
- Cape of Good Hope. 1870. Government Notice No. 467. *Government Gazette*, 17 November 1870.
- Chinigò, D. 2019. From the 'Merino Revolution' to the 'Astronomy Revolution': Land Alienation and Identity in Carnarvon, South Africa. *Journal of Southern African Studies*, 45(4):749–766. <http://dx.doi.org/10.1080/03057070.2019.1642028>.
- Cornelissen, H., Watson, I., Adam, E. & Malefetse, T. 2019. Challenges and strategies of abandoned mine rehabilitation in South Africa: The case of asbestos mine rehabilitation. *Journal of Geochemical Exploration*, 25:106 354. <http://dx.doi.org/10.1016/j.gexplo.2019.106354>.
- De Prada-Samper, J. 2012. The forgotten killing fields: 'San' genocide and Louis Anthing's mission to Bushmanland, 1862–1863. *Historia*, 57(1):172–187. http://www.scielo.org.za/scielo.php?script=sci_abstract&pid=S0018-229X2012000100010.
- Dunlap, A. & Jakobsen, J. 2019. *The Violent Technologies of Extraction: Political ecologies, critical agrarian studies and the capitalist worldeater*. London: Palgrave Macmillan. <https://doi.org/10.1007/978-3-030-26852-7>.
- Du Toit, A. & Neves, D. 2014. The government of poverty and the arts of survival: Mobile and recombinant strategies at the margins of the South African economy. *The Journal of Peasant Studies*, 41(5):833–853. <http://dx.doi.org/10.1080/03066150.2014.894910>.

- Ferguson, J. 2015. *Give a Man a Fish: Reflections on the New Politics of Distribution*. Durham: Duke University Press. <https://doi.org/10.2307/j.ctv1198xwr>.
- Gilliland, W. 2019. "R49bn to rehabilitate 6000 mines". *Mail & Guardian*, 6 December. [Online]. <https://mg.co.za/article/2019-12-06-00-r49bn-to-rehabilitate-6000-mines/> [Accessed 9 July 2021].
- Hall, R., Wisborg, P., Shirinda, S. & Zamchiya, P. 2013. Farm Workers and Farm Dwellers in Limpopo Province, South Africa. *Journal of Agrarian Change*, 13(1):47–70. <http://dx.doi.org/10.1111/joac.12002>.
- Hill, T. & Nel, E. 2018. Population change in the Karoo. *African Journal of Range & Forage Science*, 35(3&4):203–208. <https://doi.org/10.2989/10220119.2018.1529705>.
- House of Lords. 2000. Opinion of the Lords of Appeal for Judgment in the Case of *Schalk Willem Burger Lubbe et al (Appellants) and Cape Plc (Respondent)*, July 20, 2000.
- Jacobs, N.J. 2003. *Environment, Power, and Injustice: A South African History*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511511981>.
- Kallaway, P. 1982. Danster and the Xhosa of the Gariep: Towards a political economy of the Cape Frontier 1790–1820. *African Studies*, 41(1):143–160. <https://doi.org/10.1080/00020188208707581>.
- Legassick, M. 2004. *Hidden Histories of Gordonia: Land dispossession and resistance in the Northern Cape, 1800–1900*. Johannesburg: Wits University Press.
- Legassick, M. 2010. *The Politics of a South African Frontier: The Griqua, the Sotho-Tswana, and the Missionaries, 1780–1840*. Basel: Basler Afrika Bibliographien. <https://doi.org/10.2307/j.ctvh9vxxvb>.
- Legassick, M. & Wolpe, H. 1976. The Bantustans and Capital Accumulation in South Africa. *Review of African Political Economy*, 3(7):87–107. <https://www.jstor.org/stable/3997875>. <https://doi.org/10.1080/03056247608703302>.
- Lesutis, G. 2019. The non-politics of abandonment: Resource extractivism, precarity and coping in Tete, Mozambique. *Political Geography*, 72:43–51. <http://dx.doi.org/10.1016/j.polgeo.2019.03.007>.
- Li, T.M. 2009. To Make Live or Let Die? Rural Dispossession and the Protection of Surplus Populations. *Antipode*, 41(1):66–93. <http://dx.doi.org/10.1111/j.1467-8330.2009.00717.x>.
- Li, T.M. 2011. Centering labor in the land grab debate. *The Journal of Peasant Studies*, 38(2):281–298. <https://doi.org/10.1080/03066150.2011.559009>.
- Marx, K. 1976 [1867]. *Capital*, volume 1. London: Penguin Books.
- McCulloch, J. 2002. *Asbestos Blues: Labour, Capital, Physicians and the State in South*. Oxford: James Currey.
- McCulloch, J. 2005. Beating the odds: The quest for justice by South African asbestos mining communities. *Review of African Political Economy*, 32(103):63–77. <http://dx.doi.org/10.1080/03056240500121057>.
- McIntyre, M. & Nast, H.J. 2011. Bio(necro)polis: Bio(necro)polis: Marx, Surplus Populations, and the Spatial Dialectics of Reproduction and "Race". *Antipode*, 43:1 465–1 488. <http://dx.doi.org/10.1111/j.1467-8330.2011.00906.x>.
- Moses, E. & Yu, D. 2009. Migration from the Northern Cape. Southern Africa Labour and Development Research Unit Working Paper Number 32. Cape Town: SALDRU, University of Cape Town.
- Mushai, A. 2020. The Long Road to Compensation for Silicosis Sufferers in South Africa. *Journal of Southern African Studies*, 46(6):1 127–1 143. <https://doi.org/10.1080/03057070.2020.1836895>.

- Ndlovu, N., Naude, J. & Murray, J. 2013. Compensation for environmental asbestos-related diseases in South Africa: a neglected issue. *Global Health Action*, 6(1):1–7. <https://doi.org/10.3402%2Fgha.v6i0.19410>.
- Nel, J. 2006. The current risk of asbestos exposure to the citizens of the Prieska area, Northern Cape Province in South Africa. MA thesis. Potchefstroom: North-West University.
- Nienaber, G.S. & Raper, P.E. 1983. *Hottentot (Khoekhoen) Place Names*. Durban: Butterworth Publishers.
- Northern Cape Mining Community, Minerals Council South Africa, *Mining in the Northern Cape: History of mining activities in the Northern Cape*. [Online]. <http://www.northerncapeminingcommunity.co.za/mining-in-the-northern-cape/history-of-mining-in-the-northern-cape> [Accessed 20 May 2021].
- Penn, N. 2005. *The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century*. Athens (OH): Ohio University Press.
- Platzky, L. & Walker, C. 1985. *The Surplus People: Forced removals in South Africa*. Johannesburg: Ravan.
- Roche, C. 2008. 'The Fertile Brain and Inventive Power of Man': Anthropogenic Factors in the Cessation of Springbok Treks and the Disruption of the Karoo Ecosystem, 1865–1908. *Africa*, 78(2):157–188. <https://doi.org/10.3366/E0001972008000120>.
- Ross, R. 1975. The !Kora Wars on the Orange River, 1830–1880. *The Journal of African History*, 16(4):561–576. <https://doi.org/10.1017/S0021853700014559>.
- Sassen, S. 2014. *Expulsions: Brutality and Complexity in the Global Economy*. Cambridge (MA): Harvard University Press. <https://doi.org/10.4159/9780674369818>.
- South African Government. *Rehabilitation of mines*. [Online]. <https://www.gov.za/about-government/government-programmes/rehabilitation-mines> [Accessed 9 July 2021].
- Statistics South Africa (StatsSA). N.d. *Statistics by place: Siyathemba, Prieska*. [Online]. http://www.statssa.gov.za/?page_id=4286&id=6970 [Accessed 20 May 2021].
- Statistics South Africa (StatsSA). 2017. *Poverty Trends in South Africa: An examination of absolute poverty between 2006 and 2015*. [Online]. <https://www.statssa.gov.za/publications/Report-03-10-06/Report-03-10-062015.pdf> [Accessed 20 September 2021].
- Statistics South Africa (StatsSA). 2021. *Key findings: P0211 – Quarterly Labour Force Survey (QLFS), 1st Quarter 2021*. [Online]. http://www.statssa.gov.za/?page_id=1856&PPN=P0211&SCH=72943 [Accessed 17 June 2021].
- Thompson, L. 2001. *A History of South Africa*. 3rd Edition. New Haven (CT): Yale University Press.
- Tweeddale, G. & Flynn, L. 2007. Piercing the Corporate Veil: Cape Industries and Multinational Corporate Liability for a Toxic Hazard, 1950–2004. *Enterprise & Society*, 8(2): 268–296. <https://www.jstor.org/stable/23700978>. <https://doi.org/10.1093/es/khm023>.
- Tyner, J.A. 2013. Population geography I: Surplus populations. *Progress in Human Geography*, 37(5):701–711. <https://doi.org/10.1177/0309132512473924>.
- Verweijen, J. & Dunlap, A. 2021. The evolving techniques of the social engineering of extraction: Introducing political (re)actions 'from above' in large-scale mining and energy projects. *Political Geography*, 88:102342–102342. <https://doi.org/10.1016/j.polgeo.2021.102342>.

- Voskoboynik, D. & Andreucci, D. 2022. Greening extractivism: Environmental discourses and resource governance in the 'Lithium Triangle'. *Environment and Planning E: Nature and Space*, 5(2):787–809. <https://doi.org/10.1177/25148486211006345>.
- Waldman, L. 2016. Strands of Struggle: Dealing with Health Citizenship in the Aftermath of Asbestos Mining. *Journal of Southern African Studies*, 42(5):947–963. <https://doi.org/10.1080/03057070.2016.1222765>.
- Wenzel, J. 2018. "We have been thrown away": surplus people projects and the logics of waste. *Social Dynamics*, 44(2):184–197. <https://doi.org/10.1080/02533952.2018.1481687>.
- Zachariou, N.A. 2013. Archaeology and Identity In the 19th Century Northern Cape Frontier: the Xhosa of the Pramberg. MA thesis. Cape Town: University of Cape Town.

Chapter 4

Karoo ‘dorpscapes’: Social change and continuity in three small towns – Sutherland, Loeriesfontein and Vanwyksvlei

Cherryl Walker and Jan Vorster

The Karoo is commonly thought of as a rural rather than an urban space. Its extensive rangeland is dominated by large, privately owned livestock farms, and agriculture is a major contributor to the regional economy – in the Northern Cape it is the largest employer and second largest sector, after mining, in terms of contribution to provincial GDP (Northern Cape Provincial Treasury, 2018:15). Popular iconography in the mainstream media – summarised laconically by one journalist as “windmills, reservoirs, barbed wire fences and sheep skulls”, in a place where “there’s really nothing much there” (Christie, 2012) – reinforces this perception among non-residents. The daily life-worlds of most Karoo residents are, however, very different. In the mid-twentieth century, external perceptions of these drylands as farmland-cum-wasteland corresponded in spatial terms with where, if not how, most Karoo residents lived, but in actuality the urban population of the Karoo overtook the rural in the 1960s (Hill & Nel, 2018:205).

Today the overwhelming majority of Karoo residents live not on farms but in far-flung small or very small towns – the *dorp* or diminutive *dorpie* in Afrikaans, terms that have migrated into South African English. These settlements are urban in form and social function, albeit on a distinctively limited scale compared to the major centres that dominate understandings of ‘the urban’ in South Africa. A 2016 map depicting a typology of human settlements vividly illustrates these spatial dimensions; here, Karoo *dorps* (“local niche towns” in the map legend) appear as tiny, isolated pinpricks, scattered particularly thinly across South Africa’s “sparse rural” western interior (see Figure 4.1 below).

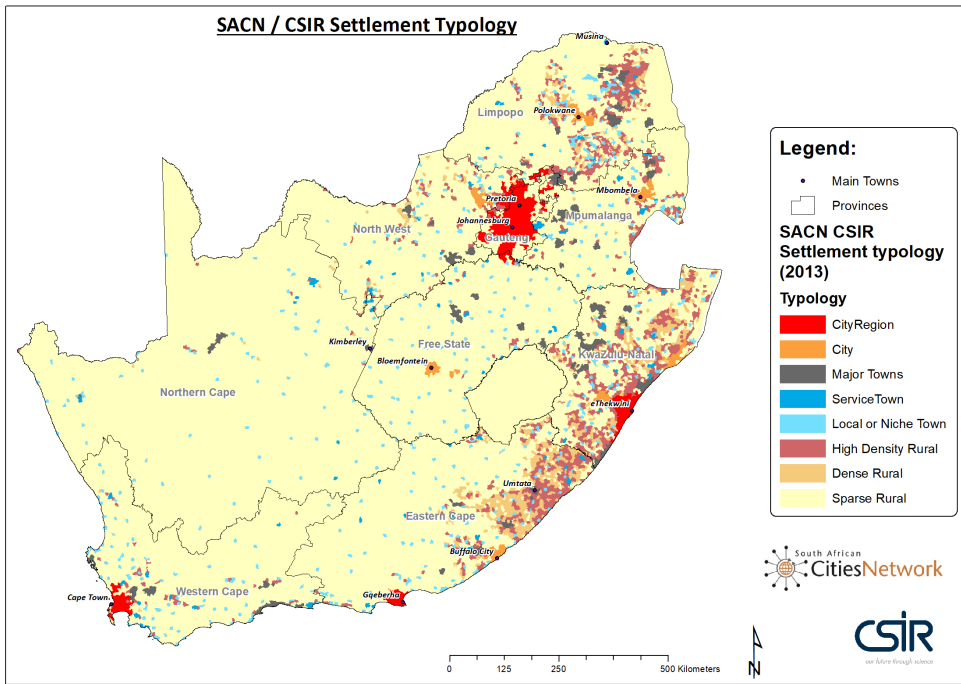


Figure 4.1 South African settlement typology (South African Cities Network; Council for Scientific and Industrial Research (CSIR))⁴¹

The small-town character of the Karoo is under-appreciated, but if one is to understand social-ecological change in this region, one needs to attend to the drivers of both change and continuity in these settlements over time. These are the places where the great majority of the people who are host to the new developments around astronomy and energy generation in the Karoo are to be found – developments that, as discussed in other chapters in this book, are reshaping not simply local land use but also the significance of this semi-arid zone in national and regional development plans. The medium- to long-term impacts of these land-use changes on social-ecological dynamics in South Africa’s western interior are still to be realised, but it is already clear that they are disrupting established relationships to land and unleashing competing claims around their much-anticipated benefits (Gastrow & Oppelt, 2019; Walker, Chinigò & Dubow, 2019; see also chapters by Borchardt, Malope, and Xaba in this volume). To what extent these developments can contribute to the rejuvenation of the small towns that have been integral to social and economic life in the Karoo since the late nineteenth century is thus a key question for the region.

41 Reproduced with kind permission of the CSIR.

Yet within the sweep of contemporary South African studies, historical and sociological analyses of small towns in the Karoo are few and far between. This is also true within Karoo Studies, as the bibliometric analysis by Hoffman and Petersen in Chapter Two of this volume has shown. This reflects the standing of these settlements in the larger political economy of the country: they are marginalised places, politically and economically. Although Karoo towns are regarded as relatively well studied within the limited academic literature on small towns in South Africa, particularly when compared to the “High Density Rural” settlements dominating eastern South Africa, the sociology of small towns is under-researched outside specialist circles (Hoogendoorn & Visser, 2016). Furthermore, as noted by Hoogendoorn and Visser (2016), most studies of small towns in South Africa focus on contemporary economic and governance challenges, in individual cases, rather than considering them more holistically, within a broader and, we would add, regionally diverse history. Little has been written on how the particular histories of Karoo settlements are woven into contemporary relationships and social dynamics. While these settlements undoubtedly share certain features with other “Local or Niche towns” in the “Sparse Rural” areas depicted in the eastern interior of South Africa in Figure 4.1 above, their more pronounced isolation in the Karoo, the arid to semi-arid natural environment in which they are located, their socio-cultural profiles, and a history rooted in particular processes of colonial dispossession and acculturation, all make for a distinctive social milieu – a particular ‘dorpescape’, to repurpose a term first coined in the late 1970s to describe the architectural heritage of towns with Afrikaner rather than British roots (Haswell, 1979).⁴²

This chapter addresses some of the lacunae identified above by offering a historically informed overview of change and continuity in social conditions (broadly understood) in three Northern Cape *dorps*: Sutherland in the south, Loeriesfontein towards the west, and Vanwyksvlei towards the east (see Figure 4.2 below). All three are very small towns (under 3 000 people) on the inland plateau of the Upper Karoo – Sutherland and Loeriesfontein in the Succulent Karoo biome and Vanwyksvlei in the Nama Karoo biome. While we are not suggesting that they are strictly representative of all Karoo small towns, the three share certain characteristics with other *dorps* in this part of the Karoo. All three developed as service centres for the sheep farming sector, which by the end of the nineteenth century had been wrestled into white hands. Well over 90% of their residents speak Afrikaans and, when asked in a survey setting about their ‘population group’, similar proportions of respondents self-identify as ‘coloured’. Today all three towns are struggling with high levels of poverty and unemployment, as well as with a dense mesh of other social and economic challenges. All three are also host towns for the new investments in astronomy and renewable energy projects that are promising transformational change that, from the viewpoint of many local people, foregrounds global and national not local concerns (Butler, 2018; Gastrow & Oppelt, 2019; Walker, 2019).

42 We are grateful to Michela Marcatelli for pointing out Haswell’s use of this term.

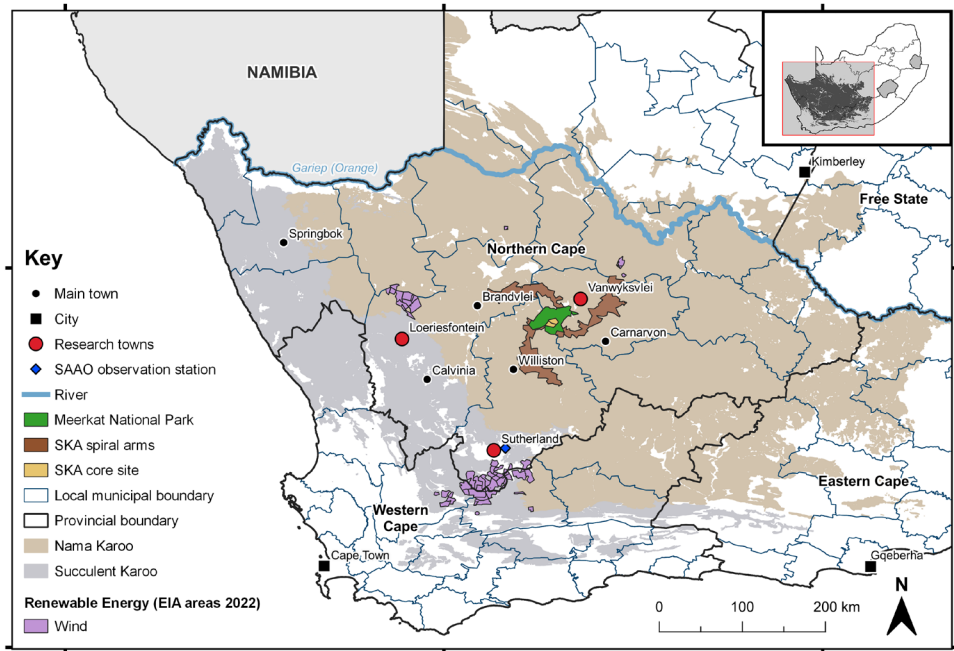


Figure 4.2 Location of the three research towns, showing Karoo biomes and selected new land uses as of 2022

Sutherland, the oldest and best known of the three, is the host town for a major optical astronomy observatory that officially opened on its doorstep in 1973; the site’s flagship Southern African Large Telescope (SALT) that was inaugurated in 2005 has cemented the town’s reputation as a minor tourist destination. More recently, the nearby escarpment has been targeted for wind-farm development as well. Loeriesfontein, a slightly smaller settlement than Sutherland, has recently emerged as the nearest service point for several renewable energy projects in the surrounding district; the first of these, two linked wind farms located some 60 kilometres from the town, started operating in 2018 (see also Malope, Chapter Nine). Much further from major centres and less well endowed with picturesque vernacular architecture than Sutherland, Loeriesfontein is on the periphery of the Succulent Karoo’s annual spring-flower spectacle and associated tourism. Vanwyksvlei is the smallest, most isolated, least known, and poorest of the three towns. It is situated approximately 60 kilometres north-east of the core site of the Square Kilometre Array (SKA), the hugely ambitious global radio astronomy project being built in the Kareeberg on former commercial farmland, now the Meerkat National Park (on this, see also Terblanche, Chapter Seven). Although recognised by the SKA as one of its local ‘human capacity development’ towns, Vanwyksvlei has received relatively

little attention in this regard compared to Carnarvon, its larger neighbour and the administrative centre of the Kareeberg Local Municipality located 80 kilometres to its south.

The discussion unfolds as follows. Section one provides a brief historical overview of the establishment of these towns in the late colonial period, through to their incorporation into the newly designated Northern Cape Province after South Africa's transition to democracy in 1994. Although more research is needed on the neglected history of each settlement, it is clear that reverberations from the social and economic changes that fundamentally altered life in the Karoo from the mid-nineteenth century are still being felt today, most notably in the aftermath of the enforced segregation and rigid distinctions of 'race' that were imposed during the apartheid era. Of interest here is that while Sutherland was founded in the mid-nineteenth century as a white church town, both Loeriesfontein and Vanwyksvlei were established several decades later, on the back of Baster settlements.⁴³

Section two provides an overview of contemporary conditions in these towns, drawing largely on household socio-economic surveys conducted in each town between 2016 and 2019. This discussion confirms the high levels of poverty and dependence on state transfers in all three towns, while pointing to certain potentially consequential differences among them in terms of their prospects for coping with the changing conditions around them. In concluding, we consider what this discussion brings to the analysis of social-ecological change in the Karoo. How well placed are local dorpspeople to respond to change – how resilient and/or adaptive are the places they call home?

The chapter draws on documentary analysis, as well as qualitative and quantitative data from several research projects that have been undertaken within the research programme of the SARChI Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University since 2016. The latter include the three household surveys mentioned above (henceforth described as SARChI surveys in the text).⁴⁴

43 The Basters were people of mixed ancestry (white and Khoekhoe mainly) who emerged as a distinct social group in the Northern Cape in the eighteenth and nineteenth centuries.

44 While the questionnaires were not fully standardised, they are sufficiently compatible to enable comparative analysis. In terms of sample size, the Vanwyksvlei survey was a full census (370 households). It was conducted first, in 2016, and its dataset does not match those from the other two surveys in several respects. The surveys in Sutherland (in 2017) and Loeriesfontein (in 2019) each involved probability samples of one in three households (253 households in Sutherland and 201 in Loeriesfontein). For reports on the latter two surveys, including discussion of sampling strategy and sampling error, see Vorster and Eigelaar-Meets (2019) and Vorster (2019).

Historical overview

Colonial origins

The small towns scattered across the Upper Karoo emerged from the history of colonisation of this part of southern Africa in the eighteenth and nineteenth centuries, a process that radically transformed the relationship between humans and their environment in this dry but biophysically rich region. As the archaeological record makes abundantly clear, the Upper Karoo is a site of human occupation stretching back over millennia (Morris, 2018; Parkington, Morris & de Prada-Samper, 2019). Parkington et al. (2019:729) refer to the “complex and changing evolutionary history of hunting and gathering people” that colonial conquest brought to a cataclysmic end:

From the 18th century, these populations experienced traumatic and disempowering intrusions from European colonists and displaced Khoe groups in the south-west, from pastoral Tswana speakers in the north and from marginalised Xhosa refugees in the south. By the mid-19th century, small towns across the Karoo completed the dispossession and transformed residual hunters and gatherers into farm labourers, domestic servants and marginal town-dwellers with little or no political and social coherence.

When Britain took over the Cape Colony from the DEIC in 1795,⁴⁵ the northern border of the colony was a soft and porous boundary that marked the projected edge of the colony but did not stop its subjects moving beyond it in search of seasonal grazing and trade and hunting opportunities, as well as to put more distance between themselves and the colonial authorities. In 1805, certain adjustments were made to the border in Namaqualand, which brought the land around the Kamiesberg and present-day Loeriesfontein more clearly within the colony (see Figure 3.2 on page 70). This was followed in 1824 by a significant northward shift of the boundary in the Upper Karoo east of the Zak River, which impacted the Xhosa settlement at Pramberg (near present-day Victoria West), described by Marcatelli in Chapter Three. Finally, in December 1847, the British Governor at the Cape formally annexed the remaining lands between this still loosely-defined northern boundary and the Gariiep River. This brought |Xam ka !au, the heartland of the surviving |Xam hunter-gatherers of the Upper Karoo, under the formal jurisdiction of the colonial authorities in Cape Town and ended the “fabric-light” (Morris 2018:179) era of the first people of the Karoo.

45 Britain first took occupation of the DEIC colony in 1795. The Cape Colony was restored briefly to Dutch authority in 1802, but reannexed by Britain in 1806.

In this contested terrain new, hybrid groups emerged, including the Basters and Griqua, who carved out intermediate positions for themselves in this frontier zone. Small, mobile bands of people fought hard to defend their independent livelihoods and status. Some acquired rights to land from the colonial authorities; some joined new mission settlements such as Amandelboom (present-day Williston) and Harmsfontein (present-day Carnarvon), or established small outposts along the Gariiep River; others trekked still further north, beyond the river and out of the colony altogether (on this see Amschwand, 2017; Legassick, 2016). Plaited through the violence of dispossession were complex processes of assimilation and cultural exchange that shaped social relationships and identities in the Karoo into the twentieth century. In this colonial vortex Afrikaans slowly emerged as the home language of both black and white residents, while Christianity established itself as the dominant religion, the church a significant if divided social institution until today. At the same time, elements of precolonial cultural systems and identities persisted, notably in stories and local knowledge encompassing the cosmos and natural environment (Parkington et al., 2019; see also Cupido et al., Chapter Five).

The establishment of Sutherland is rooted in the early phase of colonial expansion into the Karoo, under DEIC rule in the eighteenth century. Dutch-speaking *trekboers* had begun to lay down a permanent presence on demarcated farms in the *Roggeveldbergen* (where Sutherland was subsequently established) by the mid-eighteenth century.⁴⁶ Although still poorly researched, the archaeological record testifies to the prior presence of San hunter-gatherer and Khoekhoe pastoralist groups in this rugged landscape and hints at both the fierceness of their resistance and the savagery of their defeat. Thus a 2010 heritage assessment, commissioned as part of an environmental impact assessment (EIA) for a wind farm project near Sutherland, describes the Roggeveld and Great Escarpment as “a historic conflict landscape, which is physically poorly understood – the last stand of the Cape San” (Hart, Bluff, Halkett & Webley, 2010:21). The EIA also notes a few sites of mass graves, likely dating to “a massacre of 186 San ... in 1765,” and “the rebellion of the 1770s” (Hart et al., 2010:21).

By the end of the eighteenth century, the Roggeveld had been formally incorporated into what became a British colony in 1806. Under British rule, more farms were registered in this area in the early nineteenth century (Hart et al., 2010). Sutherland itself was laid out on one of these farms, which the Dutch Reformed Church (DRC) bought in 1855 as the site for a church for a small group of local congregants who, until then, were reliant on the ministry of the DRC in Worcester, over 200 kilometres to the south-west (Schoeman, 2013:151). In 1857, the DRC authorised the subdivision of this farm into 50 properties, for sale to private

46 The first recorded loan farm in the Roggeveld was registered in 1743, with a further 30 farms registered by 1750 (Penn, 1995:176).

individuals, to form a “church town” that was named after its first DRC minister (*ibid.*). In 1864, the DRC ordered the establishment of a second church in the town, this one for “*de Kleurlingen*” [Dutch: the Coloureds] (Schoeman, 2013:152), thus inscribing social and spatial distinctions between ‘white’ and ‘coloured’ on key institutions in the town from its beginning.

The origins of Vanwyksvlei and Loeriesfontein lie in the more fluid conditions that prevailed until the end of the nineteenth century in the lands along and north of the 1805 colonial boundary. Vanwyksvlei took shape in the 1880s and Loeriesfontein in the 1890s. Both towns were established on what were recognised as Baster lands at the time, a history that lies submerged beneath the outer form of the towns today. Thus, Loeriesfontein was established on a registered farm by that name, which the colonial authorities had granted in 1860, via a “ticket of occupation” to a group of 59 Basters who “had been in this area since at least 1829” (Amschwand, 2017:77). However, under growing pressure from white farmers who were pressing not only for land and water points but also for labour, the Cape government revoked the Ticket in 1892. Families “who could prove descent” from the original Baster families were granted plots; the rest of the land was put up for sale (Amschwand, 2017:81). The town was formally established in 1898 on the original farm (Davids, 2021), to which two adjacent farms were added to provide an extensive municipal commonage amounting to some 22 000 hectares around the town (Davids, 2021:7). The 1904 Cape Census recorded its population as 643 people, two-thirds of them (435) described as ‘coloured’ (Möller, 1998).

In the case of Vanwyksvlei, it lay within the south-eastern reaches of former |Xam lands in colonial Bushmanland (Parkington, et al. 2019); striking rock engravings on nearby farmlands attest to this neglected precolonial heritage (de Prada-Samper, 2014). A commemorative history of the town that was produced in 1980, in anticipation of its centenary, referred disparagingly to “a whole lot of wild Bushmen” [*heelwat wilde Boesmans*] who were in the area “as late as 1870” when they were “openly hunted” because of their “brutal murders of Whites” [*As gevolg van hulle wreedaardige moorde op Blankes is daar openlik op hulle jag gemaak*] (Marais & Van der Merwe, n.d. [1980]:3–4). However, at some stage in the nineteenth century, the land around the *vlei* (one of many large ephemeral pans in the area) became associated with the “Van Wyksbasters” who are also accorded passing acknowledgement in the white-centred narrative that this commemorative publication extols: “Later Griqua, Korana and Baster established themselves in the Middle Karoo, mainly in the vicinity of the present-day Vanwyksvlei” [*Later het Griqua, Korana en Baster hulle in die Midde-Karoo, hoofsaaklik in die omstreke van die huidige Vanwyksvlei gevestig*]. Marais and Van der Merwe go on to record, without amplification, that “the town was also named after the Van Wyksbasters”

[*die dorp heet dan ook na die Van Wyksbasters*] (n.d. [1980]:2).⁴⁷ They note historic ties between Vanwyksvlei and Carnarvon, another historically black *dorp* that was formally established in 1860, in this case on top of a colonial land grant to a Xhosa-speaking group in 1829.⁴⁸ At the time, the authorities intended this land grant to act as a buffer zone between the Colony and the |Xam people to the north (Chinigò, 2019; on this history see also Marcatelli, Chapter Three).

The history of the Vanwyksvlei Basters needs more research, but the contemporary town came into existence in the 1880s because of an ambitious project by an English surveyor, Garwood Alston, to dam the *vlei* and establish an estate of irrigated croplands below the dam wall (Marais & Van der Merwe, n.d. [1980]). In 1896, management of the settlement, by then boasting several shops, houses and a mill, was transferred from the Cape's Department of Irrigation to the Department of Lands. Twelve years later, in 1908, a local Health Board was established (Marais & Van der Merwe, n.d. [1980]:9, 10). The dam, which was completed in 1884, has been hailed as the first state-funded dam in the future South Africa (ibid.). Its construction can thus be seen as a symbolic marker of the successful imposition of settled, commercial farming, dominated by white landowners, throughout the Upper Karoo by the end of the nineteenth century.

Today, however, the dam frequently stands empty – a contemporary symbol, in a changed political landscape, of unsustainable ambition as well. The ephemeral nature of the *vlei* has meant it was never a reliable water source – high rates of evaporation and salination were major concerns even in years when there was sufficient runoff from the rains to supply it with water (*The Water Wheel*, 2020). In 2020, the Department of Water and Sanitation was in the process of “formally dissolving the long-defunct Vanwyksvlei irrigation board” (ibid.). Meanwhile at the time of the SARChI survey, residents were dependent for several months of the year on water trucks from Carnarvon for their water supply, and a mural on the outskirts of the town, depicting the dam imagined as its core, was faded and peeling (Figure 4.3).⁴⁹

47 One of the leaders of the Van Wyk Basters, Hermanus van Wyk, led the group that left the Cape Colony at the end of the 1860s and subsequently established the settlement of Rehoboth in present-day Namibia.

48 The town's original name, Harmsfontein, was changed to Carnarvon in 1874.

49 In February 2022, the dam was temporarily full, after heavy rains, while the mural on the Carnarvon side of the town had been repainted.



Figure 4.3 Mural at entrance to Vanwyksvlei, 2016 (Photograph: Cherryl Walker)

Developments after Union

The spatial and economic predominance of white commercial agriculture throughout the Karoo took 150 years to secure. (For an overview see Beinart, 2018.) Achieving this primacy involved a radical transformation of land tenure, land use and people's relationship with the land off which they lived. While the general theme of land dispossession and the subordination of indigenous people is consistent with the history of the much more populous and better watered eastern half of South Africa, some distinctive features of colonisation in the Karoo deserve more attention than they generally receive. Beinart (2018:191) has drawn attention to the Karoo as historically a "hub of innovation", with livestock farming, centred on sheep, "a motor of the Cape's agrarian economy". Significantly, no 'native reserves' were established – hence the underpinnings of the migrant labour system and, after 1948, the divide-and-rule system of bantustans on which the larger political economy of twentieth-century South Africa rested were not laid down in this region.⁵⁰ At the same time, even though the extent of land dispossession was extreme, residents who were cast as 'coloured' in the first national census of 1911 were incorporated into a regional society with common institutions. Although deeply inequitable and racist in the way in which resources were allocated and power exercised, this

50 The Northern Cape's 'coloured' reserves, home to the small-scale farmers described by Cupido et al. in Chapter Five, have a very different history from the bantustans inasmuch as they were not the product of the 1913 Natives Land Act, and their residents were not subject to the pass laws.

society offered people regarded as 'non-white' a formal equality before the law in the first half of the twentieth century; until the 1950s, 'coloured' men who met the property and educational qualifications, also enjoyed the vote.⁵¹

In this new order, small *dorps* such as Sutherland, Loeriesfontein and Vanwyksvlei functioned as vital nodes of social and economic life. Hoogendoorn and Visser (2016:100-101) note how country towns in "former 'White' South Africa" "developed, over time, in a ... symbiotic fashion with their hinterlands and local resources."⁵² Until the 1980s, this symbiotic relationship was nurtured by state policies, which supported white farmers and their communities in a range of ways – cheap loans, fencing subsidies, predation management, drought relief, extension services, state marketing boards and the like (Beinart, 2018; Doyer, Haese, Kirsten & Van Rooyen, 2007). The local histories of Loeriesfontein and Vanwyksvlei, which were produced to commemorate their centenaries, tell a story of struggle and perseverance that saw white residents beginning to enjoy a modest prosperity by the mid-twentieth century, as amenities such as schools, electricity, telephones, and a postal service were gradually brought to these towns.

Yet despite the appearance of progress and social stability that the commemorative local histories projected in the 1980s, by then long-term processes of change that were challenging this social order were well underway. A 2018 overview by geographers Hill and Nel identified the decline in the Karoo's white population and the growth of its urban population as two significant demographic trends. By the 1980s, declining levels of state support for commercial farmers, itself a consequence of the increased political and economic pressures on the apartheid state at that time, were also changing the face of Karoo agriculture and, with that, the local economies of many small Karoo towns. Commercial activity in the Karoo was becoming more concentrated in bigger centres such as Beaufort West and Graaff-Reinet, and small *dorps* without alternative sources of economic activity, such as tourism or mining, were showing signs of economic stagnation or decline (Nel & Hill, 2008).

While white residents never constituted an absolute majority in the Karoo, they were a sizable group in the early twentieth century – at 44% of the total, the largest single population group in the 1911 Census. At this time, those classified as

51 In the late colonial period, a small number of relatively privileged 'non-white' men were accorded the vote in terms of the qualified Cape Franchise. This right came under mounting pressure after 1910. African male voters in the Cape were completely disenfranchised in 1936, followed by 'coloured' male voters in 1958. White women were first enfranchised in 1930 (Walker, 1990).

52 They draw a distinction between these towns and "Homeland towns" in the former "Black Homelands" (bantustans), many of which developed as "dumping points" for black African people expelled from the cities as a result of influx control and, later, the forced removal policies of the apartheid era.

'coloured' accounted for 30% and those classified as what would later be termed 'black African' for 26% of the population (the latter concentrated in the east) (Hill & Nel, 2018). By 1980, however, the white population of the Karoo had dropped significantly, both in absolute numbers and in percentage terms. By then whites accounted for just 16% of the total population, while the proportion of those classified as 'coloured' had risen to 50%. This shift reflected the movement of both poor and better-off whites off the land and into larger urban centres, as their education levels rose, and economic opportunities widened as a result of segregationist state policies. Over the same period, the proportion of people living in the Karoo's small towns doubled, from 31% in 1911 to 62% in 1980. As shown in Table 4.1 below, the shift to a predominantly urban population dates to the mid-twentieth century.

Table 4.1 Demographic change in the Karoo, 1911–2004 (Hill & Nel, 2018:207)

	1911	1936	1951	1970	1980	2004
Total urban %	31	38	46	56	62	73
Total "coloured" – urban and rural %	30	39	39	46	50	55
Total white – urban and rural %	44	37	39	18	16	12
Total urban white (number)	40 012	53 316	61 219	57 821	50 518	44 820
Total urban "coloured" (number)	25 920	36 492	56 572	116 976	131 762	188 880

Apartheid-era policies hardened the social boundaries separating black from white in Karoo towns. Segregated 'group areas' were declared in both Sutherland and Loeriesfontein in 1968 in terms of the Group Areas Act of 1951,⁵³ on the heels of the Population Registration Act of the previous year.⁵⁴ Figure 4.4 below, showing group area boundaries in Loeriesfontein, illustrates the gross disparities in size and amenities between the areas set aside for whites and those for 'coloureds'. Not only was the actual size of the land allocated to the white minority in Loeriesfontein far larger than that proclaimed for the 'coloured' majority, but the white group area took in the established town centre, where most businesses and public buildings were located, as well as the *saailande* [sowing fields] on the municipal commonage that had been laid out in the 1890s.

53 No Government Gazette notice for the Group Areas Act in Vanwyksvlei has been found to date; however, the location and quality of housing of the township where the 'coloured' majority lives reflect the spatial politics of the Group Areas Act.

54 This Act legislated the system of 'race' classification on which rights were predicated, a system that still informs the state's understanding of 'population groups' and social identities today.

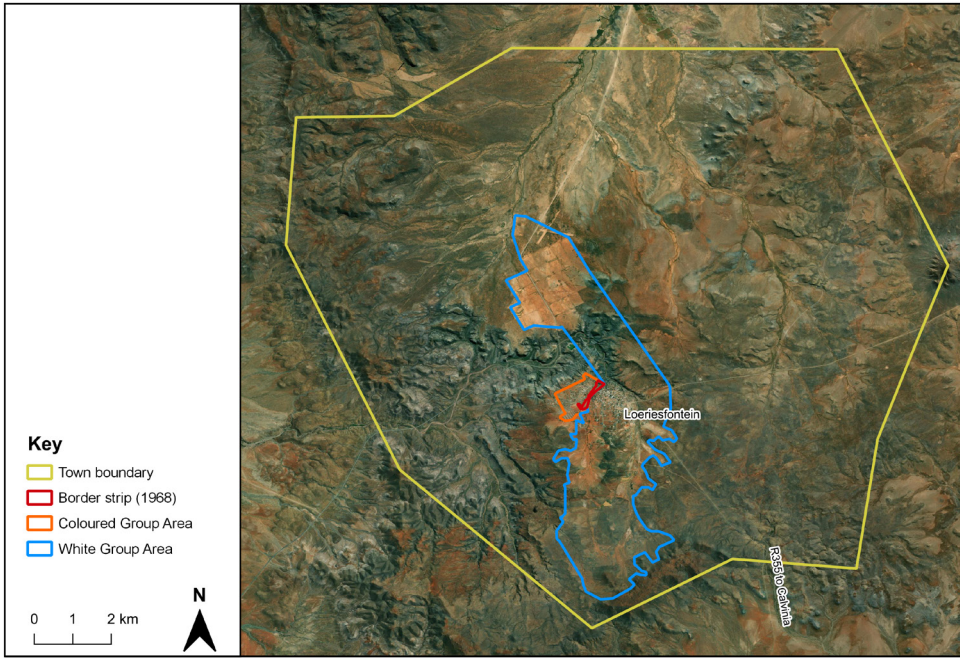


Figure 4.4 Group Areas in Loeriesfontein, as gazetted in 1968

The racialised organisation of space in Karoo towns through the Group Areas Act has persisted in the post-apartheid era. Arguably, as discussed further below, post-apartheid housing policies have entrenched it by locating new, publicly funded low-income housing schemes in formerly 'coloured' group areas. Yet unlike the situation in metropolitan areas, the impact of the Group Areas Act on families and communities in the Karoo is not well documented in the academic literature or in fiction and published memoirs. The assault on people's homes, livelihoods and sense of belonging can, however, be inferred from the general literature, as well as read off maps and the built environment itself. Today Vanwyksvlei presents perhaps the starkest testimony of the devastation wrought by the Group Areas Act on the social fabric of Karoo towns – the former township where the overwhelming majority of residents still live, on tiny, tightly packed plots, stands clearly apart from the historic town centre, with its more spacious layout, bigger houses and many empty stands, in what was formerly defined as the white area (Figure 4.5).

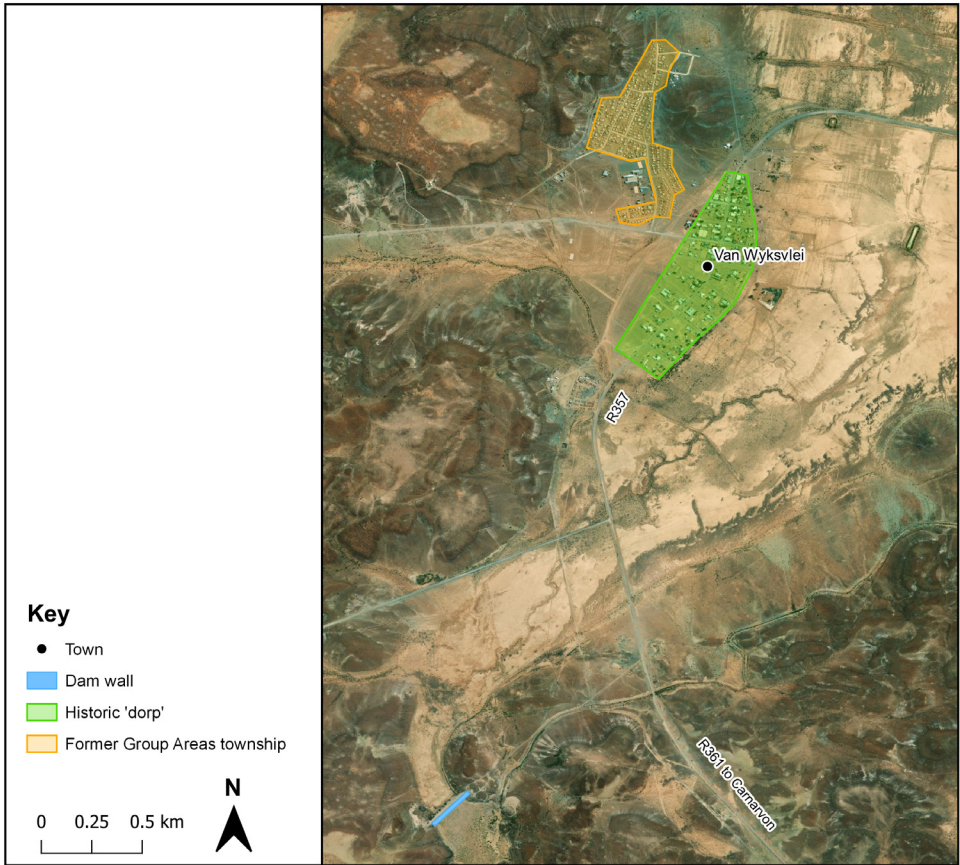


Figure 4.5 Vanwyksvlei, showing former white and ‘coloured’ areas

In Loeriesfontein, the forced removals of the apartheid era resulted in a consolidated land claim being lodged by a large group of claimants in 1998, under the Restitution of Land Rights Act of 1994, which had only been partially settled by 2020 (Davids, 2021). Figure 4.6 below shows the spatial dimensions of this claim in the town itself – the areas marked in colour (purple, green, grey) on the satellite image showing both the town plots and some of the municipal *saailande* that were claimed as restitution for the dispossession suffered as a result of “past racially discriminatory laws and practices”, in the language of the Restitution of Land Rights Act of 1994.⁵⁵ The map is suggestive of both the destructiveness of the Group Areas Act on people’s lives and the intimate scale at which this functioned in Karoo *dorps*.

⁵⁵ The full claim encompassed all the municipal commonage land, amounting to just under 22 000 hectares (Davids, 2021:7) and an adjoining farm. See Davids (2021) on this history.

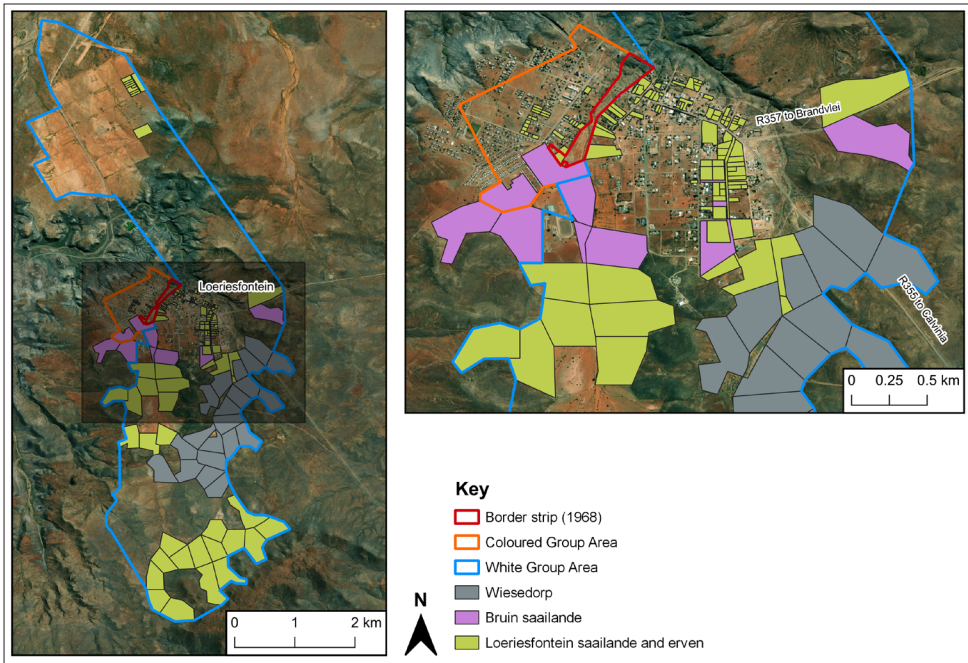


Figure 4.6 Erven under claim in Loeriesfontein town centre and adjacent saailande, showing former group-area boundaries

Contemporary socio-economic conditions

Local government, service delivery and residents' perceptions of their towns

After 1994, former magisterial districts and small-town municipalities in South Africa were realigned within a local government dispensation that was intended to dismantle political, spatial, and fiscal apartheid at the municipal level. Democratic local government was now to be rolled out within expanded local municipalities, encompassing both rural and urban areas, and nested within larger district municipalities. In the Northern Cape this has meant that formerly autonomous small towns, like the three discussed in this chapter, have now been corralled together in geographically very extensive administrative entities, generally without decent transport and communication networks.

Procedural democracy has thus been ushered in, inasmuch as all adults can now vote on an equal footing, and local politics in all three municipalities are tightly contested, with often very small margins separating the main political parties in ward

elections. In part, the competitive nature of elections is because of the potential for personal advancement and patronage associated with municipal posts and ward councillor positions (Atkinson, 2007; Wegner, 2018; and, on the Hantam Local Municipality specifically, Malope, 2022).

However, the very large geographic area and poor communications infrastructure of the new Karoo municipalities have exacerbated the problem of weak institutional capacity that is widely recognised as undermining the goal of efficient and accountable local government across South Africa (Koma, 2010; Atkinson, 2003). Thus, Vanwyksvlei became a ward in the Kareeberg Local Municipality, with its administrative centre in Carnarvon around 80 kilometres away, via a gravel road. Similarly, Loeriesfontein became a ward within the Hantam Local Municipality, with its administrative centre in Calvinia approximately 90 kilometres away via a gravel road, or 140 kilometres away via a tarred road. Sutherland, now a ward in the Hoogland Local Municipality, is a particularly extreme example of spatial dysfunctionality: Williston, its administrative centre, is 140 kilometres away, via poorly maintained gravel roads; Springbok, the headquarters of the larger District Municipality, is over 500 kilometres away, and Kimberley, the provincial capital, is 670 kilometres away.

Since 1994, the national state has targeted service delivery in poor communities throughout South Africa. In the Karoo, poor households have benefitted significantly from the investment in Reconstruction and Development Programme (RDP) housing, the rollout of social grants and the launch of the Community Work and Expanded Public Works Programmes.⁵⁶ Data from the SARChI surveys confirms the importance of these interventions in terms of ensuring a minimum level of basic services in the three towns (see Table 4.2 below). Yet while these programmes have been important for blunting poverty, they are, arguably, also tying poor households to these towns because this is where their claims to these basic services can best be secured. This is perhaps most noticeable in the case of Vanwyksvlei, where alternative livelihood options are particularly limited.

56 The post-apartheid state's RDP included the provision of low-cost housing to eligible South Africans. While the formal programme had come to an end by the early 2000s, state-subsidised houses continue to be popularly known as RDP houses.

Table 4.2 Percentage of households with selected services in survey towns and in South Africa (SARChI surveys; StatsSA 2020)

Services	Loeriesfontein (2019)	Sutherland (2017)	Vanwyksvlei (2016)	South Africa (2019)
Informal/backyard structure on plot	0.5	12	3.5	13
Piped water to plot	36	41	66	29
Piped water inside house	64	58	30	45
Pit latrine on plot	28	64	75	n/a ⁵⁷
Electricity connection	100	96	88	85

The majority of households live in small, formal, state-built houses, laid out on planned street grids. A small number of black professionals – civil servants, teachers, nurses – have been able to acquire properties in the formerly white *dorp*, but the spatial arrangement of the three towns remains largely unchanged, reinforcing the contours of race that still inform the ebb and flow of daily social relationships. In Sutherland, much of the housing stock is old and overcrowding is a major complaint, with 12% of residents living in backyard structures at the time of the SARChI survey in 2017.⁵⁸ In Loeriesfontein, in contrast, the rollout of state housing is relatively recent and at the time of the SARChI survey (2019) only one household reported living in a backyard structure. Over time, however, unless there is further investment in affordable housing, pressure on housing can be expected to grow. In Vanwyksvlei new sub-economic houses were being built alongside older structures when the SARChI survey was conducted in 2016, with a small number of households still living in older, self-built 'clay' houses and backyard structures. Here large households were also trying to use the opportunity to de-densify across adjacent new and old structures.

Almost all households in the three towns have access to piped water on their plots, but a much smaller percentage of residents in Sutherland and Vanwyksvlei have taps inside their houses compared to residents in Loeriesfontein, with its newer housing scheme. Almost all households in Loeriesfontein and Sutherland have access to electricity (in most cases via prepaid metres) but in Vanwyksvlei over 10% of households reported not being connected to the national grid. However, as Borchardt's discussion of energy poverty in De Aar in Chapter Ten makes clear, mere connectivity to the grid does not ensure consistent access to electricity, as

57 StatsSA data does not offer strictly comparable data. Nationally the percentage of households with access to "improved sanitation facilities" (covering both flush toilets and pit latrines with ventilation pipes) increased from 62 per cent in 2002 to 82 per cent in 2019 (StatsSA, 2020).

58 At the time, plans to build additional low-income housing were reportedly stalled because of opposition from within the town to the proposed site, which was on the 'white' side of town.

the cost of electricity remains a major challenge for poor households. In terms of sanitation, Loeriesfontein was again the best performing of the three towns, with almost three-quarters of its households having inside flush toilets. While respondents in the Loeriesfontein survey highlighted their upgraded sanitation services as a very positive development, the long-term sustainability of waterborne sewerage is of concern, given the severe pressure on water supply in the municipality.

In terms of people's satisfaction with conditions in their towns, the surveys produced mixed results, with respondents across the three towns identifying intra-community conflict, poor service delivery, alcohol and drug abuse, crime, and unemployment as major concerns. However, in response to a question about what people liked about their town, respondents also pointed to a cluster of positive features linked to the small scale and location of their individual towns, in which appreciation of their town's peacefulness, natural beauty and neighbourliness were prominent. In the case of Sutherland, the final survey report notes that "Those commenting favourably on the social cohesion in the community emphasised the strength of local ties" in their responses:

"Everyone knows one another and lives closely together."

"The community and people's friendliness; everyone knows everyone."

"Pretty town in the countryside, with the typical manners of the countryside – people gossip, but if someone dies, everyone grieves together" (Vorster & Eigelaar-Meets, 2019:52).

Similarly, in Loeriesfontein "four characteristics stood out" in respondents' description of "what makes Loeriesfontein special":

- The unique natural environment, especially the wildflowers in spring and the quiver trees
- The safety and tranquil nature of the town
- The windmill museum
- Strong social cohesion in the community (Vorster, 2019:57).

Demographic profile

The demographic profile of the three towns reflects broader patterns with regard to ethnicity and language in the Upper Karoo (see Table 4.3). The overwhelming majority of residents are Afrikaans-speaking and self-identify as 'coloured' (at least in the survey setting). Consistent with the historical trend described by Hill and Nel (2018), the number of permanent residents who are white is now very small, particularly in Loeriesfontein and Vanwyksvlei. In these towns, a high proportion of white residents are elderly pensioners, many of them former farmers now retired to

the *dorp*. In terms of 'race' and language as markers of social identity, these towns thus differ significantly from the prevailing position nationally and in the Northern Cape as a whole, as Table 4.3 shows.

Table 4.3 Selected demographic data for survey towns, Northern Cape and South Africa (SARChI surveys, StatsSA 2012)

Demographic data	Loeriesfontein (2019)	Sutherland (2017)	Vanwyksvlei (2016)	N Cape (2011)	South Africa (2011)
% Afrikaans home language	99	96	99	54	14
% self-identified as 'coloured'	95	97	96	40	9
% population under 14 years	26	29	33	30	29
% population 60 years and older	13	12	22	8.5	8.5
% population 20 to 59 years	55	49	45	52	53
Average household size	3.5	4	5.7	n/a	3.3

As in South Africa more generally, all three towns have young populations, with Vanwyksvlei the most youthful of the three. However, these towns also have a noticeably higher percentage of older people than the national and provincial averages, with proportionately fewer people in Sutherland and Vanwyksvlei in the 20–59 age group than is the case for the South African population as a whole. This is indicative of relatively high levels of out-migration among adults of working age, which is in turn indicative of the weakness of local economies and the consequent pressure on livelihood opportunities in these towns.

That said, a comparison of the SARChI surveys with the 2011 Census data for Sutherland and Loeriesfontein indicates that the rate of out-migration among young adults in both towns had slowed since 2011. Thus, in Sutherland the proportion of young adults in the 20–24 age cohort in 2017 was larger than that captured in the national census six years earlier, in 2011; this suggests greater scepticism among young adults about their job prospects elsewhere and a concomitant acceptance that they might be better-off staying in Sutherland, where at least family and community support systems are in place. In the case of Loeriesfontein, the SARChI survey found a similar trend in the 25–29 age cohort. This, however, cannot be attributed simply to young adults being less inclined than their counterparts in 2011 to leave in search of work elsewhere, but also to young people who had previously

left Loeriesfontein returning to the town. In this case it appears that the construction of the two wind farms outside the town between 2015 and 2018 had acted as a major pull factor, attracting former migrants back home, in the hope of finding work during the construction phase. As discussed further below, the construction of the wind farms did provide a mini-boost to the local economy but the jobs that were on offer for local people were mostly temporary and generally unskilled and low-paying. (On this see also Malope, Chapter Seven in this volume.)

As indicated in Table 4.3 above, the average size of households in Sutherland and Loeriesfontein is a little above the national average, while in Vanwyksvlei it was significantly larger at the time of its survey (when new RDP houses were being built). The data also points to how the rollout of sub-economic housing in Loeriesfontein in 2013 had made it easier for younger adults to move out of their childhood homes and establish households of their own. While approximately half of all households surveyed in Sutherland and Loeriesfontein were two-generational, just 19% of households in Loeriesfontein consisted of three generations or more, compared to almost 25% in Sutherland.

Educational levels are generally low across all three towns, which is a major barrier to improving livelihood options. With approximately a quarter of all residents 20 years or older having completed matric, Loeriesfontein ranks best in this regard; it is also performing better than the Northern Cape as a whole. Vanwyksvlei has the poorest indicators of the three towns, with only 16% of its residents aged 20 and older holding a matric at the time of the household survey. Significantly, it is the only one of the three towns that does not have a high school – its nearest high school is in Carnarvon. The low levels of post-matric education in the adult population in these towns can be attributed to the legacy of past inequities. Of particular concern, however, is that while school attendance among children aged 6–14 years is generally good across the three towns, this is not being maintained among children of high school age. All three surveys show a significant dropout rate amongst children once they reach high school, with 30% of children aged 15–18 not attending school in Vanwyksvlei, 33% in Loeriesfontein and an extremely high 40% in Sutherland. The particularly serious position in Sutherland raises questions about why school dropout rates should be so high in this town compared to Loeriesfontein and Vanwyksvlei. One contributing factor, suggested by a well-informed municipal official, is that the use of *tik* [crystal methamphetamine] has increased alarmingly among teenagers in Sutherland in recent years. Alcohol and drug abuse were identified as serious social problems by survey respondents in all three towns, but it appears that young people in Sutherland are even more vulnerable than their counterparts in the other two towns – possibly because the location of their town (relatively close to the N2 highway) means it is more accessible to drug merchants targeting new markets outside the major urban centres.

Another social concern in all three towns is teenage pregnancy (referring to women younger than 20 with their first pregnancy). Various studies have linked teenage pregnancy to a host of concerns for both the teenage mothers and their babies. These include unequal sexual relationships between men and women, poor educational outcomes for the young mothers (with negative impacts in turn on their future livelihoods), and the developmental challenges facing babies born into potentially precarious situations, with youthful mothers and stretched family support systems (see, for instance, Jewkes, Vundule, Maforah & Jordaan, 2001:733 and Mkwanzzi, 2017). While teenage pregnancy is widely identified as a “serious health and social problem” across South Africa (Western Cape Government, 2018), the Northern Cape shows the highest incidence among the nine provinces (Networking HIV and AIDS Community of Southern Africa (NACOSA), 2018; O’Regan, 2021), a trend that is confirmed by the SARChI survey data (see Table 4.4 below).

Table 4.4 Percentage of women in survey towns whose first pregnancy was before age 20, by age cohort (SARChI surveys)

Women younger than 20 with first pregnancy	Loeriesfontein (2019)	Sutherland (2017)	Vanwyksvlei (2016)
In 20-29 age cohort, %	33	46	48
In 30-39 age cohort, %	33	38	42
In 40 + age cohort, %	23	25	37

Of interest, however, is that Table 4.4 also shows differences among the towns in terms of the level and trajectories of teenage pregnancy over time. This suggests that while poverty may be a significant contributory factor (NACOSA, 2018), other social considerations also play a part in shaping how teenage girls negotiate sexual relationships. Thus Vanwyksvlei, the poorest of the three towns, has the highest level of teenage pregnancy but Loeriesfontein, which has higher levels of poverty than Sutherland, has the lowest. In all three towns, the incidence of teenage pregnancy has increased in the past twenty years, with significantly larger proportions of women in the 20–29 age category experiencing their first pregnancy in their teenage years compared to women in the 40-plus age cohort. However, in Loeriesfontein – but not in Sutherland and Vanwyksvlei – the rate seems to have stabilised, with similar rates of teenage pregnancy reported for this town among women in the 30–39 and 20–29 age cohorts. Consistent with national concerns, in Sutherland teenage pregnancy also correlates with relatively lower education achievements among the women concerned, but this is not the case in Loeriesfontein. This could be explained at least in part by the fact that in Loeriesfontein the majority of women aged 20–29 years who were teenagers with

their first pregnancy were older teenagers (18 or 19) at the time. The implication is that social controls and/or support systems are working relatively better for young women in Loeriesfontein than in Sutherland and Vanwyksvlei, although teasing out how this is functioning is a matter that requires more qualitative research.

Household income, poverty levels and livelihoods

As already noted, economic activity in all three towns is weak and poverty levels disturbingly high. Sutherland, with its small tourism industry centred on the South African Astronomical Observatory (SAAO) and its more favourable location relative to major centres and transport routes, is better endowed than the other two *dorps*. However, the benefits of this endowment are very unequally distributed within the town and poverty is widespread, with per capita income for almost half the population falling below the national upper-bound poverty line (see Table 4.5 below). In both Loeriesfontein and Sutherland the tiny middle class comprises mainly state employees (e.g., municipal officials, teachers, health workers), owners of local businesses, and a sprinkling of retired people with independent means. The public sector is staffed mainly by people classified as 'coloured', while the small private sector is mainly in white hands. In Vanwyksvlei state employees tend to be based elsewhere, e.g., Carnarvon, and commute daily or weekly to the town.

Unemployment and underemployment are serious challenges in all three towns and monthly earnings from paid work are extremely low. In Vanwyksvlei, at the time of its SARCHI survey, just over 60% of all those in employment were earning ZAR1 000 or less per month. The depth of poverty becomes clear when one relates per capita monthly income to national poverty lines. Thus in Loeriesfontein, in 2019, the monthly per capita income of 59% of residents was below South Africa's upper-bound poverty line, while over a quarter of residents fell below the food poverty line, which is a measure of extreme poverty. In Sutherland, the comparable figures were a little better, but still dire, at 47% and 22% respectively.⁵⁹ Although it has not been possible to calculate a strictly comparable figure for Vanwyksvlei, all indications are that poverty levels there are even worse. The grip of poverty on these towns is further illustrated – but also significantly eased – by the high percentage of households reporting at least one recipient of a South African Social Security Agency (SASSA) grant: nearly two-thirds of households in Loeriesfontein, over three-quarters in Sutherland, and almost four-fifths in Vanwyksvlei. As shown in Table 4.5 below, these figures are noticeably higher than both the provincial and national averages.

59 The calculations for Loeriesfontein are based on April 2019 prices and for Sutherland on April 2017 prices, to take account of the timing of the two surveys.

Table 4.5 Poverty levels and dependence on state grants in survey towns, Northern Cape and South Africa (SARChI surveys; StatsSA 2018, 2020)

	Loeriesfontein (2019)	Sutherland (2017)	Vanwyksvlei (2016)	N Cape	South Africa
% population with per capita monthly income on or below upper-bound poverty level	59	47	[data not comparable]	46 (2015)	40 (2015)
% population with per capita monthly income on or below food poverty line	27	22	[data not comparable]	n/a	14 (2015)
% households reporting hunger	20	15	15	n/a	11
% households with at least one state grant	64	78	80	56 (2019)	46 (2019)
% households in which state grants the main income source	46	37	[data not comparable]		
% of those employed with monthly earnings of R1 000 or less	30	37	61		

Unsurprisingly, unemployment rates are also very high in all three towns. As in South Africa more broadly, young people are the hardest hit – in Loeriesfontein, for instance, 60% of 20–29-year-olds were unemployed at the time of the survey, and the COVID-19 pandemic and associated lockdown in 2020 would only have made the situation worse. Most of the jobs that are available locally are in poorly paid, unskilled occupations as general workers, domestic workers, and farm workers, often on a part-time or casual basis. The Community Work Programme is a significant employer, providing employment for 12% of all working people in Loeriesfontein and 13% in Sutherland.

New land uses and local perceptions of them

In both Loeriesfontein and Sutherland, the investment in renewable energy in the region has created short-lived mini-booms but, as noted above and discussed more fully by Malope in Chapter Nine, the jobs on offer in host towns are mostly temporary and unskilled or semi-skilled. In the case of Loeriesfontein, while nearly a quarter (23%) of the individuals reported as unemployed at the time of the SARChI survey had worked previously on the two wind farms (during their construction phase), only 4% of those reported as employed in 2019 were still working on these projects. More promising is the potential for leveraging the not-insignificant funds that renewable energy companies are required to invest in local community development, as part of their bid commitments within South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The evidence from Loeriesfontein, however, suggests that this potential is being directed towards once-off, short-term projects, many of them mired in local patronage politics and designed more with an eye on meeting investors' compliance requirements than rooting out household poverty and supporting sustainable developments over the longer-term. (On this see Malope, 2022; Chapter Nine, this volume.)

While studies have identified municipal commonages as a valuable resource for land reform in the Northern Cape (Atkinson & Ingle, 2018), the SARChI surveys failed to pick up widespread interest among respondents in farming as a major source of primary or even supplementary income. This does not mean that there is no interest in farming at different scales among local residents, but the findings do reinforce the point made at the beginning of this chapter, that Karoo *dorps* should be understood as distinctively urban social spaces – dorpscapes – with popular aspirations shaped accordingly. This also suggests that the potential of municipal commonages, as community resources for local development in these three towns, needs to be reassessed in relation to changing conditions – could they be better utilised for other purposes, for instance, community-owned renewable energy projects? The severe drought of recent years means that the number of small-scale farmers who can be supported on them sustainably is even more limited than before. In Loeriesfontein, furthermore, the historic commonage has become a source of tension within the community, because the formal settlement of the land restitution claim has meant that the small-scale farmers who were previously leasing grazing land on it from the local municipality no longer can. As of 2020, many residents were still confused about the status of this land. (On this see Davids, 2021.)

These are issues to be discussed with the people most directly affected. As could be expected, survey respondents' views on the new developments redirecting land use in their metaphorical backyards have been shaped by their access to the developments in question. In Loeriesfontein, dissatisfaction with perceived

exclusionary and opaque procedures on the part of the wind farm developers around recruitment and the allocation of local contracts led to overt community protests in 2016 and continued rumblings thereafter, discussed further by Malope in Chapter Nine of this volume. In Sutherland there was high awareness of the Observatory located just outside the town, with approximately 80% of respondents indicating that they had visited it and most of them interested in doing so again. While just over three-quarters of respondents (78%) said that their households had not benefitted directly from the Observatory, there was general recognition that the facility was benefitting the town in both tangible and intangible ways, by promoting tourism and associated job opportunities, as well as by generating pride in the area and interest in science. This is in stark contrast with what the Vanwyksvlei survey found with regard to the SKA, which, as a radio telescope facility, has imposed a host of restrictive conditions on land use and daily activities in surrounding areas, rendering it a far less accommodating neighbour than its optical counterpart at Sutherland⁶⁰ (see also Terblanche, Chapter Seven). Here awareness of the SKA as a new presence in the municipality was high, with nearly 80% of respondents saying that they had heard of it. However, very few respondents understood what it was about, other than that farms were being bought up (in 2016) and, in the words of one respondent, "they do not want any noise around the satellites". The overwhelming majority of respondents did not expect local benefits through job creation or improvements in local services and infrastructure.

Conclusion

In the introduction to this chapter, we asked what an understanding of dynamics in Karoo small towns brings to the analysis of social-ecological change in the Karoo. How well placed are local residents in the three towns discussed here to cope with change? How resilient and/or adaptive are the places they call home?

The overview of socio-economic conditions presented above paints a picture of grave vulnerability in all three *dorps* in the face of changes over which most local people have had little or no say. The colonial origins of these settlements are rooted in processes of dispossession which have not yet been fully addressed. All three towns developed through the twentieth century as service centres for the commercial farming sector, but those linkages have weakened and today these settlements are struggling, albeit to differing degrees, with sluggish or declining local economies, stretched and fractious administrations, and a heavy burden of poverty, unemployment, and social problems, including alcohol and drug abuse. The imprint of the apartheid era still sits heavily on them while the state's formal

60 These restrictions are in terms of the Astronomy Geographic Advantage Act of 2007 and designed to reduce radio frequency interference produced, inter alia, by conventional cell phone technology, petrol-driven cars, microwave ovens and the like.

process of land restitution has thus far failed to deliver substantive redress in the one town where it has been invoked. All three towns are located near major development projects that, collectively, are transforming land use in the Karoo in the service of national science and South Africa's hesitant shift to a low-carbon economy, but most residents are poorly equipped to engage with and capitalise on this association.

In the post-apartheid era, these towns have become small enclaves in which state-subsidised services and social grants provide lifelines that keep the majority of residents afloat, but barely. While the state has become a critical source of livelihood support, this support leaves many households functioning in little more than survivalist mode. What the research presented in this chapter makes very clear is that in this context new modes of social and economic investment are urgently needed, modes that recognise and build on the social resources that residents have themselves identified through the SARChI surveys as valuable about their towns. These include their intimate scale, their neighbourliness, their relative peacefulness and the absence of serious crime, as well as their unique sense of history and place.

Acknowledgements

This work is based on research supported by the South African Research Chairs Initiative of the Department of Science and Innovation (DSI) and National Research Foundation (NRF) of South Africa (Grant No. 98765). The financial assistance of the NRF towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the authors and are not necessarily to be attributed to the NRF.

References

- Amschwand, N. 2017. *1847: Dispossession and Migration: Population Movement in the Northern Cape during the 19th Century*. Cape Town: Nigel Amschwand.
- Atkinson, D. 2003. Post-apartheid local government reforms: A small town perspective. CDE Focus, Occasional Paper 8, March. Johannesburg: Centre for Development and Enterprise.
- Atkinson, D. 2007. Taking to the streets: Has developmental local government failed in South Africa? In: S. Buhlungu, J. Daniel, R. Southall & J. Lutchman. *State of the Nation 2007*. Cape Town: HSRC Press.
- Atkinson, D. & Ingle, M. 2018. By their own bootstraps: municipal commonage farmers as an emerging agrarian class in the Karoo. *African Journal of Range & Forage Science*, 35(3&4):233–243. <http://dx.doi.org/10.2989/10220119.2018.1514653>.
- Beinart, W. 2018. An overview of themes in the agrarian and environmental history of the Karoo since c. 1800. *African Journal of Range & Forage Science*, 35(3&4):191–202. <http://dx.doi.org/10.2989/10220119.2018.1508070>.
- Butler, S. 2018. Knowledge relativity: Carnarvon residents' and SKA personnel's conceptions of the SKA's scientific and development endeavours. MA thesis. Stellenbosch: Stellenbosch University.
- Chinigò D. 2019. From the 'Merino Revolution' to the 'Astronomy Revolution': Land Alienation and Identity in Carnarvon, South Africa. *Journal of Southern African Studies*, 45(4):749–766. <https://doi.org/10.1080/03057070.2019.1642028>.
- Christie, S. 2012. Cartooning the Karoo. *Farmer's Weekly*, 5 October 2012. <https://www.farmersweekly.co.za/rural-insight/cartooning-the-karoo/> [Accessed 8 November 2023].
- Davids, S. 2021. Contested land: A case study of land reform on the municipal commonage in Loeriesfontein, Northern Cape Province. MA thesis. Stellenbosch: Stellenbosch University.
- De Prada-Samper, J.M. 2014. 'Di-xerreten and the lioness': text and landscape of a |Xam narrative. *Critical Arts*, 28(4):610–6. <https://doi.org/10.1080/02560046.2014.929219>.
- Doyer, O.T., D'Haese, M.F.C., Kirsten, J.F. & Van Rooyen, C.J., 2007. Strategic focus areas and emerging trade arrangements in the South African agricultural industry since the demise of the marketing boards. *Agrekon*, 46(4):494–513. <http://dx.doi.org/10.1080/03031853.2007.9523783>.
- Gastrow, M. & Oppelt, T. 2019. The Square Kilometre Array and Local Development Mandates in the Karoo. *Journal of Southern African Studies*, 45(4):711–728. <https://doi.org/10.1080/03057070.2019.1642679>.
- Hart, T., Bluff, K., Halkett, D. & Webley, L. 2010. Heritage Impact Assessment: Proposed Suurplaat Wind Energy Facility near Sutherland, Western Cape and Northern Cape. Prepared for Savannah Environmental (Pty) Ltd., 7 September 2010.
- Haswell, R. 1979. South African Towns on European Plans. *Geographical Magazine*, 51(10):686–694.
- Hill, T. & Nel, E. 2018. Population change in the Karoo. *African Journal of Range & Forage Science*, 35(3&4):203–208. <https://doi.org/10.2989/10220119.2018.1529705>.
- Hoogendoorn, G. & Visser, G. 2016. South Africa's small towns: A review on recent research, *Local Economy*. 31(1–2):95–108. <https://doi.org/10.1177/0269094215618865>.

- Jewkes, R., Vundule, C., Maforah, F. & Jordaan, E. 2001. Relationship dynamics and teenage pregnancy in South Africa. *Social Science & Medicine*, 52(5):733–744. [https://doi.org/10.1016/s0277-9536\(00\)00177-5](https://doi.org/10.1016/s0277-9536(00)00177-5).
- Koma, S.B. 2010. The state of local government in South Africa: Issues, trends and options. *Journal of Public Administration*, 45(si-1):111–120. <http://hdl.handle.net/2263/14969>.
- Legassick, M. 2016. *Hidden Histories of Gordonia; Land Dispossession and Resistance in the Northern Cape, 1800–1990*. Johannesburg: Wits University Press. <https://doi.org/10.18772/12016049544>.
- Malope, B.J. 2022. Power struggles: An exploration of the contribution of renewable energy to sustainable development, decent work and the “just transition” through a case study of wind farm development outside Loeriesfontein, Northern Cape Province (2011–2020). PhD dissertation. Stellenbosch: Stellenbosch University.
- Marais, J.J. & Van der Merwe, J.C.S. n.d. *Van Wyk's Vley Estates 1880 tot Vanwyksvlei 1980*. Np: Vanwyksvlei Eeufeeskomitee.
- Mkwanzani, S. 2017. Teenage pregnancy in South Africa: Setting a new research agenda. *South African Review of Sociology*, 48(1):42–66. <http://dx.doi.org/10.1080/21528586.2016.1216801>.
- Möller, G.S.G. 1988. *Loeriesfontein (1860-1987)*. Loeriesfontein: Kerkraad van die Ned. Geref. Gemeente.
- Morris, D. 2018. Before the Anthropocene: human pasts in Karoo landscapes. *African Journal of Range & Forage Science*, 35(3&4):179–190. <http://dx.doi.org/10.2989/10220119.2018.1533584>.
- NACOSA. 2018. *The truth about teen pregnancy*. [Online]. <https://www.nacosa.org.za/2018/11/26/the-truth-about-teen-pregnancy/> [Accessed 5 November 2023].
- Nel, E, & Hill, T. 2008. Marginalisation and demographic change in the semi-arid Karoo, South Africa. *Journal of Arid Environments*, 72(12):264–274. <https://doi.org/10.1016/j.jaridenv.2008.07.015>.
- Northern Cape Provincial Treasury. 2018. *Socio-Economic Review and Outlook 2018*. Kimberley: Northern Cape Provincial Government.
- O'Regan, V. 2021. Schoolgirl births 'unacceptably high' in South Africa. *Daily Maverick*, 7 September 2021. [Online]. <https://www.dailymaverick.co.za/article/2021-09-07-schoolgirl-births-unacceptably-high-in-south-africa/>.
- Parkington, J., Morris, D. & de Prada-Samper, J.M. 2019. Elusive Identities: Karoo Xam Descendants and the Square Kilometre Array. *Journal of Southern African Studies*, 45(4):729–747. <http://dx.doi.org/10.1080/03057070.2019.1647655>.
- Penn, N.G. 1995. The Northern Cape Frontier, 1700–c.1815. PhD thesis. Cape Town: University of Cape Town.
- Schoeman, C. 2013. *The Historical Karoo: Traces of the Past in South Africa's Arid Interior*. Cape Town: Zebra Press.
- Statistics South Africa (StatsSA). 2012. Census 2011 Census in brief. Pretoria: Statistics South Africa.
- Statistics South Africa (StatsSA). 2018. Men, Women and Children: Findings from the Living Conditions Survey 2014/15. Pretoria: Statistics South Africa.
- Statistics South Africa (StatsSA). 2020. Statistical Release P0318: General Household Survey 2019. Pretoria: Statistics South Africa.

- The Water Wheel*. 2020. South Africa's first state dam is a memory of greener times. *The Water Wheel* September/October 2020. <https://www.wrc.org.za/mdocs-posts/water-wheel-september-october-2020/> [Accessed 20 September 2023]
- Vorster, J. 2019. Loeriesfontein: Socio-Economic Characteristics. Research Report. Stellenbosch: DST/NRF SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development, Department of Sociology and Social Anthropology, Stellenbosch University.
- Vorster, J. & Eigelaar-Meets, I. 2019. Sutherland: Socio-Economic Characteristics. Research Report. Stellenbosch: DST/NRF SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development, Department of Sociology and Social Anthropology, Stellenbosch University.
- Walker, C. 1990. The women's suffrage movement: The politics of gender, race and class. In: C. Walker (ed.). *Women and Gender in Southern Africa to 1945*. Cape Town: David Philip. 313–345.
- Walker, C. 2019. Cosmopolitan Karoo: Land, Space and Place in the Shadow of the Square Kilometre Array. *Journal of Southern African Studies*, 45(4):641–662. <http://dx.doi.org/10.1080/03057070.2019.1645493>.
- Walker, C., Chinigò, D. & Dubow, S. (eds). 2019. Karoo Futures: Astronomy in Place and Space. Special issue, *Journal of Southern African Studies*, 45(4):667–790. <https://doi.org/10.1080/03057070.2019.1654664>.
- Wegner, E. 2018. Local-Level Accountability in a Dominant Party System. *Government and opposition: An International Journal of Comparative Politics*. 53(1):51–75. <https://doi.org/10.1017/gov.2016.1>.
- Western Cape Government. 2018. *Teenage Pregnancy*. [Online]. <https://www.westerncape.gov.za/general-publication/teenage-pregnancy>. [Accessed 3 December 2020].

Chapter 5

Agrisyncretic knowledge production and applications among Namaqualand herders

Clement F. Cupido, William Ellis and M. Igshaan Samuels

In this chapter we explore what we are describing as the agrisyncretic knowledge system used by Nama herders in Namaqualand to manage the rangeland and their herds. The main aim of this chapter is to demonstrate that herding is a complex and multifaceted undertaking that relies on an array of knowledge systems to raise livestock successfully within these arid and semi-arid environments. Herders' comprehensive awareness of vital fodder species and their understanding of the grazing potential of landscapes are key to their pastoral practices. A further aim of the chapter is to show how the agrisyncretic knowledge utilised by Nama herders reflects a blend of indigenous and scientific knowledge systems, as well as what we term 'idiosyncratic' practices. Applying the concept of syncretism to this form of range management allows us to examine how herders have integrated ideas, theories, cosmologies, and practices from different knowledge systems within their pastoral practices. Through this approach, we provide novel insights into the adaptability and flexibility of pastoralism as it is currently practised in the former 'coloured' reserve areas of Namaqualand in the north-western Karoo.

Today the value of local pastoral knowledge is increasingly being appreciated, in part as a result of the upsurge in participatory research methods in the social sciences since the 1970s (Reed et al., 2007). Participatory research methods often show that pastoralists in Africa have developed comprehensive knowledge systems concerning their environment (Roba & Oba, 2008). In Namaqualand, certain aspects of their knowledge systems have recently been studied by 'outsider' researchers through the anthropological, ecological, and economic lenses of their respective disciplines. For example, the botanically rich landscapes of Namaqualand have attracted the attention of botanists and ecologists, resulting in a substantial list of peer-reviewed research publications, especially over the last 30 years (Hoffman et al., 2021, Hoffman & Petersen, Chapter Two). Similarly, anthropologists have documented the rich indigenous plant-use knowledge of the Nama people (Archer, 1994; Cohen, 2015; Nortje & Van Wyk, 2015; Wheat, 2014).

Since the early 2000s, researchers from the Agricultural Research Council (ARC) have also been studying rangeland management in the former 'coloured' reserves, in particular in the Leliefontein and Steinkopf communal rangelands (Figure 5.1). In developing this work, they have adopted a transdisciplinary approach to study the grazing routes used by herders, as well as their stockpost movements within the confines of the communal rangelands. They have also explored the different roles that herders fulfil in order to raise livestock and manage the rangeland (Samuels, 2006, 2013; Samuels et al., 2018).

This chapter is based on this work in Namaqualand. It provides a brief history of pastoralism in the Karoo, as well as an introduction to agrisyncretic knowledge production. This is followed by a discussion of who the Namaqualand herders are, and then a section that focuses on the agrisyncretic knowledge production approaches used in the herding practices of current Namaqualand herders.

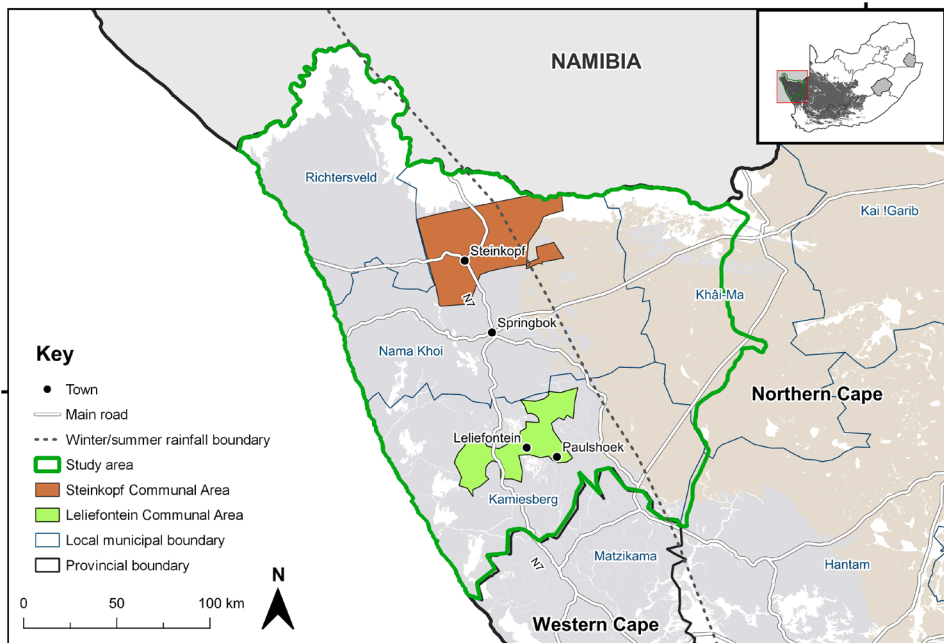


Figure 5.1 Steinkopf and Leliefontein communal areas, showing the Namaqualand study area

A brief history of pastoralism in the Karoo

The first specialised groups of pastoralists in Africa appeared in the southern part of present-day Kenya approximately 3 000 years ago (Marchant et al., 2018; Marshall, 1990). About a thousand years later, there is evidence of Bantu and Khoekhoe milch pastoralists in southern Africa (Elphick, 1985; Kinahan, 2019). Archaeological and historical accounts indicate that by the mid-seventeenth century, when European settlers first established themselves at the Dutch East India Company (DEIC) settlement at present-day Cape Town, Khoekhoe pastoralists and their livestock kraals were located throughout much of the western half of South Africa (Kinahan, 2019; Lander & Russell, 2018; Sadr 1998, 2013). The lands along the west coast, stretching across the Gariiep River, were inhabited specifically by Nama-speaking herders and San hunter-gatherers (Raper & Boucher, 2004).

These pastoralists utilised a transhumance strategy in which they moved with their fat-tailed sheep breeds and cattle over relatively large distances to access grazing and water resources to sustain their animals (Hoffman & Rohde, 2007). Khoekhoe movement into the present-day Western Cape reflected this transhumance strategy and allowed them to move between the narrow band of winter-rainfall land in the south-west corner of the Cape and the summer-rainfall regions of the Karoo to secure access to good grazing throughout the year (Russel, 2020) (see Figure 5.1 above).

The decision-making processes of Khoekhoe herders, as well as their livestock and rangeland management practices have not been well documented in the historical record. One can deduce, however, that a large pool of knowledge about the local ecology and domestic livestock management would have been essential for them to sustain the large numbers of livestock that were involved in their trade with the DEIC at Cape Town during the early years of colonialism. Indigenous knowledge to manage livestock and rangelands was undoubtedly accumulated through experiential learning and passed on to the next generation.

As a result of the intrusion of European livestock farmers into the interior of southern Africa in the eighteenth century, many Khoekhoe pastoralists, as well as surviving San hunter-gatherers, were forced to seek refuge in smaller pockets of land that, in the nineteenth century, were declared as mission stations by the British government of the Cape Colony. (On this history see also Marcatelli, Chapter Three; Walker & Vorster, Chapter Four.) Subsequently, in 1909, just prior to the declaration of the Union of South Africa in 1910, the Cape government passed the Mission Stations and Communal Reserves Act 29 to define the boundaries of these reserves, as well as to improve the management and control of resources within these areas (Carstens, 1966; Samuels et al., 2021). Act 29 was applicable in six communal reserves in Namaqualand and accounted for about 1.2 million

hectares. These reserves formed the basis of the communal areas that persisted throughout the twentieth century and even into the post-apartheid era, when new tenure and ownership models were introduced. Presently, pastoralists also have access to additional state land and land acquired through the Provision of Land and Assistance Act (Act 126 of 1993), which means that they are able to graze their animals on 1.8 million hectares of communal rangeland in Namaqualand.

The combination of land dispossession, changes in land tenure systems, and shifting economic ideologies and government policies in the eighteenth and nineteenth centuries especially, meant that the traditional lifestyles, culture, and language of the Khoekhoen were undermined, and in some mission stations, practically destroyed. Transhumance was abandoned or largely restricted to areas within the boundaries of the mission stations (Hoffman & Rohde, 2007; Samuels, 2013). German, British, and Dutch missionary societies established schools in the communal reserves, not only to educate, but also to sedentarise the semi-nomadic, Nama pastoralists. New agricultural practices, such as the cultivation of crops, were also introduced, which local people then incorporated into their adapted form of livestock farming. Such practices kept them in closer proximity to the local church and school around which settlements such as Leliefontein and Steinkopf grew (Samuels et al., 2021).

During this period, the Karoo also became increasingly populated by *trekboers* (semi-nomadic, colonial livestock farmers) who initially utilised similar transhumance practices as those of the indigenous Khoekhoen (Penn, 1986). As exclusive rights to parcels of grazing land (leading to private ownership) were enforced under colonial rule, new grazing systems evolved. These were developed further by the introduction of technologies, such as permanent livestock water points fed by boreholes and by fencing (Archer, 2000). Herders of Khoekhoe descent were also used as herders by the *trekboers* and by settled farmers on privately-owned farms to implement a livestock management system that utilised daily grazing routes and the kraaling of animals at night.

The application of inappropriate grazing systems by settled livestock farmers, often with stocking rates above the carrying capacity of the area, resulted in the gradual degradation of Karoo rangelands. In the first part of the twentieth century, the national government established bodies such as the Drought Investigation Commission (Du Toit, 1923), to understand the reasons for the degradation of the Karoo's natural capital. The herding and kraaling system was perceived by the agricultural scientist who led the Drought Investigation Commission in 1923 as the main reason for this degradation (Du Toit, 1923). Consequently, the kraaling system and use of herders with outlying stockposts were phased out on private farms and replaced by a combination of vermin-proof fencing, conservative stocking rates, and a system of rotational camp grazing around water points associated

with boreholes and windmills (Archer, 2000). Grazing systems such as the two-, three-, four- and five-camp systems involved relatively long grazing periods in large camps, at low stocking densities (Hoffman, 1988). To increase the resting periods of rangeland, other variations of rotational grazing, which used nine to 12 camps or eight camps for three groups of animals, were employed in the grassy eastern Karoo (Danckwerts & Teague, 1989). In the late 1980s, Savory (1988) proposed the high-intensity grazing system, which involves using a multi-camp system, with very short grazing and long resting periods, and the frequent rotation of large herds of animals, often with more than 1 000 animals per herd.

Over time, the adoption of rotational camp systems resulted in the demise of herding on privately owned farms in the Karoo. However, herding continued in the communal areas of Namaqualand. The debate over the most appropriate grazing system for the Karoo and other ecosystems across the world is ongoing (e.g., Briske et al., 2011; Kgosikoma et al., 2013), as there appears to be no conclusive benefit to primary and secondary productivity when adopting continuous or adaptive grazing management approaches to livestock production (Hawkins, 2017). Context and farming objectives are key considerations in deciding on the implementation of a specific grazing system. The role for herding is being reconsidered as a useful approach to farming in the Karoo (Schurch et al., 2021).

An unanticipated outcome of the mission stations and later the 'coloured' reserves, where Nama herders became spatially constrained, was that these areas became important sites for the integration of indigenous knowledge with knowledge systems derived from outside the region. It was here that undocumented indigenous knowledge around livestock management and plant use, which the Nama people had developed over centuries, survived. During our research in Namaqualand, we interacted with a large number of herders and documented several herding practices that could be considered the result of agrisyncretic knowledge production.

Agrisyncretic knowledge and pastoralism in Namaqualand

The term 'syncretic' is used in the social sciences to describe a fusion of beliefs, ideas, knowledge, rituals, and practices that produce novel systems or social groups (Greenfield & Droogers, 2003). 'Agrisyncretic' thus describes traditional farming systems in which farmers blend multiple ways of knowing and doing to produce a knowledge system and framework that is distinctive to their specific region. The resulting amalgam of knowing and doing allows for a system that remains open to new ways and can adjust to shifts in social, economic, cultural, political, and ecological conditions.

Syncretism is both a characteristic of social practices and an epistemological stance (Ascot, 2009). The term indicates a set of practices that are a blend of multiple elements (Greenfield & Droogers, 2003). This suggests that the syncretic is never static, and rarely does one knowledge system dominate. Instead, it borrows freely, granting credence to a variety of worldviews and practices. Syncretic practices are thus polyphonic, drawing in new voices, ideas, and beliefs to synthesise novel forms (Tateo & Marsico, 2014). Several fields of study have applied syncretism in their analyses. Although this approach has most commonly been found in religious studies (Shaw & Stewart, 1994), it has also proved useful for studying art, politics, culture, literature, and economics. We suggest that syncretism can easily be applied to agricultural systems as well, especially those found in parts of the world where 'traditional' or older forms of agriculture persist together with more advanced systems or 'ways of doing'. In analysing the elements that have fused to form the agrisyncretic in Namaqualand, three broad clusters have been identified: the indigenous, the scientific, and the idiosyncratic.

The indigenous elements comprise phenomena that have been in operation over a long time, spanning many generations. These elements can be described as cultural rudiments, encompassing beliefs, cosmologies and traditions that are often place-specific, operating at a spatial scale congruent with the locality of the particular ethnic group. In Namaqualand, indigenous framings influence group practices concerning land, exchange relations and slaughter rituals. Indigenous knowledge is also critically important for herders' understanding of ecology and for informing local livestock and rangeland management strategies.

With regard to the scientific elements of their agrisyncretic knowledge, communal livestock farmers have been drawn into scientific management strategies mainly through the state's agricultural extension services. An example is the recording of livestock data, which is applied to the setting of limits around stock numbers. Pastoralists also pay attention to findings from rangeland ecology, ethnoveterinary services, ethnobotany, and climate science. Examples of the influence of tools and practices informed by scientific research include feed, technology, and herd management practices. The efforts of agricultural extension work in promoting scientific knowledge extends to decisions around animal breeds, genetics, and animal health, including the treatment of livestock disease and the control of parasites. Scientific knowledge about the environment and livestock has also been passed on to Nama pastoralists by non-governmental organisations (NGOs) and by researchers themselves.

The third cluster of elements adding to the agrisyncretic comprises what we have described as idiosyncratic practices. These are practices that are based on individual or household experiences and are seen to offer the individual or household a perceived advantage in their farming undertakings. The idiosyncratic frame

thus includes innovative practices that specific herders develop in their lifetime. Here the material position of the herder can be a factor, with status and relative wealth influencing farming practices. Those with access to income are generally in a better position to invest and innovate than those with fewer resources. Often the latter have very basic living arrangements in the veld, usually with less access to feed and smaller herd sizes. As a result, their farming methods and rituals are likely to be less distinctive than those with more resources (Samuels et al., 2018).

The agrisyncretic practice of Karoo herders makes for a flexible, open, dynamic, and scalable form of pastoralism that has the potential to adapt to new contexts as a result of its dynamic socio-ecological environment. For this reason, we argue that agrisyncreticity allows pastoralism to be future adaptable. Future adaptability is a function of the openness of a system of practice, as it allows all future decisions about farming to be made based on whichever system best suits the livestock farmers. This weaving together of different elements gives it a unique character that is suited to both the local context and the diverse farming objectives of many pastoralists. Its adaptability allows herders to respond to changing socio-cultural and economic conditions, as well as to keep pace with climatic and ecological shifts. To ensure this flexibility in the face of changing environmental conditions, the system needs to remain open to new ideas, knowledge, and practices. An open epistemology would encourage herders to be resilient in the face of risks and shocks but also responsive to the need for innovation. What is critical about the agrisyncretic knowledge system is that it is scalable across both space and time, further adding to its potential adaptability in a changing world.

In the next section we briefly describe the modern-day herders of the region, before discussing in more detail how agrisyncretic knowledge is used in livestock production systems in Namaqualand.

Who are the herders of Namaqualand?

In Namaqualand, the two most comprehensive assessments of herders are those undertaken by Samuels (2006) in Leliefontein, and Michler et al. (2019) in the Richtersveld. These two studies examined the perceptions and agro-ecological knowledge of herders, outlined their herding strategies, and determined livestock grazing patterns. What they found was that a typical herder is usually male, over the age of 40, and someone who is often employed on behalf of an extended family.

Samuels' (2006) analysis of 20 individuals in Leliefontein showed that the age of full-time herders varied from 17 to 71 years, with a median age of 55. In the Richtersveld, herders had a median age of 46 years and ages ranged between 25 and 87 years, with only 23% aged 35 years or younger (Michler et al., 2019). Full-time female herders in Michler et al.'s (2019) Richtersveld study accounted for only

6% of all herders. In Samuels' (2006) Leliefontein study, there were no full-time female herders, although it was found that women do look after family herds on a temporary basis, for example, when their husbands have passed away and there are no male members of the family to look after the herd. Women also act as stand-in herders for short periods when the full-time male herder cannot fulfil his daily duties due to illness or commitments that take him away from the herd.

Herders sometimes own the entire herd they are managing, but ownership is usually shared between many individuals who are often members of the same extended family. A common occurrence is that herders are brought in from other regions in Namaqualand and employed to manage herds in a communal area other than their own. Herders have different herding experience depending on their age or whether they have previously left livestock farming to work in urban areas or in the mines. Usually after retrenchment or retirement, people from the communal areas return and continue herding (Wisborg & Rohde, 2005). Seventy-six per cent of households in Leliefontein owned livestock (Ogidan, 2014) and for some it was the only source of income, whereas in Paulshoek village, an earlier study suggested that livestock constituted on average only 4% of household income (Rohde et al., 2003). However, livestock-owning households do have a 34% higher income than non-livestock owning families (Rohde et al., 2003).

It is not uncommon to find more than one herder per herd, mostly when the herd size is over 250 animals or during the lambing season [*amtya*], when goat kids born in the veld have to be carried to the stockpost. The herds that are managed vary in size from fewer than 10 animals to more than 1 500 sheep and goats. Cattle numbers in Namaqualand are relatively low compared to small stock. Perhaps because of this, cattle are not herded but are allowed to range freely, with owners checking on them on a weekly or fortnightly basis.

Herd composition depends on numerous factors, including herder preferences and health, herd management and marketing strategies, and rangeland condition, which, in turn, determines food type availability. Nama herders keep Boer goats almost exclusively, but their sheep are largely hybrids of six different breeds – Dorper, Damara, Afrikaner, Persian, Meatmaster and Swakara. A few farmers keep pure-bred Swakara sheep for their pelts, which are exported mainly to Europe.

Contact points for knowledge exchange: *Krymekaar* meetings and discussions with livestock owners

Herders typically live relatively solitary and isolated lives except during the lambing season, when extra labour is required to share the workload. Contact with the village and with places beyond the stockpost usually occurs only when the herder is on vacational leave, during weekly visits of the livestock owner, and with the other herders in the veld. These meetings at strategic locations, such as water points, are generally timed to take place during the hottest time of the day. They not only perform an important social function but also serve as opportunities to share information about herding conditions. In the dry season when animals need to drink frequently, these encounters happen daily. The communal sources of water in the semi-arid regions in the dry season makes such meetings unavoidable. Meetings between herders also occur after hours at one of the herder's stockpost, especially on evenings when the moon is full, for ease of visibility.

According to herders we have interviewed, the Afrikaans term *krymekaar* [to meet or get together with each other] is used to describe meetings involving two or more herders. Depending on the size of the rangeland and the spread of water points, we have observed between two and six herders gathering at the same water point at the same time (Figure 5.2). The kind of agriculturally related information that is shared includes weather predictions, the presence of predators, veld condition, the occurrence of poisonous plants, animal health and condition, and the outbreak of parasites or locusts. In our interaction with Nama herders, we have found these meetings to be friendly, relaxed and unstructured. The knowledge that is shared may come either from internal sources, based on local experiences and observations, or from external sources such as the radio, workshops, training courses or reading material, which often has a scientific basis. Reading material relating to agriculture is, however, a scarce commodity in Namaqualand's communal areas and not all herders have access to a radio.

The relationship that herders have towards their animals is also on display at the water point when the herders depart in different directions to their stockposts after watering their animals. The herds that are mixed together at the water point respond to each herder's call and depart in the same direction as their herder. The herder-animal relationship is such that any animals that become mixed with the 'wrong' herd at a *krymekaar* are returned to the correct herd at the next meeting.



Figure 5.2 Herder meeting at a water point in Steinkopf (Photograph: Clement Cupido)

Livestock owners are probably the primary source of information about the outside world for the herder when they bring food, water and tobacco supplies to the herder (typically about once a week). It is generally the livestock owner who attends information sessions such as workshops arranged by NGOs, and government institutions such as the Department of Agriculture or the ARC. Knowledge and the use of new technologies are shared at such workshops (Figure 5.3), which could impact the management strategy of herders. These weekly meetings also give herders the opportunity to provide feedback to the livestock owner on animal condition and matters regarding rangeland condition. In return, the livestock owner provides feedback about new knowledge acquired through such workshops and current news, as well as family and community matters.



Figure 5.3 A workshop with Steinkopf livestock keepers and herders, using a participatory Geographic Information System (GIS) approach (Photograph: Clement Cupido)

The *krymekaar* meetings described above, as well as the meetings between herders and livestock owners, provide the space that gives life to the agrisycretic production of knowledge, since this is where knowledge from the different epistemologies is shared. These meetings facilitate the agrisycretic practice that is so vital to the sustained practice of herding.

Agrisycretic knowledge production in herding practices

Schlecht et al. (2020) describe herding as a multifaceted occupation with the primary purpose of ensuring suitable nutrition for the flock by (1) directing livestock to nutritious grazing areas and water points, (2) preventing crop damage, (3) keeping different herds separate from each other, (4) caring for newborn animals, (5) milking lactating ewes, and (6) protecting the herd from predators and stock theft. This description captures herders' dependence on a diverse and collective knowledge

system to address all aspects of their occupation. To illustrate how agrisyncretic knowledge is used in herding practices in the communal areas of Namaqualand, in this section we discuss herder knowledge systems in three broad areas: (1) climate and weather, (2) ecology and veld utilisation, (3) livestock management.

Climate and weather: prediction and adaptation

Accurate weather forecasting at the local level is a key responsibility of herders that helps to protect the herd against the elements and determines important management decisions, such as when to move their stockpost. Chisadza et al. (2015) show that local indicators used at a household level in Zimbabwe were accurate in weather forecasting and predicting droughts when compared to meteorological forecasting. Increasingly, however, Nama pastoralists are vulnerable to the impact of climate change and seasonal shifts in rainfall. For example, in the Leliefontein communal area, the date for herders to move their livestock to the winter grazing areas has traditionally been set for 15 May or, in the absence of early rains, at least two weeks after the first good rainfall (Kamiesberg Municipality, 2019). Movement back to the summer grazing area has traditionally been around 15 November, after crops have been harvested. These dates have been used for decades, but with the impact of climate change and what herders see as seasonal shifts in rainfall (Ntombela, 2017), it has become difficult to keep to them. As a result, these movements are often shifted to a later date on an ad-hoc basis.

In Africa, pastoralists use local knowledge in forecasting the weather, drawing primarily on the observation of celestial bodies, atmospheric variables such as wind or cloud formation, and certain biological features (Balehegn et al., 2019). In Namaqualand, indigenous knowledge involving the waxing and waning of the moon (Table 5.1) is used to predict variations within the main seasons (i.e., sub-seasons) and seasonal cycles, such as the start of planting seasons. To predict weather, herders in Namaqualand also rely on observations of the activities and movement of tortoises, snakes, and termites (Ntombela, 2017).

At the same time, Nama herders take into consideration scientific evidence in the form of meteorological predictions and early warning systems broadcast through radio programming (Table 5.1). Consistent with the findings of Balehegn et al. (2019) in Ethiopia, Nama herders do not rely on solitary indicators from either indigenous or scientific knowledge systems, but, rather, on triangulating indicators from both, i.e., on agrisyncretic knowledge. While smartphone weather applications are commercially available, very few herders have access to cell phones or reliable cell phone reception. Most herders, therefore, rely on a combination of their local observations and forecasts from the South African Weather Services to predict the short- and long-term weather that is vital for their decision-making.

Table 5.1 below summarises the different ways in which herders in Namaqualand predict weather, as well as some of the adaptations that have emerged in response to prevailing climatic conditions in the region.

Table 5.1 Herder knowledge systems used in weather forecasting

Indigenous	Scientific	Idiosyncratic
<ul style="list-style-type: none"> • Shape of the moon to delimit specific sub-seasons, especially to determine planting times • Observation of cloud formations; cloud shape; activities of tortoises; snakes and termites; changes in wind direction and temperature; including the presence or absence of frost, to predict short-term weather conditions 	<ul style="list-style-type: none"> • South African Weather Service • Weather forecasts on radio and cell phone apps 	<p>Triangulation of more than one knowledge system to predict the weather and make seasonal forecasts</p>

Ecology and veld utilisation

Ecology is a specialised biological science that deals with the study of living organisms and their interactions with the abiotic environment. The field has applications in conservation biology and natural resource management, which includes rangeland management. Seid et al. (2016) argue that pastoralists can contribute to the improvement of biodiversity, the conservation of wildlife and their habitats, and increasing soil carbon through their management of herd mobility, the establishment of grazing reserves and the strategic use of fire to promote regrowth in the rangeland. This is because pastoralists tend to observe nature at different scales from ecologists and utilise indigenous knowledge at species level, as well as landscape level, to assess the condition of the land. This may include knowledge of plant distribution; the identification of important plant species; invasive plants; encroaching species; knowledge of wetlands; predator distribution and ecology; parasite life cycles; insects; climate; and soil erosion. Herders in Namaqualand, for example, make use of plant indicators including the dominance of certain unpalatable plants, such as *kraalbos* (*Aizoon africanum*), as an indicator of overstocking on a landscape level, and the presence of certain palatable species, such as *bietou* (*Tripteris sinuatum*), as indicators of productive veld.

With regard to taxonomy, numerous studies confirm that some pastoralists possess comprehensive local ecological knowledge that they develop over time and apply in their daily decision-making and rangeland management. For example, Mongolian herders classify pastures in terms of a suite of criteria, which includes the season in which plants are grazed, as well as the elevation and topography of

the pasture (Fernandez-Gimenez, 2000) (see also Berkes et al., 2003; Milcher et al., 2019). Samuels et al. (2016) show that in Namaqualand, herders plan grazing routes systematically, based on where the most palatable plants occur, and whether their livestock can access these resources. Directed herding, therefore, influences the forage species that livestock select, with herded animals grazing on a wider range of plant species than unherded animals (Samuels et al., 2016).

The botanical sciences have developed a complex, formal plant classification system, but the area-wide and local taxonomic system developed by Nama herders is equally complex. Herders identify plants through growth form, morphology and the colour of leaves and flowers, scent, toxicity, medicinal value, edibility for people, and palatability for livestock (Table 5.2; Samuels et al., 2018). However, while Nama herders have their own taxonomies based on indigenous frameworks, they also readily adopt scientific taxonomies. For instance, herders will refer to the Fabaceae family as *peulplante* (legumes), but will also use their own framework linked to Nama derived names, such as */eibie*, */ouroe* and */outsiamma* to classify plants (see Table 5.2 on page 137). Nama taxonomies are often not based on ecology, but, rather, on the benefits or disadvantages that the species hold for livestock. For example, some poisonous plants, including species of *Tylecodon* and *Cotyledon* in the family Crassulaceae, are often grouped and referred to as *krimpsiekplante*. This refers to the way in which the animal's muscles tighten and contract after they have eaten certain parts of these plants as a result of the toxic cardiac glycoside compounds contained therein. Furthermore, when it comes to the forage plants used by livestock, indigenous and scientific knowledge systems often overlap (see Table 5.2 on page 137). For example, herders who utilise the higher-lying areas of the Leliefontein communal area distinguish between 'sweet' and 'sour' veld. The former is regarded as more palatable, requiring little precipitation, and the latter as less palatable, with livestock requiring a supplementary salt lick or molasses to stimulate feeding. Several scientific veld management guidelines make a similar distinction between the quality of 'sweet' and 'sour' veld in the Karoo and Grassland biomes of South Africa and how it changes over altitudinal gradients and in different seasons (Tainton, 1999).

Palatability is a complex issue and herders' perceptions of the palatability of plants are derived from their experience and keen observations of plant-animal interactions over time. In a participatory ranking exercise with Nama herders from the Kamiesberg and Steinkopf regions, herders could group forage plants into unpalatable and palatable plants relatively easily. It was, however, challenging for them to rank these plants in terms of relative palatability, because of their complex understanding of palatability in terms of seasonality, rainfall, and specific characteristics of the soil. Herders also evaluate palatability in terms of the feeding preferences of different livestock species and breeds, and what they might need to fulfil their dietary requirements at different times of the year (Samuels et al., 2018) (see Figure 5.4 below).



Figure 5.4 Herders and livestock keepers from Leliefontein ranking and sorting plants according to their differences in palatability (Photograph: Melvin Swarts)

Cropping, which was first introduced into the region by missionaries to encourage settled farming, is often used to fill gaps in the availability of fodder but only during average to high rainfall years when a successful harvest is realised. Harvest failure, usually because of drought, can precipitate a fodder gap and can result in many animal deaths, unless emergency fodder supplies are provided by the state. Such failures, linked to climate change, are predicted to only increase in future. The prolonged and rare multi-year drought, which was experienced in Namaqualand between 2015 and 2021, for example, is thought to be a harbinger of things to come (Archer et al., 2022; Chikoore & Jury, 2021). Information from other farmers and agricultural extension officers is being used to select for more drought-tolerant fodder crops such as *Atriplex* spp. (saltbush) (Table 5.2). Scientific knowledge has also been incorporated into veld assessments, where research on indicator plants has been used to develop a three-tiered veld assessment method with the local communities of Leliefontein and Kharkams (ARC, 2015).

An example of idiosyncratic knowledge at work can be seen in the *Calobota sericea* (*fluitjiesbos*) project, in which the ARC has collaborated with individual members of the Leliefontein Development Cooperative. *C. sericea* is considered

an early pioneer on old cropping lands (Hoffman & Rhode, 2007) and has also been identified by participating herders as one of the most important fodder plants in the region. These herders sparked the development of the project, which aims to cultivate this indigenous and drought-tolerant plant on abandoned croplands to supply fodder to fill the summer fodder gap in Namaqualand. The role of herders interested in this project does not only reflect collaboration between indigenous and scientific knowledge, but also exhibits initiative and innovation on the part of the participants to improve animal production and better manage the veld.

Many Nama herders divide their grazing lands according to landscape features that distinguish among mountainous areas, lowland habitats, cultivated and fallow croplands, and riverine and wetland areas (Samuels et al., 2018). Herder knowledge about palatability, topography, land use and useful infrastructures are all used to create mental maps of the landscape, which in turn are used to direct livestock to grazing areas with the most nutritious forage. Herders have also participated in building scientific knowledge through the collection of rainfall data, the development of livestock census records, and participation in ecological studies where conservation-worthy plants and habitats, such as wetlands, have been mapped (Samuels et al., 2018).

Because of their keen observation of the abiotic and biotic components of the veld, together with their experiential learning, some herders are able to 'read the condition of the veld' and plan daily routes for their animals to follow. In 'reading' ecological features, they make connections between the terrain and plant distribution and are knowledgeable about plant phenology and the flowering time of palatable, unpalatable, and poisonous plants (Table 5.2). According to Meuret and Provenza (2015), herders in Europe use this kind of knowledge to steer their animals away from poisonous plant patches encountered during the day. These herders have also developed a grazing 'menu' whereby access to plants is sequenced during the day to boost the appetite and food intake of animals. The grazing menu as a livestock management strategy has also been studied among Namaqualand herders (Debeaudoin, 2001). The grazing circuits used by herders are often unique and incorporate an ecological understanding of the landscape with a spatially explicit assemblage of plants, which is individual to each herder. Herders often stay away from wetland areas in the winter when grazing livestock could cause severe trampling damage. However, they use these wetland areas as key resources in times of need during drier periods when the impact of animals on the habitats will be minimal. Table 5.2 below summarises herders' agrisyncretic knowledge generation as it relates to ecology and veld utilisation.

Table 5.2 Herder knowledge systems used in taxonomy, pasture management and in the ecological understanding of plants and landscapes

	Indigenous	Scientific	Idiosyncratic
Taxonomy	Local and area-wide taxonomy based on plant traits, growth forms, palatability and species significance, often with names derived from Nama; for example, / <i>eibie</i> (the name used in Steinkopf and / <i>ibbie</i> (Leliefontein) refers to a group of non-succulent shrubs, particularly <i>Eriocephalus</i> spp. but may also include other non-succulent shrubs; / <i>ouroe</i> refers to leaf succulents such as <i>Ruschia robusta</i> ; / <i>outsiamma</i> refers to <i>Cheiridopsis denticulata</i> or similar succulent species; / <i>abi/ai</i> refers to non-succulent, thorny shrubs, such as <i>Cliffortia</i> spp (Note: / is a dental click equivalent to the c in isiXhosa orthography.)	<ul style="list-style-type: none"> • Linnaean classification system (e.g. family, genus, species) • Species distinction also based on Decreaser and Increaser plants 	Complex classification based on individual herder's perception of ecological value, fodder value and sensitivity to grazing of plants
Pasture management	<ul style="list-style-type: none"> • Distinction between sweet and sour veld • Local and area-wide palatability rating 	<ul style="list-style-type: none"> • Distinction between sweet and sour veld • Forage crops (exotic pastures, e.g. lucerne, <i>Atriplex</i> spp.) • Grazing index values 	<ul style="list-style-type: none"> • Forage crop mixes • Cut-and-carry lucerne grown in local gardens • <i>Atriplex</i> hedges at stockposts • Collaborative <i>Calobota sericea</i> fodder project

	Indigenous	Scientific	Idiosyncratic
Ecology	Local grazing routes and menu based on: <ul style="list-style-type: none"> • forage and water availability • phenological stages of plants • grazing intensity of plants • occurrence of poisonous plants • traditional stockpost movements between rainfall regions to allow for rest 	Resting of paddocks based on: <ul style="list-style-type: none"> • grazing intensity • keystone species • indicator species Conservation of habitats based on: <ul style="list-style-type: none"> • keystone species • endemic species • farms in different biomes 	Using specific plant indicators to determine stockpost movements, grazing routes and resting sites based on individual herder's knowledge of these species from the areas which they and their family units have used, often for generations

Livestock management

Ethno-veterinarian care and predator management are two critically important components of livestock management in which herders draw on agrisyncretic knowledge.

Ethno-veterinarian care refers to the ability of herders to use different knowledge systems to treat livestock disease and to assist ewes giving birth during the lambing season. Livestock is exposed to a range of diseases, among them those caused by microbes (viruses, bacteria, fungi, protozoa), internal or external parasites, poisoning, dietary problems, malnutrition, metabolic disease, and cancers (Oberem, 2009). Livestock diseases that result in production losses and mortality are a major challenge for pastoralists, especially since government-supported animal health services have declined in recent decades (Brown et al., 2013). Frequent drought can exacerbate the impact of disease, with drought-induced malnourishment in animals rendering them more susceptible to infections and weakening their ability to recover from diseases. Herders from Leliefontein and Steinkopf have also reported an increase in tick numbers in drought years (Ntombela, 2017).

Indigenous remedies for livestock diseases in South Africa use mainly plant-based products (Table 5.3). However, Brown et al. (2013) have pointed out the limitations of this knowledge in controlling tick populations, which is a key challenge for livestock owners across the continent. In Namaqualand, herders have used indigenous plants to remedy livestock illnesses for centuries, with the Kamiesberg

region in particular, regarded as a key centre of Nama ethno-medical information. Wheat (2014) found that herders in Paulshoek village treat illnesses such as diarrhoea, gall sickness, heartwater, coughing and helminth infestation with plant remedies. For example, leaf sap of *Aloe microstigma* (*bitteralwyn*) is used to treat internal and external parasites, and roots of *Antizoma miersiana* (*bloubos*) are used to treat cardiac glycosides (Nortje, 2011). While these ethno-medicinal treatments, based on indigenous knowledge, are regularly administered to sick animals, some herders also use scientifically formulated pharmaceutical inoculants and other commercial products, especially when new diseases break out (Wheat, 2014). However, herders often revert to traditional remedies when commercial products are unavailable or are seen as too expensive.

Producing livestock remedies is considered a specialised skill within the local community. In many instances certain individuals use specific household practices in concocting remedies and become advisors for the rest of the herding community (see Figure 5.5). In some cases, the choice of plants may have a spiritual dimension, in which the herder or healer is guided towards a particular plant or combination of plants. In many cultures, plant knowledge is considered or experienced as being intuitive and healers typically report that they know, feel or even dream about plant uses (Sobiecki, 2012). This knowledge can also be the result of trial-and-error experimentation over generations.

The lambing and kidding (parturition) season is usually a most challenging time for Nama herders, and depending on herd size, they often need an assistant during this period. The period is particularly challenging for goat herders as newborn kids are not able to walk and need to be carried back to the stockpost. In Namaqualand, the season normally runs from March to June each year, coinciding with the start of the winter rainfall season, which provides new growth in the rangeland. Timing of the parturition season is crucial since herders need to consider the drop in temperatures that could be fatal for newborns. Hinch and Brien (2014) indicated that over 70% of lambs die within the first three days of being born, with between 20 and 30% of lambs dying before they are weaned. Dystocia (difficult birth) is a significant contributor to such deaths, and it is one of the key responsibilities of herders to assist during difficult births to reduce mortality.



Figure 5.5 Livestock owner administering a homemade remedy to a Boer goat (Photograph: Clement Cupido)

The main predators in Namaqualand are jackal, caracal and occasionally leopard. Predation by baboon is less common compared to the threat they pose in certain areas of the Nama Karoo (Kerley et al., 2018). In Namaqualand, herders make use of traditional methods of kraaling at night, with the herder sleeping in close proximity to these kraals. Kraals built out of rocks (*klipkraals*) that are over a hundred years' old can still be observed in the Tankwa National Park, while similar structures are still sometimes utilised as kraaling sites in the Kamiesberg and Richtersveld. These *klipkraals* were strategically placed near rocky areas to protect livestock from the wind and to minimise the attack zone of predators. Further evidence of agrisyncretic practices is provided by the observation that Namaqualand herders today mostly make use of jackal-proof fencing for their kraals because they offer greater security and are also easily relocated.

In the United States of America, it is estimated that predators account for some 39% of all sheep mortality annually, leading to total losses of around USD20.5 million in 2010 (US Department of Agriculture, 2010). In South Africa, predation, primarily by black-backed jackal and caracal, has been estimated to account for losses of between ZAR1 and ZAR2 billion per annum (Predation Management Forum, 2016;

Van Niekerk, 2010). In the communal areas of Namaqualand, however, livestock losses as a result of predation appear to be relatively low. According to a study by Lutchminarayan (2014), from the village of Paulshoek in Namaqualand, an average of only 3.1% of goats and 5.4% of sheep were lost annually to predators over the 15 years between 1998 and 2013. This compares very favourably with livestock losses of between 6 and 13% for sheep and goats on commercial farms in the primary livestock producing provinces of South Africa (Van Niekerk, 2010). The relatively low loss of animals under herding conditions is in line with what has been found in other countries where herding is practised, e.g., Nepal: 2.6 to 5% (Oli et al., 1994); Bhutan: 2.3% (Wanga & MacDonald, 2006); Ethiopia: 1.4% (Atickem et al., 2010), and Romania: under 1% (Mertens & Anghel, 2000). Herding is one of the oldest ways to drive away potential predators during the day, with research showing that the human presence disrupts the behaviour patterns of predators (Linnell et al., 1996).

Dogs have long been a key part of pastoralism in Namaqualand, although little is known of the first appearance and breed of dogs in precolonial times. The earliest mention in written sources of the dogs that accompanied San communities comes from 1497, in an account by the Portuguese mariner Vasco Da Gama (Boonzaier et al., 1996). Later documents from the DEIC period describe the dogs as medium-frame, short-haired, and long-muzzled (Mitchell, 2014), quite similar to the landrace breeds accompanying herders in Namaqualand today (Figure 5.6). These landrace dogs are more than just company for the herder and play an essential role in keeping predators away from the herd. Herders can be accompanied by between one to six dogs. These small-framed dogs are well adapted to hot climates and can be maintained at little cost.

SANParks, the South African National Parks agency, introduced the Anatolian Dog Livestock Guarding Project in 2006, in an attempt to assist Kamiesberg herders in protecting their livestock from predators. Anatolian dogs, originally from Turkey, have a good reputation for their ability to protect livestock from potential predators. While they are good protectors of livestock, there are two main concerns. First, these dogs are expensive to maintain and eat considerably more than indigenous breeds. Secondly, because they are so fiercely protective of their herds, they can make it difficult for herders to meet up, for instance at water points. Anatolian dogs in the communal areas have also been known to kill the dogs that belong to other herders.

Herders also use sound deterrents such as the cracking of whips or shouting to drive away potential predators (Table 5.3 on page 143). An example of an idiosyncratic imitative around sound deterrents is the use of the *vuvuzela* (a long cheap plastic horn that was widely used at the 2010 FIFA World Cup by enthusiastic, cheering

fans), which are blown before the herder moves into ravines or mountainous areas where predators, especially caracal, may lurk (see Figure 5.6). Other commercially produced predator mitigation measures that are employed are non-lethal neck collars or bells to protect livestock from attacks.



Figure 5.6 A herder with landrace dogs, *kierie* [stick] and *vuvuzela* to protect livestock from predators (Photograph: Clement Cupido)

In their predator control strategies, herders rely mostly on their indigenous knowledge. They tend to adopt an approach of living with, rather than fighting against, natural elements such as predators in their environment. According to a local saying, '*Die jakkals is God se hond en hy moet ook eet*' [The jackal is God's dog and must also eat], which appears to be a creed that many Nama herders and livestock owners live by (Ellis et al., 2021). Over generations they have learnt to live with predators and allow them to take 'their portion'. Our work with herders and livestock owners in Namaqualand has revealed a completely different view of predators compared to the aggressive approach to predator control favoured by some commercial farmers outside the communal areas, in which predators are killed indiscriminately (on this, see Terblanche, Chapter Seven).

Table 5.3 below summarises the agrisyncretic knowledge systems that herders use in their livestock management practices.

Table 5.3 Herder knowledge systems in herd management

	Indigenous	Scientific	Idiosyncratic
Ethno-veterinarian	<ul style="list-style-type: none"> • Use of mainly plant-based remedies using indigenous plants • Indigenous specialist 	<ul style="list-style-type: none"> • Use of pharmaceuticals • Veterinary services • Inoculations 	<ul style="list-style-type: none"> • Novel and innovative blend of treatment regimes
	<ul style="list-style-type: none"> • Adoption of lambs • Lamb care • Milking, sheltering 	<ul style="list-style-type: none"> • Formula feeding of lambs • Genetic trait selection for healthier offspring 	<ul style="list-style-type: none"> • Unique nursing methods and sheltering developed by individual herder
Predator control	<ul style="list-style-type: none"> • Herding • Kraaling, whips, avoidance, fire • Use of indigenous, mixed-breed dogs 	<ul style="list-style-type: none"> • Trained herding dogs • Not killing jackals indiscriminately • Evidence-based management of predators 	<ul style="list-style-type: none"> • Alternative horn instruments • Anatolian dog alone with herd

Conclusion

Maintaining the pastoral lifestyle of Nama herders in the communal lands of South Africa’s former ‘coloured’ reserves, with their history of land dispossession by settlers as well as acculturation, has required the integration of both indigenous and scientific knowledge systems in the approach to livestock production. Nama herders have a rich history, a large component of which remains unwritten, with indigenous knowledge handed down orally from one generation to the next. The adoption of modern scientific approaches has resulted in a dependency on commercially available products in order to promote agricultural ‘advancement’. In navigating between two contrasting worlds herders have had to make sense of their own practices and come to see the benefits of both knowledge systems in advancing their livelihood strategies in impoverished and demanding circumstances. In utilising these different knowledge systems, they have created a unique agrisyncretic blend of approaches, one which is often misunderstood by the more commercially oriented institutions that drive policies aimed at promoting what they regard as better agricultural practices.

Our observation is that there is a general perception amongst commercial farmers and others in the agricultural education training sphere that herding is an occupation that does not require knowledge and skill, with herders seen as doing little more than walking absentmindedly behind their flocks. The Afrikaans term for herder, *veewagter*, loosely translates to mean someone who is merely a 'livestock guard'. However, this term does not acknowledge or recognise the knowledge, skillset and physical fitness required to fulfil this occupation.

In this chapter, we have shown how herders in Namaqualand have adopted, adapted and co-produced knowledge over the years, drawing from a range of sources to develop an agrisyncretic system of herding that is extremely well adapted to their environment. The ability of Namaqualand herders to draw on different knowledge systems has led to a unique knowledge base that has persisted despite many political, economic, and environmental challenges. Their knowledge system is complex and the diversity of elements that characterises it should be recognised by agricultural practitioners and researchers. Here we concur with Molnar et al. (2020) – that herding as a form of knowledge production connects the social, economic, and natural sciences as they relate to livestock production. This knowledge pool should be used by herding schools and agricultural colleges as a rich source of information about livestock management in South Africa's semi-arid areas, with herders themselves important disseminators of this knowledge.

In the midst of a changing climate, livestock farmers need to adapt their management practices quickly in order to survive prolonged droughts. The ability of Nama herders to blend knowledge systems in ways that are distinctive to the region gives them important advantages in becoming future adaptable and, potentially, offering solutions to the many challenges of agrarian change, especially in the drylands of South Africa. Given the value that herding provides in terms of knowledge creation, we would recommend that herding be considered more seriously in the development of policies concerned with the management of rangelands in variable environments such as the Karoo.

References

- Agricultural Research Council (ARC). 2015. *Handleiding vir renosterveld monitering op plaaslike vlak in die Kamiesberg Hoogland – 'n integrasie van plaalike en wetenskaplike kennis*. Unpublished report. Cape Town: Agricultural Research Council.
- Archer, E., Du Toit, J., Engelbrecht, C., Hoffman, M.T., Landman, W., Malherbe, J. & Stern, M. 2022. The 2015–19 multi year drought in the Eastern Cape, South Africa: it's evolution and impacts on agriculture. *Journal of Arid Environments*, 196:104–630. <https://doi.org/10.1016/j.jaridenv.2021.104630>.
- Archer, F.M. 1994. Ethnobotany of Namaqualand: The Richtersveld. MA thesis. Cape Town: University of Cape Town.
- Archer, S. 2000. Technology and Ecology in the Karoo: A Century of Windmills, Wire and Changing Farming Practice. *Journal of Southern African Studies*, 26(4):675–696. <https://doi.org/10.1080/03057070020008224>.
- Ascott, R. 2009. Syncretic Reality: Art, Process, and Potentiality. *Revista Digital de Tecnologias Cognitivas*, 2nd Edition. ISSN. 1984–3585. http://www4.pucsp.br/pos/tidd/teccogs/artigos/2009/edicao_2/1-syncretic_reality-art_process_potentiality-roy_ascott.pdf.
- Atickem, A., Williams, S. & Bekele, A., Thirgood, S. 2010. Livestock predation in the Bale Mountains, Ethiopia. *African Journal of Ecology*, 48(4): 079– 082. <http://dx.doi.org/10.1111/j.1365-2028.2010.01214.x>.
- Balehegn, M., Balehey, S., Fu, C. & Liang, W. 2019. Indigenous weather and climate forecasting knowledge among Afar pastoralists of north eastern Ethiopia: Role in adaptation to weather and climate variability. *Pastoralism: Research, Policy and Practice*, 9:8. <https://doi.org/10.1186/s13570-019-0143-y>.
- Berkes, F., Colding, J. & Folke, C. 2003. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge: Cambridge University Press.
- Boonzaier, E.C., Malherbe, C., Berens, P. & Smith, A. 1996. *Cape Herders: A History of the Khoikhoi of Southern Africa*. Cape Town: Clyson Printer.
- Briske, D.D., Sayre, N.F., Huntsinger, L., Fernandez-Gimenez, M., Budd, B. & Derner, J.D. 2011. Origin, Persistence, and Resolution of the Rotational Grazing Debate: Integrating Human Dimensions Into Rangeland Research. *Rangeland Ecology & Management*, 64(4):325–334. <https://doi.org/10.2111/REM-D-10-00084.1>.
- Brown, K., Ainslie, A. & Beinart, W. 2013. Animal disease and the limits of local knowledge: dealing with ticks and tick-borne diseases in South Africa. *The Journal of the Royal Anthropological Institute*, 19(2):319–337. <http://dx.doi.org/10.1111/1467-9655.12035>.
- Carstens, P. 1966. *The Social Structure of a Cape Coloured Reserve: A Study of Racial Integration and Segregation in South Africa*. Cape Town: Oxford University Press.
- Chikoore, H. & Jury, M.R. 2021. South African drought, deconstructed. *Weather and Climate Extremes*, 33:100–334. <http://dx.doi.org/10.1016/j.wace.2021.100334>.
- Chisadza, B., Tumbare, M.J., Nyabeze, W.R. & Nhapi, I. 2015. Linkages between local knowledge drought forecasting indicators and scientific drought forecasting parameters in the Limpopo River Basin in Southern Africa. *International Journal of Disaster Risk Reduction*, 12:226–233. <http://dx.doi.org/10.1016/j.ijdr.2015.01.007>.

- Cohen, J.B. 2015. Kruidokters, Plants and molecules: Relations of power, wind, and matter in Namaqualand. PhD thesis. Cape Town: University of Cape Town.
- Danckwerts, J.E. & Teague, W.R. 1989. *Veld management in the Eastern Cape*. Pretoria: Department of Agriculture and Water Supply.
- Debeaudoin, L.M.C. 2001. *Livestock farming practices in a communal rangeland, Leliefontein, Namaqualand*. MSc thesis. Bellville: University of the Western Cape.
- Du Toit, H.S. 1923. *Final report of the Drought Investigation Commission Report*. Cape Town: Government Printers.
- Ellis, W., Cupido, C. & Samuels, M.I. 2021. Walking with herders: following into the multispecies classroom. *Anthropology Southern Africa*, 44(2):50–63. <https://doi.org/10.1080/23323256.2021.1912615>.
- Elphick, R. 1985. Khoikhoi and the founding of white South Africa. *Journal of African History*, 28(2):330.
- Fernández-Giménez, M.E. 2000. The role of Mongolian nomadic pastoralists' ecological knowledge in rangeland management. *Ecological Applications*, 10(5):1 318–1 326. <http://dx.doi.org/10.2307/2641287>.
- Greenfield, S.M. & Droogers, A. 2003. Syncretic Processes and the Definition of New Religions. *Journal of Contemporary Religion*, 18(1):25–36. <http://dx.doi.org/10.1080/13537900305495>.
- Hawkins, H.J. 2017. A global assessment of holistic planned grazing compared with season-long, continuous grazing: meta-analysis findings. *African Journal of Range & Forage Science*, 34(2):65–75. <http://dx.doi.org/10.2989/10220119.2017.1358213>.
- Hinch, G. & Brien, F. 2014. Lamb survival in Australian flocks: a review. *Animal Production Science*, 54:656–666. <http://dx.doi.org/10.1071/AN13236>.
- Hoffman, M.T. 1988. Rationale for Karoo grazing systems: criticisms and research implications. *South African Journal of Science*, 84:556–559.
- Hoffman, M.T. & Rohde, R.F. 2007. From pastoralism to tourism: The historical impact of changing land use practices in Namaqualand. *Journal of Arid Environments*, 70:641–658. <https://doi.org/10.1016/j.jaridenv.2006.05.014>.
- Hoffman, M.T., Cowling, R.M., Petersen, H. & Walker, C. 2021. Karoo research update: Progress, gaps and threats. *South African Journal of Science*, 117(1/2): Article #8695. <http://dx.doi.org/10.17159/sajs.2021/8695>.
- Kamiesberg Municipality. 2019. *Leliefontein Communal Area Management Plan (draft)*. Garies: Kamiesberg Municipality.
- Kerley, G.I.H., Wilson, S.L. & Balfour, D. (eds). 2018. *Livestock Predation and its Management in South Africa: A Scientific Assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University.
- Kinahan, J. 2019. The Origins and Spread of Pastoralism in Southern Africa. *Oxford Research Encyclopedia, African History*. <https://doi.org/10.1093/acrefore%2F9780190277734.013.678>.
- Kgosikoma, O.E., Mojeremane, W. & Harvie, B.A. 2013. Grazing management systems and their effects on savannah ecosystem dynamics: A review. *Journal of Ecology and the Natural Environment*, 5(6):88–94. <http://dx.doi.org/10.5897/JENE2013.0364>.
- Lander, F. & Russell, T. 2018. The archaeological evidence for the appearance of pastoralism and farming in southern Africa. *PLoS ONE*, 13(6): e0198941. <http://dx.doi.org/10.1371/journal.pone.0198941>.

- Linnell, J.D.C., Smith, M.E., Odden, J., Kaczensky, P. & Swenson, J.E. 1996. Strategies for the Reduction of Carnivore - Livestock Conflicts: A Review. *Norwegian Institute for Nature Research Oppdragsmelding*, 443:1–116. https://www.researchgate.net/publication/242723678_Strategies_for_the_Reduction_of_Carnivore_-_Livestock_Conflicts_A_Review.
- Lutchminarayan, K. 2014. Predation impacts on livestock in a communal area of Namaqualand, Northern Cape, South Africa. BSc (Hons) thesis. Cape Town: University of Cape Town.
- Marchant, R., Richer, S., Boles, O.J.C., Capitani, C., Mustaphi, C.J., Lane, P.J., Prendergast, M.E., Stump, D., De Cort, G., Kaplan, J.O., Phelps, L., Kay, A.U., Olago, D.O., Petek, N., Platts, P.J., Punwong, P., Widgren, M., Wynne-Jones, S., Ferro-Vázquez, C., Benard, J., Boivin, N.L., Crowther, A., Cuni-Sanchez, A., Deere, N.J., Ekblom, A., Farmer, J., Finch, J.M., Fuller, D.Q., Gaillard-Lemdale, M.-J., Gillson, L., Githumbi, E.N., Kabora, T., Kariuki, R., Kinyanjui, R.N., Kyazike, E., Lang, C., Lejju, J., Morrison, K.D., Muiruri, V.M., Mumbi, C., Muthoni, R., Muzuka, A., Ndiema, E., Kabonyi Nzabandora, C., Onjala, I., Pas Schrijver, A., Rucina, S.M., Shoemaker, A.C., Thornton-Barnett, S., van der Plas, G., Watson, E.E., Williamson, D. & Wright, D.K. 2018. Drivers and trajectories of land cover change in East Africa: Human and environmental interactions from 6000 years ago to present. *Earth-Science Reviews*, 178:322–378. <https://doi.org/10.1016/j.earscirev.2017.12.010>.
- Marshall, F. 1990. Origins of Specialized Pastoral Production in East Africa. *American Anthropologist*, 92(4):873–894. <http://dx.doi.org/10.1525/aa.1990.92.4.02a00020>.
- Mertens, A. & Anghel, C. 2000. Livestock predation, in *Carpathian Large Carnivore Project, Annual Report 2000*. HACO International Publication.
- Meuret, A. & Provenza, B. 2015. How French shepherds create meal sequences to stimulate intake and optimise use of forage diversity on rangeland. *Animal Production Science*, 55:309–318. <http://dx.doi.org/10.1071/AN14415>.
- Michler, L., Treydte, A., Hayat, H. & Lemke, S. 2019. Marginalised herders: Social dynamics and natural resource use in the fragile environment of the Richtersveld National Park, South Africa. *Environmental Development*, 29:29–43. <https://doi.org/10.1016/j.envdev.2018.12.001>.
- Mitchell, P. 2014. The canine connection II: dogs and southern African herders. *Southern African Humanities*, 26:1–19. <https://hdl.handle.net/10520/EJC158003>.
- Molnár, Z., Kelemen, A., Kun, R., Máté, J., Sáfián, L., Provenza, F., Díaz, S., Barani, H., Biró, M., Máté, A. & Vadász, C. 2020. Knowledge co-production with traditional herders on cattle grazing behaviour for better management of species-rich grasslands. *Journal of Applied Ecology*, 57:1 677–1 687. <http://dx.doi.org/10.1111/1365-2664.13664>.
- Nortje, J.M. 2011. Medicinal ethnobotany of the Kamiesberg, Namaqualand, Northern Cape Province, South Africa. MSc thesis. Johannesburg: University of Johannesburg.
- Nortje, J.M. & van Wyk, B.E. 2015. Medicinal plants of the Kamiesberg, Namaqualand, South Africa. *Journal of Ethnopharmacology*, 171:205–22. <http://dx.doi.org/10.1016/j.jep.2015.04.049>.
- Ntombela, K.P. 2017. Assessing livestock farmers' ecological knowledge and adaptation to climate and environmental change in arid regions of South Africa. MSc thesis. Bellville: University of the Western Cape.
- Oberem, P. 2009. *Diseases and parasites of cattle, sheep and goats in South Africa*. Pretoria: Afrivet Business Management.

- Ogidan, O.O. 2014. Valuing the natural resources and ecosystem services of Leliefontein communal rangeland in Namaqualand, South Africa. MSc thesis. Bellville: University of the Western Cape.
- Oli, M.K., Taylor, I.R. & Rogers, M.E. 1994. Snow leopard *Panthera uncia* predation of livestock: An assessment of local perceptions in the Annapurna Conservation Area, Nepal. *Biological Conservation*, 68:63–68. [http://dx.doi.org/10.1016/0006-3207\(94\)90547-9](http://dx.doi.org/10.1016/0006-3207(94)90547-9).
- Penn, N.G. 1986. Pastoralists and Pastoralism in the Northern Cape Frontier Zone during the Eighteenth Century. *Prehistoric Pastoralism in South Africa: Goodwin Series*, 5:62–68. <https://doi.org/10.2307/3858148>.
- Predation Management Forum. 2016. *Predation Management Manual: The farmer's one-stop guide to identifying and managing predators*. Pretoria: Agri Connect (Pty) Ltd.
- Raper, P.E. & Boucher, M. 2004. *Robert Jacob Gordon: Cape Travels, 1777 to 1786*. Johannesburg: Brenthurst Press.
- Reed, M.S., Dugill, A.J. & Taylor, M.J. 2007. Integrating local and scientific knowledge for adaptation to land degradation: Kalahari rangeland management options. *Land Degradation and Development*, 18:249–268. <http://dx.doi.org/10.1002/ldr.777>.
- Roba, H.G., & Oba, G. 2008. Integration of herder knowledge and ecological methods for land degradation assessment around sedentary settlements in a sub-humid zone in Northern Kenya. *International Journal of Sustainable Development and World Ecology*, 15:251–264. <http://dx.doi.org/10.3843/SusDev.15.3:8>.
- Rohde, R., Hoffman, T., & Allsopp, N. 2003. *Hanging on a wire: A historical and socio-economic study of Paulshoek village in the communal area of Leliefontein, Namaqualand*. Research Report No. 17, Programme for Land and Agrarian Studies (PLAAS). Bellville: University of the Western Cape.
- Russel, T. 2020. The role of the Cape's unique climatic boundaries in sustaining specialised pastoralists in southern Africa during the last 2000 years. *Azania: Archaeological Research in Africa*, 55(2):242–257. <http://dx.doi.org/10.1080/0067270X.2020.1757887>.
- Sadr, K. 1998. The First Herders at the Cape of Good Hope. *African Archaeological Review*, 15:101–32. <https://www.jstor.org/stable/25130648>.
- Sadr, K. 2013. A Short History of Early Herding in Southern Africa. In: M. Bollig, M. Schnegg & H. Wotzka (eds). *Pastoralism in Africa: Past, Present and Futures*. New York: Independent Publishers. 171–197. <https://doi.org/10.1515/9780857459091-009>.
- Samuels, M.I. 2006. Patterns of resource use by livestock during and after drought in a communal rangeland in Namaqualand. MSc thesis. Bellville: University of the Western Cape.
- Samuels, M.I. 2013. Pastoral mobility in a variable and spatially constrained South African environment. PhD thesis. Cape Town: University of Cape Town.
- Samuels, M.I., Cupido, C.F., Swarts, M.B., Palmer, A.R. & Pause, J.W. 2016. Feeding ecology of four livestock species under different management in a semi-arid pastoral system in South Africa. *African Journal of Range & Forage Science*, 33(1):1–9. <http://dx.doi.org/10.2989/10220119.2015.1029972>.

- Samuels, M.I., Swarts, M.B., Schroeder, A., Ntombela, K.P. & Cupido, C.F. 2018. Through the lens of a herder: Insights into landscape ethno-ecological knowledge on rangelands in Namaqualand. *Anthropology Southern Africa*, 41(2):136–152. <https://doi.org/10.1080/23323256.2018.1462091>.
- Samuels, M.I., Allsopp, N. & Hoffman, M.T. 2021. Changes in pastoral mobility in a semi-arid montane region of South Africa: The role of policy and legislation. *African Journal of Range & Forage Science*, 38(1):1–13. <http://dx.doi.org/10.2989/10220119.2020.1861096>.
- Savory, A. 1988. *Holistic Resource Management*. Covelo: Island Press.
- Schlecht, E., Turner, M.D., Hülsebusch, C.G. & Buerkert, A. 2020. Managing Rangelands Without Herding? Insights From Africa and Beyond. *Frontiers in Sustainable Food Systems*, 4:549–954. <https://doi.org/10.3389/fsufs.2020.549954>.
- Schurch, M.P.E., McManus, J., Goets, S., Pardo, L.E., Gaynor, D., Samuels, I., Cupido, C., Couldridge, V. & Smuts, B. 2021. Wildlife-Friendly Livestock Management Promotes Mammalian Biodiversity Recovery on a Semi-Arid Karoo Farm in South Africa. *Frontiers in Conservation Science*, 2:652–415. <http://dx.doi.org/10.3389/fcosc.2021.652415>.
- Seid, M.A., Kuhn, N.J. & Fikre, T.Z. 2016. The role of pastoralism in regulating ecosystem services. *Revue Scientifique et Technique* (International Office of Epizootics), 35(2):435–444. <https://doi.org/10.20506/rst.35.2.2534>.
- Shaw, R. & Stewart, C. 1994. Introduction: Problematizing Syncretism. In: R. Shaw & C. Stewart (eds). *Syncretism/Anti-Syncretism: The Politics of Religious Synthesis*. London: Routledge. 1–24. https://doi.org/10.4324/9780203451090_Introduction.
- Sobiecki, J.F. 2012. Psychoactive Ubulawu Spiritual Medicines and Healing Dynamics in the Initiation Process of Southern Bantu Diviners. *Journal of Psychoactive Drugs*, 44(3):216–223. <http://dx.doi.org/10.1080/02791072.2012.703101>.
- Tainton, N.M. 1999. *Veld Management in South Africa*. Pietermaritzburg: University of Natal Press.
- Tateo, L. & Marsico, G. 2014. Open complementarity in cultural psychology. In: B. Wagoner, N. Chaudhary, & P. Hviid (eds). *Cultural Psychology and its Future: Complementarity in a New Key*. Charlotte: Information Age Publishers. 77–91.
- United States Department of Agriculture – National Agricultural Statistics Service. 2010. *Sheep and Goat's Death Loss*. Washington D.C. [Online]. <https://downloads.usda.library.cornell.edu/usda-esmis/files/hh63sv88v/mc87pt05z/jw827f62b/sgdl-05-27-2010.pdf> [Accessed 31 January 2023].
- Van Niekerk, H.N. 2010. The cost of predation on small livestock in South Africa by medium sized predators. MSc thesis. Bloemfontein: University of the Free State.
- Wanga, S.W. & MacDonald, D.W. 2006. Livestock predation by carnivores in Jigme Singye Wangchuck National Park, Bhutan. *Biological Conservation*, 129(4):559–565. <http://dx.doi.org/10.1016/j.biocon.2005.11.024>.
- Wheat, N. 2014. An ethnobotanical, phytochemical and metabolomics investigation of plants from the Paulshoek Communal Area, Namaqualand. PhD thesis. Cape Town: University of Cape Town.
- Wisborg, P. & Rohde, R. 2005. Contested land tenure reform in South Africa: Experiences from Namaqualand. *Development Southern Africa*, 22(3):409–428. <https://doi.org/10.1080/03768350500253260>.

Chapter 6

Beyond livestock farming: Game farming and sustainable development in the Ubuntu Local Municipality of the Northern Cape

Charmaine R.S. Manyani

Private landowners in South Africa have been legally allowed to utilise the wildlife on their farms commercially since the 1970s. These landowners have been credited with the significant growth of game farming (i.e., farming commercially with wildlife) since then. In the first two decades after South Africa's transition to democracy in 1994, game farming boomed, as evidenced by the massive escalation in the price of species, especially rare game species. For instance, in 2008 a sable bull sold at a game auction for a world-record price of ZAR3 million, but in 2012 this record was broken by another bull, which sold for ZAR12 million (Kriek, 2017; Thomas, 2017). In 2003, the total value of wildlife sold by Vleissentraal (a livestock marketing company) was ZAR62 million, while by 2013 the figure had jumped to ZAR864.5 million.⁶¹ After 2017, there was a downward trend in the price of wildlife, attributed to market principles of supply and demand, in a context of increased uncertainty within the sector as a result of drought, fears among investors about the direction of land reform in the country, and the impact of the COVID-19 pandemic on tourism.⁶² Nevertheless, game farming is now a well-established sector within commercial farming in South Africa, including in the Karoo.

The question arises as to whether it is a form of farming that can make a positive contribution to sustainable development in this semi-arid region. In this chapter, sustainable development is understood not simply in terms of aligning economic growth with biodiversity conservation but also in terms of social justice – the latter understood to include a land reform programme that addresses the starkly

61 www.vleissentraal.co.za/Auctions

62 Statistics obtained from African Wildlife Auctions (2020) indicate a decline of 21% in total revenue from game auctions between 2018 and 2019, from ZAR598 million in 2018, to ZAR472 million in 2019. By 2020, the decline had more than doubled to 59%, which was attributed mainly to the impact of the COVID-19 pandemic.

racialised inequalities in access to land that stem from South Africa's past and are particularly marked in the Karoo. Sustainable agriculture (discussed further below) similarly involves commitments not only to working with (not against) the environment but also to social justice. While the growth of the game farming industry measured in economic terms is not in doubt, there are debates within both the natural and the social sciences on whether the turn to game farming has had adverse environmental and social consequences, including the degradation of the environment and the erection of barriers to land reform in the name of conservation.

This chapter takes up these debates in the context of game farming in the Ubuntu Local Municipality of the Northern Cape. This part of the semi-arid Nama Karoo is known to be a very good area for extensive sheep farming, and commercial sheep farming has been the mainstay of the local economy since the latter half of the nineteenth century. The local municipality had a total population of 18 601 in the 2011 Census. Its municipal headquarters are in the small town of Victoria West, which is the biggest service centre in the area; other still smaller towns in the municipality are Loxton and Richmond and there are two tiny settlements at Merriman and the railway siding of Hutchinson (see Figure 6.1 below).



Figure 6.1 Ubuntu Local Municipality in the Nama Karoo

Almost all the farming land in the municipality is owned by white commercial farmers. Some black small-scale farmers are able to utilise municipal commonage land for grazing their livestock and there is one land reform project on a small farm by the name of Mardeck, some three kilometres north of Victoria West. Most commercial livestock farmers farm with both the merino breed of sheep (primarily for wool) and the dorper breed (for meat). Despite the apparent success of livestock farming, game farming has established itself in the municipality, with my research indicating that approximately 20% of commercial farmers are farming with game, although, as discussed further below, not necessarily exclusively so. Local game farmers are involved in all the sub-sectors of the industry, including hunting, ecotourism, live game sales and the production of game meat (the latter primarily in the form of biltong). Ecotourism and hunting are the main foci.

This chapter explores the views of both commercial and small-scale farmers in the municipality on the shift to game farming and its implications for sustainable development, drawing on fieldwork conducted between November 2016 and March 2019 towards a doctoral dissertation on this issue in this region (Manyani, 2020). While other sociological studies on the shift from livestock to game farming in South Africa have focused largely on the negative impact of game farming on farm workers and dwellers (see, for instance, Luck, 2005; Mkhize, 2012; Snijders, 2012; Brandt & Spierenburg, 2014), the particular contribution of this study lies in its focus on the motivations and aspirations of farmers themselves, operating at very different scales. This chapter thus provides a novel case study of game farming in a semi-arid area, one which has not been previously studied and where sustainable land and agrarian reform faces many challenges, not least drought.

The discussion unfolds as follows. The next section briefly reviews key debates on the credentials of game farming in South Africa. The second and third sections provide background information on the mixed-methods research design I developed for my case study and a profile of the farmers who participated in it. The fourth section explores farmers' views on game farming and its relationship to sustainable agriculture within this region. The concluding section reflects on the possible contribution a reconfigured sector could make to sustainable development within the Karoo region.

Key debates surrounding the switch from livestock to game farming in South Africa

The game farming industry has been mired in contentious debates about its economic, social, and environmental contribution to sustainable development, with studies across the social and natural sciences yielding varied findings on the subject. The debates in the academic, public and policy spheres hinge on whether

this land-use change presents meaningful opportunities for sustainable agriculture into the future or whether the industry's credentials as a positive force, with good future prospects, need to be reconsidered.

On the one hand, proponents (including Sims-Castley et al., 2005; Langholz & Kerley, 2006; Lindsey et al., 2013; Taylor, Lindsey & Davies-Mostert, 2016) argue both that the game farming industry in South Africa is doing very well and that it offers important conservation, economic and social benefits, provided it is practised responsibly. They point to the significant contribution the game farming sector is making to the economy through the creation of employment opportunities and the generation of foreign currency through both on-farm and off-farm activities and their multiplier effects. They argue that the game farming sector has been particularly successful in integrating its farming activities with the tourism industry, through the provision of lodges, many boasting a high-end 'safari' experience, as well as its linkages to local and regional tourism value chains (the supply of food, wine, travel, and recreational services, etc.) (Child, Musengezi, Parent & Child, 2012). Thus, a study by Van der Merwe, Saayman & Rossouw (2014) found that biltong hunters were contributing an estimated ZAR661.7 million, and trophy hunters an estimated ZAR34.3 million per annum to the Northern Cape economy. A study by Hoogendoorn, Meintjies, Kelso and Fitchett (2018), who located their research within the extensive conservation literature on rewilding, i.e. "returning a non-wild area back to the wild" (Corlett, 2016, in Hoogendoorn et al, 2018:2), also pointed to the economic and conservation benefits claimed by their sample of cattle farmers in Limpopo Province who had converted to game farming. At the same time, they noted the need for more research, including clarification around "the conceptual distinction between game farming and rewilding" (2018:5–6).⁶³

Proponents argue that game farming has contributed significantly to wildlife conservation, including through selective breeding projects that have resulted in an increase in rare and endangered species such as roan antelope, sable, and black rhino. Several studies (Bothma, 2002; Sims-Castley et al., 2005; Langholz & Kerley, 2006) have argued that game farming can be environmentally friendly if farmers ensure the sustainable utilisation of their natural resources. National wildlife associations such as Wildlife Ranching South Africa (WRSA) and the Professional Hunters' Association of South Africa vigorously defend the record of game farming by linking its contribution to habitat conservation and the protection of rare species with broader rural development goals. For instance, in 2010 Gert Dry, then WRSA president, argued at a multi-sectoral Green Economy Summit in Johannesburg:

63 I do not engage further with the extensive literature on rewilding but it is worth noting in relation to the issue of conceptual clarity raised by Hoogendoorn et al. that, as the discussion in this chapter shows, all my informants approached game farming as primarily about farming, not about restoring land to a former 'wild' state, while in the Karoo wildlife is generally being introduced onto already uncultivated 'natural' veld.

In South Africa's socio-political landscape, it is an undisputed reality that commercial wildlife ranching is about appropriate land-use and rural development; it is less about "animals per se", not a "white affluent issue", not a "conservation at all cost thing", it's about economical sustainability with a powerful "green footprint". It is a land-use option that is ecological[ly] appropriate, economical[ly] sustainable, political[ly] sensitive, but finally, socially just (Dry, 2010).

On the other hand, critics such as Mkhize (2012), Brandt (2013), Ngubane and Brooks (2013), Zulu (2015) and Zungu (2017) argue that the development of game farming has had adverse social impacts in the South African countryside, impacting particularly negatively on the livelihoods and security of tenure of farm dwellers and workers who are being displaced from the land as a result. This is because game farms are marketed as offering tourists an 'African safari' experience that is premised on the presentation of these farms as 'pristine' spaces of nature, which the presence of farm-worker communities would undermine. This has led to the emptying of game farms of many workers and their families who were previously living on these farms, often for generations, resulting in these communities losing not only their livelihoods but also their homes and sense of belonging. Furthermore, these critics argue, commitments to land redistribution are being set back, not just because farm dwellers are being denied their land rights but also because the state tends to regard game farms as off-limits for land redistribution purposes. This is because of the alleged contribution of these farms to conservation – a contribution its critics are calling into question. According to Welz (2017), opponents of the shift to game farming in commercial agriculture in South Africa characterise it as "doused in greenwash" when, in their view, it is deeply implicated in the dispossession of farm workers and farm dwellers and has shifted attention away from the imperatives of land reform.

From a social justice point of view, a related and equally contentious issue concerns the whiteness of the industry. Game farming, as is true of commercial farming in general, is dominated by white landowners, an outcome of the history of colonial dispossession and the racially discriminatory policies of the apartheid era in which white ownership over most of the land of South Africa was a central pillar. Zulu (2015) has pointed out that class, not simply race, is also an important consideration in game farming. The capital needed to run a successful game farming business is considerable, with the consequence that game farming is beyond the financial means not only of most black farmers but of many white commercial farmers as well, as my study confirmed. (The gendered nature of the industry, in terms of the overwhelming dominance of men, is less commonly remarked upon.) Nevertheless, game farming in South Africa is deeply racialised, which reinforces criticisms of the industry as complicit in safeguarding the status quo of white

domination of commercial farming, including by legitimising the presence of white farmers on the land in the role of nature conservationists (Ngubane & Brooks, 2013; Brandt & Spierenburg, 2014; Mkhize, 2014).

The land question in South Africa is widely regarded as a critical challenge facing the country (see, *inter alia*, Hendricks, Ntsebeza & Helliker, 2013; Aliber, 2015; Beinart & Delius, 2015; Walker & Cousins, 2015; Hall & Kepe, 2017). More than two decades after the country's transition to a democratic dispensation under a black-led government, there is broad consensus that the redistributive land reform programme envisaged in South Africa's 1996 Constitution is still urgently needed, although there is much less agreement on the scope and nature of such a programme, as well as the speed at which it needs to be implemented (Presidential Advisory Panel on Land Reform and Agriculture, 2019). As noted in other chapters in this volume, the extent of land dispossession in the Northern Cape Karoo historically was particularly extreme and contemporary land reform in this province is lagging, not so much in terms of the total hectareage that has been distributed, but in terms of the tiny proportion of land that is in black ownership (see Walker, 2018).

The Ubuntu Local Municipality is a case in point. According to information obtained from an official in the-then Department of Agriculture, Forestry and Fisheries (DAFF), commercial farming in the municipality covers an area of 1 711 771 hectares (DAFF official, 2017). This land is owned by an estimated 235 commercial farmers who thus average some 7 284 hectares of land each. Almost all local commercial farmers are white – certainly none of the commercial farmers in my survey sample was black. Mardeck, the one land reform farm in the municipality that I was able to identify in my study, is very small by commercial farm standards, at 365 hectares, and is shared by four farmers in a poorly organised Communal Property Association (on this see Manyani, 2020). A member of the Pixley ka Seme District Land Committee (DLC), whom I interviewed in 2017, highlighted that the committee was constrained by its inability to acquire land for small-scale farmers through the state's 'willing buyer-willing seller' land acquisition policy. He attributed the failure to the unwillingness of commercial farmers to sell their land and exorbitant land prices in instances where land was on the market (DLC member, 2017).

With regards to municipal commonage, the total extent of commonage land attached to the towns of Victoria West, Richmond and Loxton that is available for small-scale farming amounts to 26 275 hectares, i.e., less than 2% of the area allocated to large-scale commercial farming in the municipality. I was unable to get detailed information on the Richmond and Loxton commonages, but the Victoria West commonage is 6 946 ha in extent, with 28 farmers identified officially as users (Manyani, 2020:180) and more in practice.

Social scientists are not the only group critical of the conservation claims of game farming. Ecologists have also raised concerns that the rapid transformation of game farming into an intensive, profit-driven enterprise has eroded its conservation credentials. Although the game farming industry's contribution to the increase in selected wildlife species is not in question, ecologists have raised questions about the limitations of the industry with respect to the conservation of biodiversity more broadly. Critics such as Smith and Wilson (2002), Langholz and Kerley (2006), Cousins, Sadler and Evans (2010), Lindsey et al. (2013) have argued that several practices within the game farming industry are in conflict with conservation principles. These include selective breeding for recessive colour variations and quality traits like huge horns (for trophy hunting purposes), sometimes described as the breeding of 'freaks', as well as the introduction of extralimital species⁶⁴ onto game farms to boost wildlife tourism. Other concerns relate to the breeding of animals in captivity, which may result in inbreeding and the domestication of wild animals, and to unethical practices associated with 'canned' hunting (i.e., the hunting of animals in confined spaces, which means they have no chance of escaping from the hunter).⁶⁵

Research design

Sustainable agriculture

Conventional understandings of sustainable agriculture emphasise the need for farmers to respect the ecological foundations underlying agricultural systems, for instance the following definition from a 1990 Report of the United States House of Representatives, which defined sustainable agriculture thus:

...an integrated system of plant and animal production practices ... that will, over the long term: 1) satisfy human food and fiber needs; 2) enhance environmental quality and the natural resource base on which the agricultural economy depends; 3) make the most efficient use of non-renewable resources and on-farm resources ... ; 4) sustain the economic viability of farm operations; and (5) enhance the quality of life for farmers and society as a whole (Debertin & Pagoulatos (2015:7).

64 This refers to the introduction of species that were not previously found in a given geographical area, sometimes referred to as 'exotics'.

65 This concern began to be addressed in May 2021, when the South African government announced it was moving to outlaw the captive lion breeding industry and close facilities offering canned hunting and lion petting experiences (<https://news.mongabay.com/2021/05/south-africa-pulls-the-plug-on-controversial-captive-lion-industry/>).

My study worked with an understanding of sustainable agriculture in which its contribution to social justice is given greater prominence. It drew on a model of sustainable development developed by Holden, Linnerud and Banister (2016), who argue that at a societal level sustainable development involves the co-existence of three non-negotiable moral imperatives that span the economic, social, and ecological spheres. The three imperatives, which must all be met in tandem with one another, are 1) ensuring that basic human needs are met, 2) advancing social equity, and 3) respecting environmental limits to human activity. Understanding sustainable agriculture in terms of its contribution to a broader development agenda that advances all three imperatives is helpful, not only for assessing the sustainability credentials of game farming in the Karoo in the present, but also for considering its potential within a transformed agricultural sector in the future.

In applying these ideas to my investigation of game farming in the Ubuntu Local Municipality, I developed a mixed-methods research design to explore the issue from multiple perspectives. The primary data collection methods comprised an initial survey of commercial farmers in the municipality, which was followed by in-depth semi-structured interviews with 25 commercial farmers, 23 small-scale farmers and 12 key informants (including local officials and wildlife experts). I also carried out two focus group discussions with small-scale and so-called backyard farmers within the municipality.⁶⁶ The survey allowed for the creation of a general profile of commercial farmers, covering demographics, landownership patterns and farm histories as well as participants' views on game farming compared to livestock farming, while the qualitative methods facilitated an open-ended examination of issues that the individual participants themselves found important in our discussion. These data collection methods were supplemented by ongoing observation of local dynamics in the local municipality during my fieldwork.⁶⁷

After deploying a number of strategies to ensure that my survey sample was as representative as possible (see Manyani, 2020), I ended up with a total of 57 completed questionnaires; thus, a sample of approximately one in four commercial farmers in the municipality (given the estimated total of 235). The 57 farmers came from across the district. Forty-six described themselves as livestock farmers, while 11 ticked the game-farmer box on the questionnaire, thus indicating a roughly

66 Backyard farming involves the keeping of livestock by town dwellers who do not have formal access to grazing land and use their backyards as the base from which they farm, generally on a part-time basis (Manyani, 2020).

67 A limitation of the study is that it did not extend directly to farm workers and farm dwellers, both current and former. Their perspectives on working conditions and tenure security were thus not canvassed. Researcher access to farm workers independently of their employers is notoriously difficult (see for instance, Gastrow & Oppelt, 2019) and I was concerned not to jeopardise my research relationship with the farmers who were the primary focus of my study. I also did not consider interviews with workers under the supervision of their employers to be a productive use of my time.

80 : 20 percentage split between livestock and game farmers in the municipality. However, closer engagement with commercial farmers through my semi-structured interviews revealed that most game farmers still kept some livestock on their farms and, in the words of one affluent livestock farmer, “should not call themselves game farmers, rather they should refer to themselves as mixed farmers” (Jan, 2017).⁶⁸ A game farmer who described himself as “one of the more well-known game farmers around here” confirmed that he “maintained some ... livestock operations” – “As it stands, I can say my farm is about 70% game operation and 30% livestock” (Daan, 2017).

My survey thus established that despite the growing interest in game farming, small livestock farming with sheep still forms the backbone of the economy in the Ubuntu Local Municipality. However, although game farmers in the Ubuntu Local Municipality are a minority, they are not a negligible group in terms of their local standing and influence; they also represent a trend that may well become more pronounced in coming years. Furthermore, game farming is highly differentiated, and the industry as a whole extends beyond the individual farm gate to include a range of subsidiary activities and enterprises such as transport of game, taxidermy, auctions and the tourism sector. The diversified nature of the industry across all its sub-sectors needs to be borne in mind in evaluating the contribution of the industry to sustainable agriculture and its potential in terms of rural development in the Karoo more broadly. It points to the potential of game farming as one strand in a more diversified economy in the municipality, an issue which I return to in the concluding discussion.

Profile of farmers in the study area

The commercial farmers

All the commercial farmers in the study were white and male, and most were middle-aged or older, with only one of the survey respondents younger than 35 and approximately two-thirds (36 of the 57) older than 45 (Table 6.1). The profile of the game farmers was noticeably more youthful than that of the livestock farmers, with over half the game farmers (seven of the 11) younger than 46, compared to a little under a third of the livestock farmers (14 out of 46). These figures suggest that game farming in the municipality is associated with younger farmers who, because of their stage of life, may be more inclined to innovate and take risks than farmers who are moving towards the end of their careers.

68 All personal names attributed to interviewees are pseudonyms; those commenting in specific capacities are identified in terms of their institutional affiliation.

Table 6.1 **Distribution of commercial farmer respondents in Ubuntu Local Municipality by age and farm type**

Age Group	Livestock Farmers	Game Farmers	Total
35 and younger	0	1	1
36-45	14	6	20
46-55	17	3	20
56-65	11	1	12
65 and older	4	0	4
Total	46	11	57

The greater appetite for risk may also be associated with higher levels of education. Given the small number of game farmers in my survey, caution needs to be exercised in extrapolating too freely from the data. Nevertheless, as a group, the game farmers in the study were noticeably more highly qualified academically than the livestock farmers, with seven of the 11 game farmers holding a bachelor's degree or higher qualification, compared to just nine of the 46 livestock farmers (see Table 6.2 below). In general, I found that the younger farmers with an agriculture-related qualification were more open-minded about trying new methods of farming and venturing into diversifying their land uses, for instance through game farming or other farming activities, such as the growing of garlic as a cash crop.

Table 6.2 **Level of education of commercial farmer respondents in Ubuntu Local Municipality**

Education Level	Game farmers	Livestock farmers	Total
Matric or lower	1	15	16
National certificate/diploma after grade 9 (not agriculture-related)	2	4	6
National certificate/ diploma after grade 9 (agriculture-related)	1	16	17
Bachelor's degree (agriculture-related)	4	4	8
Bachelor's degree (not agriculture-related)	1	2	3
Post graduate qualification (agriculture-related)	1	2	3
Post graduate qualification (not agriculture-related)	1	1	2
No response	0	2	2
Total	11	46	57

The farmers I interviewed were generally positive about supplementing their hands-on experience and informally acquired farming knowledge by attending training workshops and farmer meetings aimed at facilitating the exchange of ideas. At the same time, the older farmers in particular emphasised the importance of the generational passing down of farming knowledge from parent to child (effectively, from father to son), including knowledge about the weather and variability in temperature, rainfall and wind patterns over time. To them this generational transmission of local knowledge was fundamental for understanding that “farming is not only about production; it is also about understanding the system in which you produce as a farmer,” in the words of game farmer Gert (2017).

In terms of landownership, all the commercial farms in my survey were privately owned, almost all of them (53 of the 57) registered to the individual farmer, with a further three owned by a family trust. Only one of the farms was owned by a private company. The breakdown between categories is shown in Table 6.3 below. This pattern of ownership is consistent with the strong presence of generational farming, which participants described as traditional in the area, with farm ownership passing to a younger male family member when a farmer retires (usually at around the age of 65) or dies. Generally, this would be the oldest son, who would have grown up on the farm and been groomed to take it over.

Table 6.3 Farm ownership among commercial farmer respondents in Ubuntu Local Municipality

Ownership type	Livestock farms	Game farms	Total
Private individual	43	10	53
Family trust	2	1	3
Private company/ partnership	1	0	1
Total	46	11	57

Most farmers consider themselves deeply rooted within the municipality in terms of their family history, not recent *inkommers* [incomers]. Sixty per cent (34) of the 57 ‘survey’ farms were acquired by the current owner’s family before 1970: five between 1891 and 1910, 13 between 1911 and 1950, and 16 between 1951 and 1970. A further 16 were acquired between 1971 and 1990, with the remaining seven acquired between 1991 and 2007 (Manyani, 2020: 131). Today, however, the children of commercial farmers are less likely to follow in their fathers’ footsteps and take over the family farm than was the norm in their fathers’ and grandfathers’ time. This means that if current trajectories are maintained, the racial profile of commercial farming in the municipality is likely to become progressively less white in coming years. Without state intervention, this is also likely to be accompanied by

a reduction in the number of family-owned farms in favour of corporate owners and an increased consolidation of farms.

The majority of farmers who remain committed to livestock over game farming cited a range of reasons for this preference. Three-quarters of them cited tradition as a strong incentive for staying in livestock farming, with two-thirds also noting the reputation of this part of the Karoo as excellent for sheep farming. However, there was general acknowledgement that a combination of pressures – economic, environmental, and political – was making game farming increasingly attractive for those with the financial resources to branch into it. These pressures, which are explored further below, included the increasing cost of farming, the ongoing drought and associated lack of state support, and the threat of land reform, linked to fears around land expropriation. Lack of state support extended to the local municipality, with a general feeling amongst the farmers that the local government was failing in its development mandate which they attributed to a mixture of corruption (the misappropriation of public funds), inefficiency and a lack of commitment by officials to perform better. The failure of the municipality to maintain district roads, which impacted negatively on farming activities, was a prominent complaint.

Farmers who had diversified their income portfolios to include game farming viewed having both game and livestock income streams as providing an important economic safety net – if one income stream was under pressure, they could fall back on the other. This was seen as especially important in times of environmental stress, such as that occasioned by the drought the region was experiencing when I carried out my fieldwork, with wildlife being seen as generally more resilient than livestock under drought conditions. As noted above, there were generational differences in attitudes towards game farming as an alternative source of income within this historically prominent livestock region. Although livestock farming has deep cultural roots in the municipality (among black and white residents), there is increased interest in game farming amongst the younger generation of (white) commercial farmers.

The small-scale farmers

The 23 small-scale farmers who participated in my study were a far more heterogeneous group than their commercial counterparts.⁶⁹ They comprised 13 livestock owners dependent on the municipal commonage attached to the town of Victoria West for grazing land, six so-called backyard farmers in Victoria West, i.e., livestock owners living in the town, with no access to grazing land other than that available on their small urban plots or on street verges and open spaces in the town, and four beneficiaries of the land reform project on the farm Mardeck.

69 Because these participants did not amount to a representative sample of small-scale farmers in the municipality, generalisations based on their aggregated data must be treated with caution, as indicative of general trends rather than being statistically valid.

What is important to recognise is that they are a differentiated group in terms of their aspirations as farmers. A few aspired to be full-time farmers but the majority regarded livestock farming as a part-time occupation – as noted by one backyard farmer in one of the focus group discussions, “Not all of us have an intention to be full-time large-scale farmers; however, some of us would love to have access to adequate land so we can farm part-time to supplement our incomes” (Speaker 3, 2017). Only one of the four farmers on the land reform farm considered himself a full-time farmer, while four of the 13 commonage farmers considered themselves to be farming full-time and none of the backyard farmers did. Understanding the different needs of part-time and full-time farmers is important for developing policies aimed at providing both groups with appropriate support.

A little under two-thirds of the sample identified themselves as ‘coloured’, all of them Afrikaans-speaking, and the remainder as black African, all of them with Xhosa as their first language but with many also fluent in Afrikaans. (This breakdown is roughly comparable to the 2011 Census data for the Ubuntu Local Municipality, in which people classified as ‘coloured’ constituted 70% of the population, and those classified as black some 21%.⁷⁰) Three-quarters of the small-scale farmer participants were male, while none of the 23 was younger than 35, and 16 of the 23 were older than 55. The bias against women is consistent with what has been found in other studies of small-scale farmers (Davenport, Shackleton & Gambiza, 2012). The age profile, with only two of the farmers falling in the 36–45 cohort (both commonage farmers), is also in line with broad national trends. Most of the farmers with whom I spoke indicated that there was a lack of interest in farming among the younger generation, but whether that will change as the current younger generation ages remains an open question.

Education levels were generally very low, as shown in Table 6.4 below. Eighteen of the respondents had not proceeded to high school, with eight of them having no formal education at all. Only four had a secondary education, while just one, a commonage farmer, had obtained a national certificate after matric, in a field unrelated to agriculture. According to a senior municipal official (2017), limited education acts as a barrier to small-scale farmers accessing vital agricultural information and improving their technological skills. A DAFF official I interviewed (2017) also noted that the age and education levels of small-scale farmers in the municipality create challenges for extension support as the farmers are set in their ways and resistant to considering new ways of farming.

70 http://www.statssa.gov.za/?page_id=993&id=ubuntu-municipality

Table 6.4 Education levels of small-scale farmers interviewed in Victoria West

Level of Education	Commonage (13)	Mardeck (4)	Backyard (6)	Total
No education	3	1	4	8
Primary Grade 1-7	6	2	2	10
Secondary Grade 8-12	3	1	0	4
National certificate after matric	1	0	0	1

The small-scale farmers interviewed expressed similar sentiments as the commercial livestock farmers regarding livestock farming being both well-suited to the area and a traditional and valued way of making a living – something with which they were familiar and considered worth pursuing. Unlike the commercial farmers, however, game farming was not something that they knew much about, and it was thus not an option they had considered. All the small-scale farmers interviewed regarded game farming as something beyond what they could imagine for themselves: it was a “white” endeavour. There was generally very little awareness about the extent of game farming locally, with commercial farmers seen for the most part as an undifferentiated group of privileged white people.

Small-scale farmers in the Ubuntu Local Municipality do not have access to the land, capital or skills required to branch out into game farming. Although a few of the younger, small-scale farmers indicated an interest in finding out more about game farming during our discussions, the general feeling was that the first priority was a land reform programme that worked for them as livestock farmers. Secure access to land, financial support and extension services were their major needs. If they could not farm successfully with livestock, how could they even consider game farming, given their lack of experience with it? Andrew, a commonage farmer, expressed it thus: “I’ve not even achieved my life-long dream of being a successful large-scale livestock farmer. How can I even dream of being a game farmer? It just seems impossible” (2017). A participant in one of my focus group discussions concurred: “First, the government must give us the land we were promised, then as farmers we have an opportunity to dream further from this commonage land” (Speaker 5, 2017).

This account of their needs echoes the findings of many other studies on the land question in South Africa (Aliber, 2015; Atkinson & Ingle, 2018; Beinart & Delius, 2015; Hall, 2015; Cousins, 2018). Of interest, however, is that in my discussions the issue of whether game farming is insulating commercial farmers land against land reform did not arise as a specific issue.

Game farming and sustainable agriculture in the Ubuntu Local Municipality

The following section reviews the commercial farmers' views on game farming in terms of my tripartite understanding of sustainable agriculture as a system of farming that is economically viable, respects the ecological foundations of agriculture, and contributes to social justice.

The economic dimensions of game farming

While game farming is embedded in economic, political, and social processes that have national dimensions, its relative attractiveness to commercial farmers is shaped by local conditions, among which the environment is a critical factor. As already noted, the continued commitment to livestock farming in the Ubuntu Local Municipality reflects the extent to which the area is recognised as excellent for livestock farming, with a history of successful sheep farming at scale that stretches back into the nineteenth century. However, commercial farmers feel that current conditions are forcing them to diversify their farming activities beyond producing primary products (meat and wool) for the market. The need to diversify livelihoods was a major discussion point in my interviews with all the commercial farmers interviewed, including those committed to livestock farming. Commercial farmers highlighted the importance of cutting production costs and venturing into other income streams such as lucerne and garlic farming, stud breeding and even ecotourism in some cases. (It is worth noting that having diversified income streams was also an issue in my discussions with small-scale farmers for whom having livestock was generally important as a supplementary, rather than primary, source of income.)

The game farmers interviewed were clear that game farming can be profitable for the individual farmer, if properly managed. All 11 game farmers in the survey agreed that the perceived profitability of game farming had been an important motivating factor in their decision to take it up. The potential for foreign exchange earnings from trophy hunting and international tourism was a particularly strong incentive. As noted by a prominent game farmer in the municipality:

There is a lot of money to be made in game farming, some of the guys in Victoria West sold a springbok ram for a million rands and that would normally sell for 800 rands. Comparing the nature pricing, one would opt for the pot of gold especially with the colour variants. Colour variants have contributed to the profitability and attraction to game farming. Though the prices have recently dropped, this is not doom for the game industry. Game still fetches better prices than livestock. And the breeding industry will continue for tourism, stud breeding and venison (Gert, 2017).

At the same time, most of the game farmers interviewed made the point that the conservation of biodiversity is vital for the economic success of their business. In the words of one:

...though profit is important in the running of a successful farm, I have also discovered the importance of managing my farm for conservation. The more I keep my farm in tip-top shape, the more competitive my farm will remain as an ecotourism destination. So yes, some of this money that I am making from these activities I am reinvesting back into the farm (Jako, 2017).

All seven of the game farmers I interviewed in depth commented on the resilience of especially plains game in the area. Game farmer Daan (2017) noted that impala will eat any nutritious plant they can find to survive while eland can go for a long time without water. Pieter, a member of a local farmers' association, made a related point: "Livestock farmers have realised that game farming is very profitable in this region and less susceptible to environmental calamities. This is not to say game does not perish in these harsh conditions, but they show a greater resilience as opposed to sheep farming" (2017).

Game farmers also allied themselves with spokespeople for the industry in highlighting the wider economic benefits that the sector has brought to the Ubuntu Local Municipality. They highlighted an overall increase, rather than decrease, in on-farm employment opportunities, along with an increase in business activities in the local towns, with spinoffs also for the informal sector. With regard to the contentious issue of the heightened vulnerability of farm workers, the commercial farmers in my study challenged the narrative around the loss of jobs. While both livestock and game farmers acknowledged the ongoing reduction in the number of permanent, full-time farm workers on farms in their area, they questioned the particular responsibility of game farmers for this. Rather, they saw it as part of a general trend, driven by the various challenges being experienced by game and livestock farmers alike, including the prolonged drought, rising costs of production, and lack of government support. Here, it needs to be acknowledged that, given the absence of farm workers and farm dwellers among my research participants, issues around job and tenure security for farm workers and dwellers were not fully addressed. Clearly farm workers remain a very vulnerable group, but this is as true for livestock as it is for game farms.

In countering the narrative of job losses, several game farmers maintained that they have had to hire more part-time workers to attend to the game side of their operations, which they are running in conjunction with livestock operations on other portions of their land. Furthermore, four of the 11 game farmers I interviewed, all of whom have ecotourism enterprises on their properties, noted that they have had to hire more staff to service these facilities (on-farm accommodation, restaurants, curio shops, game drives, etc.), as well as to maintain the fencing and other

infrastructure on their farms. Their net employment numbers have thus increased rather than decreased. They also maintained that at least some of these new jobs are better paid, with better prospects, than the average farm worker's job.

However, although new jobs have been created, it also emerged that the farm workers who have been displaced by changing dynamics on commercial farms are often not well-positioned to take up the new jobs, because they do not have the necessary education or skills, such as driving licences and knowledge about wildlife. In addition, the jobs are often seasonal, and their availability depends on how well the business is doing. An interesting gender dimension is emerging here, with women rather than men frequently preferred as new employees in the hospitality side of game farming, for instance as waitresses and cleaners. The gendered nature of farm work on game farms is an under-researched topic that needs further unpacking in order to understand the changing nature of work on commercial farms in South Africa.

With regard to the contribution of game farming to off-farm jobs, a number of game farmers claimed that the increase in the tourism trade has boosted the local informal sector, for instance by providing opportunities for local townspeople to produce curios for tourists. Some farmers also mentioned that they have occasionally hired local dancers and singers to entertain their guests. The municipal officials with whom I interacted confirmed that there were some positive spinoffs from game farming in terms of increased business opportunities in the local towns. Although I was unable to obtain actual figures (another issue for follow-up research), one official spoke positively about an increase in bed-and-breakfast operations in Victoria West, as well as the boost to other small businesses related to tourism and travel. This was reflected in an increase in financial service institutions, service stations and local supermarkets, which had resulted in some local job creation. These employment spinoffs were also seen as benefitting more women than men in the municipality, with most of the new service-sector jobs in town being taken up by formerly unemployed women. However, the officials noted that overall, those best placed to capitalise on the new opportunities in town tended to be members of the white elite who have the properties, skills, and financial resources to take advantage of them.

The ecological dimensions of game farming

Disentangling the economic and the environmental issues is difficult because of the way in which game farming depends on the natural environment as a primary input. As noted above, environmentalists' concerns centre on the commodification of nature in the name of conservation and the negative consequences of this for the sustainable utilisation of scarce natural resources, through overstocking. As argued by Kamuti (2019), the principle that 'if it pays it stays' may tempt farmers

to overexploit those resources that provide the biggest return and ignore the environmental thresholds that set limits to the types and numbers of species that their farms can support. Furthermore, some of the practices that have taken root within the industry, such as canned hunting and the breeding of 'freaks' and 'exotics', are not consistent with the basic principles of biodiversity conservation, while also offending moral values around fairness in the treatment of animals. However, not all game farmers engage in these activities, and these practices were certainly not common in my study site. Thus, none of the game farmers I interviewed in the Ubuntu Local Municipality was involved in the breeding of colour variants and only one of the 11 was stocking his farm with extralimital species – in this case, with rhino. Several of the farmers interviewed were outspoken in their criticism of this individual on the grounds that "those rhinos" were not suited to the region's ecology and would do damage to the veld.

Thus, although the profit motive drives the adoption of 'green' principles in game farming (as in other industries), there is a growing awareness among farmers that humans have a symbiotic relationship with the environment and the best way to ensure a sustainable future is to respect environmental limits. Although farmers rely on the local environmental knowledge passed from generation to generation, there is also an openness to experimenting with new methods of farming that are seen as beneficial for the health of their land. This is particularly evident among the younger and better educated farmers. This cohort indicated that there is a movement towards more science-based ways of planning and land management among younger farmers, along with some of the more open-minded of the older farmers in the municipality. For example, livestock farmer Ruan, who is 44 years' old and has an agriculture-related bachelor's degree, formed a study group for interested farmers, to meet once a month, with agricultural extension officers and researchers from different organisations, to discuss various issues related to farming.

The principle of sound environmental management was endorsed by all the commercial farmers I interviewed, although actual practice in the district was also acknowledged to be uneven. Farmers insisted that to farm successfully they have to consider environmental issues and manage their land well. Thirty-seven of the 46 livestock farmers and all 11 of the game farmers in my survey noted that the sustainable utilisation of natural resources is crucial for viable farming, with good veld management extending to projects to restore degraded veld and manage for water scarcity. As game farmer Gert (2017) put it, "A farmer's livelihood is derived from the land; failure to take care of this resource may make or break a farmer. A wise farmer knows that his success as a farmer comes from respecting the land from which his livelihood is derived." Five of the seven game farmers interviewed stated that game farming has increased the area of land in which wildlife is protected in the province, thus associating themselves with the principles

of private stewardship of natural resources, even if they are not formally involved in such initiatives themselves. An official I interviewed from the Northern Cape's Department of Environment and Nature Conservation (DENC) also viewed game farming as making a positive contribution to conservation in the region, given the limited extent of Protected Areas in the Nama Karoo biome in the Northern Cape (DENC official, 2017; see also Chapter Eight for more context).

Linked to this, a number of the farmers interviewed proposed that the contribution of game farming to conservation warrants more serious research. Otieno (2016) has also argued that the urgency around the threat of climate change in the Karoo necessitates a thorough study of game farming as an alternative to livestock farming and its potential role in climate change adaptation. Concerns around drought and climate change are certainly leading to heightened environmental awareness among commercial farmers. A number of my informants emphasised that the losses farmers have incurred as a result of the prolonged drought have forced them to review their stocking and grazing strategies and to manage their veld optimally. At the same time, farmers' understanding of biodiversity conservation was subordinated to the requirements of making a decent living on their individual farms. Frequently biodiversity conservation was equated with the protection of particular species (for instance, the endangered riverine rabbit), rather than with the conservation of ecosystems within and across farm boundaries.

Social justice and land reform

One of my major interests in undertaking this study was to explore the complex set of issues relating to the social impacts of game farming and the extent to which it might contribute to social justice in South Africa, particularly in relation to land and agrarian reform. On this issue, my findings were less positive. For the majority of commercial farmers in the study, sustainable farming involves balancing economic and environmental concerns, with social issues not of immediate relevance. While there was some recognition that a socially responsible farmer should provide for his workers as their employer and the landowner, broader social concerns in the municipality were generally not seen as the responsibility of farmers but of the state, one that the state was, furthermore, failing to meet. Very few commercial farmers I interviewed showed any sense of personal or family responsibility for the broader context of racial divisions, poverty, and inequality in which they are living and farming.

At the same time, concerns around farm security and the uncertain land reform policy context certainly featured prominently in farmers' decision-making around farming strategies. Almost half of the commercial farmers in the survey (26 out of 57) saw land reform as a threat rather than as an opportunity to promote social justice and a more sustainable farming sector, although most of the farmers with

whom I conducted in-depth interviews did acknowledge the constraints in terms of access to land facing small-scale farmers in the municipality, along with the resulting degradation of the municipal commonage. Only four of the 25 farmers interviewed recognised the need for a land reform programme (three of them livestock farmers and one game farmer), while only two of them (both livestock farmers) mentioned that they were involved in mentoring relationships with some of the small-scale farmers. The mentoring was of an informal nature, involving the sharing of knowledge around livestock, veld, and financial management on an ad-hoc basis. One of these farmers, a livestock farmer, explained his stance thus:

Though issues of land reform are making most farmers uncomfortable, it was bound to happen. If it has happened in neighbouring countries, why wouldn't it happen in South Africa? In my own capacity and other farmers are doing it as well, I've engaged in mentorship and partnership with some local small-scale farmers and have given them access to land to use for their own livestock. As farmers it is best for us to address some of these social issues that have tarnished this sector of agriculture by being proactive (Howard, 2017).

The few farmers who showed a sense of social responsibility beyond the minimum requirements of treating their workers fairly, within the parameters set by the law, generally did so in an unselfconsciously paternalistic way. Zulu, in his study on commercial game farming, observed how relationships on farms are structured around the farmer as "the benefactor" and the farm worker the "willing dependant" (2015: 90). Atkinson (2007: 94) has described paternalism on commercial farms as constituting a "micro-welfare system", a dynamic that is reflected in the following account from one of my interviews:

These people you see working here have been here for a long time. They cease to be just workers and you begin to like some of them. As the owner of this farm, it is my duty to make sure that I also treat them fairly and give them a good salary. I have taken it upon myself to make sure that I pay school fees for some of my workers' children because I see the importance and opportunity it gives them. There is one boy here, Elias, he did so well at school, and I paid his way all through to an Agricultural College in Middelburg. When he was done, he asked to come work with me, and I made him a farm manager. He was so good that I recommended him as a beneficiary to one of these land reform projects in Vosburg (Diedrick, 2017).

My research also confirmed what has already been established through many other studies, which is that although land reform is urgently needed in the area, both to deracialise commercial farming and to provide land for black small-scale farmers who are desperate to access it, neither the Mardeck land reform project nor the municipal commonage scheme in Victoria West are meeting the needs of their beneficiaries. The four land reform beneficiaries I interviewed from Mardeck

all complained about the lack of adequate aftercare they received from the state in terms of extension support, financial support, and skills training. Furthermore, the farm, at just 365 hectares, is far too small to accommodate the number of small-scale livestock farmers for whom it has been acquired. While analysts have identified commonage farming as having significant potential as a form of land reform, the commonage land set aside for small-scale farming in Victoria West is also grossly insufficient to meet the needs of all those who have been granted permission by the local municipality to access it, never mind addressing the pent-up demand for grazing land among backyard farmers in the town.

At the same time, my study has also confirmed that the game farming industry is not itself a suitable vehicle for pro-poor land reform, because of the capital costs involved in becoming and remaining a game farmer. However, the Ubuntu Local Municipality does serve as an interesting case study of the co-existence of livestock and game farming in the area, including on the same farm. This co-existence points to promising avenues to explore further in thinking about land reform not simply at the level of the individual farm enterprise but also in terms of its linkages with economic development at the district level more generally. Of interest here is the evidence that a well-regulated and supported game farming sector can stimulate off-farm economic opportunities within the municipality, an issue returned to in the conclusion below.

Conclusion

The debates around the merits of game farming have tended to take place in separate silos, with advocates and critics largely talking past and not to each other. This study has attempted to engage with all sides of the debate while giving voice to farmers on the ground – both commercial farmers, who are often talked about, rather than talked to, in the scholarly work on land and agrarian change in South Africa, and small-scale farmers, a particularly neglected constituency in relation to game farming. Farmers' views are essential for understanding the challenges they face and the considerations that shape the decisions they make around land use and their livelihood options. As this study has confirmed, commercial and small-scale farmers are internally differentiated and the members of these two groups do not all share the same interests in farming. At the same time, and despite the significant differences between them, commercial and small-scale farmers also face some common challenges, including the problems with drought, weak local government and lack of state support that were articulated by farmers across the board in my study.

The Northern Cape economy has hinged on commercial livestock farming since the mid-nineteenth century, but this dominance is being challenged in the current conjuncture. As noted in other chapters in this volume, the Karoo region of South

Africa has entered a period of significant social and ecological change. There is competition for land from a range of externally driven developments in the form of renewable energy projects, astronomy and proposed shale-gas, uranium, and other mining initiatives (Henschel, Hoffman & Walker, 2018; Walker & Chinigò, 2018). While drought and climate change are major concerns, the lack of government support is also hampering the growth of the agriculture sector in South Africa. Diminishing returns from farming are impacting negatively on the economy of small towns such as Victoria West, which are burdened with many social problems.

Against this background, my research has revealed that firstly, the switch to game farming by commercial farmers in the Ubuntu Local Municipality has been spurred primarily by economic calculations relating to maintaining farm profitability through diversifying their farming portfolios. Environmental considerations play a part in farmers' decision-making, but for most game farmers the conservation of biodiversity is narrowly understood as a means to an end, not an end in itself. While economic considerations are the driving force behind the growth in the district's game farming sector, concerns about security and the perceived threat of land reform are also influencing the choices commercial farmers are making. At the same time, there is still strong support for livestock farming in this part of the Nama Karoo, as not all farmers have the capital required to make the shift to game farming and many consider livestock farming both a productive land use and a valued way of living on the land.

A second conclusion to be drawn from my study is that game farming emerges as no more nor less complicit in socially and ecologically unsustainable farming practices than livestock farming: it depends on how it is practised on individual farms. Although livestock and game farmers acknowledged the ongoing reduction in the number of permanent, full-time farm workers on farms in the area, this has been offset to some extent by new, albeit not necessarily secure jobs, including service-sector jobs that have benefitted women in particular. Furthermore, while it is primarily economic incentives motivating farmers to manage their veld sustainably, the results can be environmentally beneficial. Contemporary conservation efforts in South Africa operate in the long shadow cast by the history of white settler farming and apartheid policies. However, given the limited allocation of land to Protected Areas in the Nama Karoo, the farming sector as a whole is critically positioned to impact either positively or negatively on the region's extensive but fragile natural resource base. In this regard game farms can complement and extend the contribution to conservation made by national and provincial parks and other nature reserves, as well as by community-based natural resource management initiatives in South Africa.

Thirdly, with regard to small-scale farmers, the entry into commercial farming by those interested in expanding their farming operations is severely hampered by the absence of critical resources that include land, financial assistance, extension

support and effective institutions. Given this context, game farming is beyond what the great majority can envisage, never mind aspire to as a means of making a living. Commonage and backyard farmers interested in farming as a means of supplementing their livelihoods, rather than a full-time occupation, are also not getting the support and access to well-situated, secure and well-managed land that they need. Any commitment to sustainable agriculture in the Ubuntu Local Municipality (and the Northern Cape more generally) has to prioritise their needs.

At the same time, the environmental challenges posed by drought and climate change are making it difficult for farmers at all scales to remain productive. Thus, a further issue to emerge from my study concerns the need for a rethink of established livelihood strategies. This should extend to considering afresh the potential of game farming as one element of a broader, sustainable rural development strategy. Although the potential of game farming as a pro-poor vehicle of growth is clearly limited, there is an under-explored potential to draw in black farmers who are financially capable of venturing into the sector, not only at the very high end but also at what could be considered the middle range of the spectrum. There may well be opportunities, for instance, for interested and capable small-scale farmers to be supported in expanding into the production of biltong, through a more effective and broadly conceived land and agrarian reform programme in the district. Possibilities for collective game farming by well-run, well-supported trusts and co-operatives also warrant further investigation. However, any such investigation would have to engage seriously with small-scale farmers' lack of familiarity with game farming and suspicions of it as a 'white' activity in the first instance, and, for women, a 'male' undertaking that excludes them.

More consideration is also needed for how game farming enterprises might co-exist with other developments that are taking off in the Karoo, such as renewable energy projects and astronomy. Although game farming in the way that it is currently practised is clearly racially exclusive, capital-intensive, and elitist, it has generated new off-farm economic opportunities in the municipality. A reconfigured, more inclusive, and socially and environmentally conscious game farming sector could potentially be harnessed to a broader programme of local economic development, as one component of a more diversified development strategy, in a time of significant social-ecological change.

Acknowledgements

This work is based on research partly supported by the South African Research Chairs Initiative (SARChI) of the Department of Science and Innovation (DSI) and the NRF of South Africa (Grant No. 98765). The financial assistance of the NRF towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the author and are not necessarily to be attributed to the NRF.

References

- African Wildlife Auctions. 2020. *AWA Wildlife Trends Analysis for 2020*. Vaalwater: African Wildlife Auctions.
- Aliber, M. 2015. Unravelling the “willing buyer, willing seller” question. In: B. Cousins & C. Walker (eds). *Land Divided, Land Restored; Land Reform in South Africa for the 21st Century*. Johannesburg: Jacana Media. 145–160.
- Andrew, commonage farmer. 2017. Personal interview, 22 March. Victoria West.
- Atkinson, D. 2007. *Going for broke: The fate of farm workers in arid South Africa*. Cape Town: HSRC Press.
- Atkinson, D. & Ingle, M. 2018. By their own bootstraps: municipal commonage farmers as an emerging agrarian class in the Karoo. *African Journal of Range & Forage Science*, 35(3–4):233–243. doi:10.2989/10220119.2018.1514653.
- Beinart, W. & Delius, P. 2015. The Natives Land’s Act of 1913: A template but not a turning point. In: B. Cousins & C. Walker (eds). *Land Divided, Land Restored; Land Reform in South Africa for the 21st Century*. Johannesburg: Jacana Media. 24–39.
- Bothma, J. du P. 2002. *Game Ranch Management* 4th Edition. Pretoria: Van Schaik.
- Brandt, F. 2013. Tracking an invisible great trek: An ethnography on the re-configuration of power and belonging on trophy-hunting farms in the Karoo. PhD thesis. Amsterdam: University of Amsterdam.
- Brandt, F. & Spierenburg, M. 2014. Game fences in the Karoo: Reconfiguring spatial and social relations. *Journal of Contemporary African Studies*, 32(2):220–37. doi:10.1080/02589001.2014.925300.
- Child, B.A., Musengezi, J., Parent, G.D. & Child, G.F.T. 2012. The economics and institutional economics of wildlife on private land in Africa. *Pastoralism*, 2(1):1–32. doi/10.1186/2041-7136-2-18.
- Corlette, R.T. 2016. The role of rewilding in landscape design for conservation. *Current Landscape Ecology Reports*, 1(3):127–133. <https://link.springer.com/article/10.1007/s40823-016-0014-9>.
- Cousins, B. 2018. Small-scale farmers should be at the centre of land reform in South Africa. *The Conversation*. 16 April. [Online]. <https://theconversation.com/small-scale-farmers-should-be-at-the-centre-of-land-reform-in-south-africa-94546>. [Accessed 14 November 2018].
- Cousins, J.A., Sadler, J.P. & Evans, J. 2010. The challenge of regulating private wildlife ranches for conservation in South Africa. *Ecology and Society*, 15(2):23. doi: 10.5751/ES-03349-150228.
- Daan, game farmer. 2017. Personal interview, 21 March. Victoria West.
- DAFF official, Department of Agriculture, Forestry and Fisheries. 2017. Personal interview, 7 March. Victoria West.
- Davenport, N.A., Shackleton, C.M. & Gambiza, J. 2012. The direct use value of municipal commonage goods and services to urban households in the Eastern Cape, South Africa. *Land Use Policy*, 29(3):548–557. <https://doi.org/10.1016/j.landusepol.2011.09.008>.
- Debertin, D.L. & Pagoulatos, A. 2015. Production Practices and Systems in Sustainable Agriculture. Staff Papers 200248, Lexington: Department of Agricultural Economics, University of Kentucky.
- DENC official, Department of Environment & Nature Conservation. 2017. Personal Interview, 1 June. Kimberley.

- Diedrick, livestock farmer. 2017. Personal interview, 15 October. Loxton.
- DLC member, Pixley ka Seme District Land Committee. 2017. Personal Interview. 8 March. Victoria West.
- Dry, G.C. 2010. Commercial Wildlife Ranching's Contribution to the Green Economy; Presentation to the Green Economic Forum, 19 May. [Online]. <https://slideplayer.com/slide/4165171/>. [Accessed 2 November 2023].
- Gastrow, M. & Oppelt, T. 2019. The Square Kilometre Array and local development mandates in the Karoo. *Journal of Southern African Studies*, 45(4):711–728. <https://doi.org/10.1080/03057070.2019.1642679>.
- Gert, game farmer. 2017. Personal interview, 20 March. Victoria West.
- Hall, R. 2015. Who, what, where, how, why? The many disagreements about land redistribution in South Africa. In: B. Cousins & C. Walker (eds). *Land Divided, Land Restored; Land Reform in South Africa for the 21st Century*. Johannesburg: Jacana Media. 127–144.
- Hall, R. & Kepe, T. 2017. Elite capture and state neglect: New evidence on South Africa's land reform. *Review of African Political Economy*, 44(151):122–130. doi: 10.1080/03056244.2017.1288615.
- Hendricks, F., Ntsebeza, L. & Helliker, K. 2013. *The Promise of Land: Undoing a Century of Dispossession in South Africa*. Johannesburg: Jacana Media.
- Henschel, J.R., Hoffman, M.T. & Walker, C. 2018. Introduction to the Karoo Special Issue: Trajectories of change in the Anthropocene. *African Journal of Range & Forage Science*, 35(3–4):151–156. doi:10.2989/10220119.2018.1535214.
- Holden, E., Linnerud, K. & Banister, D. 2016. The Imperatives of Sustainable Development. *Sustainable Development*, 25(3):213–226. doi: 10.1002/sd.1647.
- Hoogendoorn, G.T., Meintjes, D., Kelso, C.J. & Fitchett, J.M. 2018. Tourism as an incentive for rewilding: The conversion from cattle to game farms in Limpopo province, South Africa. *Journal of Ecotourism*, 18: 309–315. <http://dx.doi.org/10.1080/14724049.2018.1502297>.
- Howard, livestock farmer. 2017. Personal interview, 17 October. Victoria West.
- Jako, game farmer. 2017. Personal interview, 23 October. Loxton.
- Jan, livestock farmer. 2017. Personal interview, 18 October. Victoria West.
- Kamuti, T. 2019. "If it pays, it stays": The lobby for private wildlife ranching in South Africa. In: J-B. Gewald, M. Spierenburg, M. & H. Wels, H. (eds). *Nature Conservation in Southern Africa. Morality and Marginality: Towards Sentient Conservation*. Leiden: Brill. 189–2013. https://doi.org/10.1163/9789004385115_009.
- Kriek, J. 2017. Practical management aspects of wildlife ranching. *Annual Game Breeders Journal*, (1):42–45.
- Langholz, J. A. & Kerley, G. I. H. 2006. Combining conservation and development on private lands: an assessment of ecotourism-based private game reserves in the Eastern Cape. Centre for African Conservation Ecology, Report No. 56. Port Elizabeth [Gqeberha]: Nelson Mandela University. (56):1–34.
- Lindsey, P. A., Haveman, C. P., Lines, R. M., Price, A. E., Retief, T. A., Rherbegen., T., Van der Waal, C. & Romañach, S. S. 2013. Benefits of wildlife-based land uses on private lands in Namibia and limitations affecting their development. *Oryx*, 47(1):41–53. doi: 10.1017/S0030605311001049.

- Luck, K. 2005. Farm workers and land tenure reform: The case of game farming in Hope Fountain in the Eastern Cape. *Social Dynamics: A Journal of African studies*, 31(1):84–103. doi: 10.1080/02533950508628697.
- Manyani, C. R. S. 2020. From livestock to game farming: Farmers' understandings of land use changes, sustainable agriculture and biodiversity conservation in the Ubuntu Municipality. PhD dissertation. Stellenbosch: Stellenbosch University.
- Mkhize, N. N. 2012. Private game farms and the tenure security of farm workers and dwellers in Cradock – Implications for tenure reform in South Africa. PhD thesis. Cape Town: University of Cape Town.
- Municipal official. 2017. Personal interview, 7 March. Victoria West.
- Ngubane, M. & Brooks, S. 2013. Land beneficiaries as game farmers: Conservation, land reform and the invention of the “community game farm” in KwaZulu-Natal. *Journal of Contemporary African Studies*, 31(3):399–420. doi: 10.1080/02589001.2013.811790.
- Otieno, J.O. 2016. Climate change and wildlife utilization on private land: Evidence from wildlife ranching in South Africa. PhD thesis. Cape Town: University of Cape Town.
- Pieter, member of local farmers association. 2017. Personal Interview, 9 March. Victoria West.
- Presidential Advisory Panel on Land Reform and Agriculture. 2019. *Final Report of the Presidential Advisory Panel on Land Reform and agriculture*. Pretoria: The Presidency.
- Sims-Castley, R., Kerley, G.I.H., Geach, B. & Langholz, J. 2005. Socio-economic significance of ecotourism-based private game reserves in South Africa's Eastern Cape Province. *Parks*, 15(2):6–17.
- Smith, N. & Wilson, S. L. 2002. Changing land use trends in the Thicket Biome: Pastoralism to game farming. Terrestrial Ecology Research Unit, Report No. 38. Port Elizabeth [Gqeberha]: University of Port Elizabeth [Nelson Mandela University].
- Snijders, D. 2012. Wild property and its boundaries – on wildlife policy and rural consequences in South Africa. *Journal of Peasant Studies*, 39(2):503–520. doi: 10.1080/03066150.2012.667406.
- Speaker 3. 2017. Focus group discussion 1, 22 March. Victoria West.
- Speaker 5. 2017. Focus group discussion 1, 22 March. Victoria West.
- Taylor, A., Lindsey, P. & Davies-Mostert, H. 2016. An assessment of the economic, social and conservation value of the wildlife ranching industry and its potential to support the green economy in South Africa. Johannesburg: The Endangered Wildlife Trust.
- Thomas, S. 2017. Hunting: The colour game is over. *Financial Mail*. 1 January. [Online]. <https://www.businesslive.co.za/fm/features/2017-01-26-colour-game-is-over/> [Accessed 12 March 2018].
- Walker, C. 2018. Overview of Land Reform in the Karoo/Northern Cape, in SARChI Chair in the Sociology of Land, Environment and Sustainable Development, Workshop Report, Karoo Futures Workshop on Envisioning Land Reform in South Africa's Drylands, Stellenbosch, 26–27 November 2018. Available at <https://cosmopolitankaroo.co.za/research-outputs-2/reviews-presentations/> [Accessed 2 November 2023].
- Walker, C. & Chinigò, D. 2018. Disassembling the Square Kilometre Array: Astronomy and development in South Africa. *Third World Quarterly*, 39(11):1–19. <https://doi.org/10.1080/01436597.2018.1447374>.

- Walker, C. & Cousins, B. 2015. Land divided, land restored: Introduction. In: B. Cousins & C. Walker (eds). *Land Divided Land Restored; Land Reform in South Africa for the 21st Century*. Johannesburg: Jacana Media. 1–23.
- Welz, A. 2017. Fenced in: Does South Africa's private wildlife ranching industry hold the key to saving world species and natural habitats? *Ensis Edge*. [Online]. <http://edge.ensia.com/fenced-in/> [Accessed 6 April 2018].
- Zulu, N. 2015. An analysis of the post 1980s transition from pastoral to game farming in South Africa: a case study of the Marico district. PhD thesis. Johannesburg: University of Witwatersrand.
- Zungu, V. M. 2017. The socio-economic implications of conversion from commercial agriculture to private game farming. PhD thesis. Cape Town: University of Cape Town.

Chapter 7

Ongedierte: Commercial farmers, black-backed jackals and human-wildlife conflict around the Square Kilometre Array (SKA), 2016–2019

Renelle Terblanche

The black-backed jackal (hereafter ‘the jackal’), the main predator on sheep in the Karoo, has been a powerful figure in stories from this region since pre-colonial times, featuring as a trickster and coward in |Xam and Khoekhoe folktales (Wittenberg, 2014). Similar motifs can be found in popular Afrikaans literature and cartoon strips in the twentieth century (de Prada-Samper, 2016; Terblanche, 2020; Van Niekerk, 2018). Anthropomorphic characteristics commonly attached to jackals include that they are “stealthy”, “cowardly, treacherous and secretive” also “cunning” and “hardy” (Beinart, 2003:205, 206; Drouilly et al., 2021:9; Palmer, 1966:179; Wittenberg, 2014:593). The designation of this animal as *ongedierte* in Afrikaans, literally a “non-animal or de-animalised creature” (Beinart, 2003:207), captures popular understandings of the jackal as an aberration among animals, one with unnatural human-like qualities. The English translation of the Afrikaans as vermin fails to convey especially commercial livestock farmers’ views of jackals as not simply pests but “agents of degradation and the enemy of other, more proper and desirable forms of nature” (Holm, 2012:77).

The jackal is a serious threat to livestock farmers’ livelihoods. While farmers draw on the negative stereotypes around jackals in popular culture, their own experience of jackals on their farms, as adversaries with whom they are in constant battle, also feeds back into popular culture. Borrowing from Becker’s labelling theory, one can argue that jackals gain their ‘outsider’ status from the fact that they “cannot be trusted to live by the rules agreed on” (1963:1). According to Benavides, cultural artefacts that “create and reproduce animal metaphors ... in turn feed the attachment of the general public to a metaphorical and analogical discourse, by means of which the notion of ‘negative animals’ maintains its presence and legitimacy” (2013:70–71).

Conflict between farmers and jackals has been a persistent theme in commercial livestock farming in the Karoo from its beginnings in the nineteenth century. In the last decade, however, this conflict has taken on new dimensions in the Kareeberg region of the Upper Karoo, with the decision by the South African government to invest in the construction of the Square Kilometre Array (SKA) radio telescope on a cluster of former sheep farms lying between the small towns of Carnarvon, Williston, Brandvlei and Vanwyksvlei; subsequently the land acquired for the SKA was designated a Protected Area, the Meerkat National Park (see Figure 7.1 below). These dynamics and their implications for both jackal management and the relationship between commercial farmers in the Karoo and the SKA are the subject of this chapter.

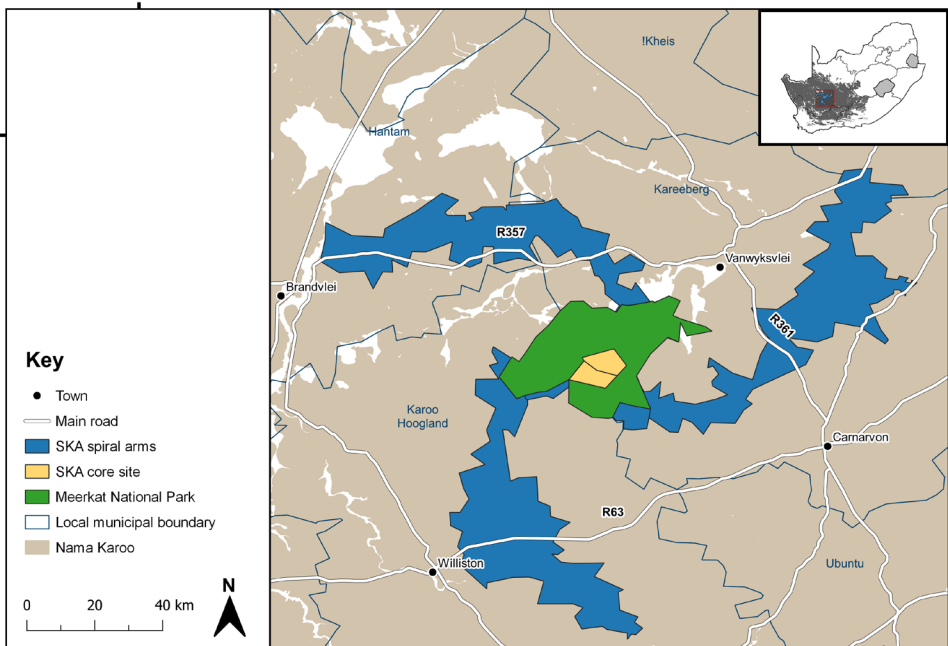


Figure 7.1 The Square Kilometre Array (SKA), showing its core site within the Meerkat National Park, spiral arms and neighbouring small towns

The SKA is a major international radio astronomy project in which South Africa has been investing since the early 2000s.⁷¹ In 2008, the National Research Foundation (NRF) of South Africa bought two farms in the Kareeberg hills as the core site for

⁷¹ The Array, when finally completed, will consist of a computer-linked network of antenna dishes spread around the world that collectively will constitute a radio telescope with a collecting area of a full square kilometre.

its prototype KAT-7 (Karoo Array Telescope) array, as part of South Africa's bid to become the primary host for the future SKA telescope. After being awarded co-hosting rights with Australia in 2012, SKA South Africa (SKA SA) began construction of 64 antenna dishes, collectively known as MeerKAT, on this core site.⁷² It also embarked upon an extensive land acquisition programme between 2016 and 2019, buying up additional farms around the core site so as to “make the SKA a reality” (SKA SA, n.d.a). In 2020, this expanded area, totalling some 135 000 hectares, was proclaimed a national park – the Meerkat National Park – with the protection of the telescope infrastructure the primary motivation. In this time, plans were also finalised for the location of additional antennas on three ‘spiral arms’ surrounding the core site, all on privately owned farms whose owners would have to enter into servitude agreements with the SKA. (On this history, see Atkinson et al., 2017; Gastrow, 2014; Walker & Chinigò, 2018; Walker et al., 2019; Wild, 2012.)

For farmers, the arrival of the SKA as a major landowner in the Kareeberg constituted a significant disruption of the social order in a region where they have long regarded themselves as *baas van die plaas* [master of the farm] (Terblanche, 2020).⁷³ Since the late nineteenth century, the local economy of this area has been based primarily on commercial livestock farming on white-owned farms, in which the *baas* is white and the farm workers, on a much lower social ranking, black (for more on this history, see Chinigò, 2019; Marcatelli, Chapter Three, this volume; Terblanche, 2020). Even though the importance of sheep farming has declined since the mid-twentieth century, commercial agriculture continues to play a dominant role in this region, both economically and socially. For local farmers, the state's extensive land acquisition programme thus constituted a serious threat to their future (Atkinson, 2019; Kirsten, 2016; Terblanche, 2020). Also of major concern were the restrictions being imposed on their everyday operational tools, including cell phones, petrol-driven cars, and electric fences – restrictions intended to eliminate or minimise as far as possible disruptive ‘radio frequency interference’ around the SKA core site. Local farmers’ distance from the centres of power where decisions around the project were being made exacerbated their feelings of uncertainty and loss of control in what was already a difficult economic environment.

72 In 2017, SKA SA was amalgamated with other South African radio astronomy projects to form the South African Radio Astronomy Observatory (SARAO). MeerKAT is designed to be incorporated into the SKA proper, which involves the construction of a further 133 antenna dishes at the Kareeberg site, starting in late 2022.

73 A popular Afrikaans expression that refers to someone who is clearly the boss, also in contexts beyond the farm.

These feelings of insecurity were aggravated by the state's decision to proclaim the core site a National Park, which farmers feared would become a poorly managed haven for jackals and other predators such as caracal. For their part, the managers of the SKA core site, as well as the life scientists advising them, were telling farmers to abandon long-entrenched lethal methods of predator control and "learn to live with the jackal" (Natrass & Conradie, 2015:10) as well as to apply 'scientific knowledge' in their predation management strategies.⁷⁴ In response, farmers defended the necessity of hunting jackals and the use of deterrents such as jackal-proof fencing if they were to survive financially. They also questioned the ecologists' research-based findings as mere hypotheses, which, they maintained, were not borne out by their own experience and local knowledge. How best to manage mesopredators thus emerged as a major fault line in the already antagonistic relationship between the SKA and commercial farmers in the Upper Karoo (Terblanche, 2020).

The extensive literature on human-wildlife conflict recognises that this conflict is not simply about competition for resources between humans and wildlife but also involves contestations among humans as a result of competing interests regarding the wildlife in question, as well as the clash of value systems around the status of animals more generally. In other words, human-wildlife conflict is also human-human conflict (Decker & Chase, 1997; Madden, 2004; Redpath et al., 2015). This conflict has the potential to escalate "when local people feel that the needs or values of wildlife are given priority over their own needs, or when local institutions and people are inadequately empowered to deal with the conflict" (Madden, 2004:248).

This chapter focuses on the intersection of human-wildlife and human-human conflict in the Kareeberg in a particular phase of the development of the SKA, during the height of its land acquisition programme between 2016 and 2019, when levels of mistrust and antagonism among the parties were particularly high. In the ensuing tussle between farmers and the SKA over authority and recognition, the figure of the jackal loomed large. In exploring white commercial farmers' attitudes towards the SKA project, I argue that for local farmers their ongoing struggle to control the presence of jackals on their farms became fused with their struggle against the SKA. The very different assessments of the importance of this major international project among farmers, local representatives of the SKA and ecologists invested in

74 In their sociological research on jackal ecology and management in the Central Karoo, Natrass and Conradie (2015) identified two rival "jackal narratives" in which the tensions between 'scientific' and 'local' knowledge systems were clearly present: the "environmental jackal narrative", rooted in scientific knowledge, biocentrism and an objective, rationalist approach to jackal management, and the "farmer jackal narrative", rooted in local knowledge, anthropocentrism and an affective approach to jackal management. I have drawn on the two narratives in presenting my findings (see Terblanche, 2020).

the conservation of the biodiversity of the SKA core site not only complicated the rollout of the SKA project after 2012, but also threatens effective jackal management in this area. By highlighting the social dimensions of farmer–jackal conflict in the context of a significant, politically contested land-use change, my research project extends the analysis of human–wildlife conflict in South Africa, and underscores the importance of the social sciences in analysing such conflict.

The doctoral study on which this chapter is based deployed a qualitative research methodology, involving in-depth semi-structured interviews, participant observation and extensive documentary analysis between May 2016 and July 2019 (Terblanche, 2020). It involved a total of 32 semi-structured interviews with 36 individuals – 19 of them farmers and 17 officials or professionals working for the SKA or environmental and academic institutions.⁷⁵ As a participant observer, I attended 15 public meetings, information sessions and workshops, including one closed meeting, and accompanied farmers, farm workers and specialist predator hunters on numerous hunting excursions, farm patrols and the setting of traps. I also used discourse and content analysis to examine a wide range of documents on jackal management, the SKA, the history of farming and conservation in the Karoo, and fables and folktales in which jackals feature as protagonists and supporting characters.

This account begins with a brief review of farmer–jackal conflict, followed by an overview of the ways in which human–jackal and human–human conflict came together in the SKA's land acquisition programme, culminating in the decision to establish a new national park. The concluding discussion considers the implications of my findings for jackal management in and around the newly proclaimed Meerkat National Park.

75 The bulk of the interviews were conducted in Afrikaans. For reasons of space, only the English translations of the original are provided here. Most research participants have been assigned first-name pseudonyms to preserve their anonymity but research participants who are public players and have given their permission to do so, are identified by their real names.

Farmer-jackal conflict

Weighing between 6.5 and 8.5 kilograms, the black-backed jackal is a slender, long-legged mesopredator that derives its name from the characteristic dark saddle of black and white hair along its back down to its bushy tail (see Figure 7.2 below).



Figure 7.2 The black-backed jackal (Photograph: Renelle Terblanche)

In southern Africa, jackals occur across a wide range of habitats, including the arid coastal deserts in the west, the Nama and Succulent Karoo, and the grasslands and open savannahs in the east. According to Brassine (2011:18), the jackal's adaptability "allows them to expand their ranges and sustain high and stable population sizes in areas where other large predators succumbed to changes in their habitats as well as to human–carnivore conflict." This adaptability is linked to the jackal's dietary flexibility. They are opportunistic omnivores, capable of surviving on plants, insects, carrion, human refuse, invertebrates, reptiles, birds, and small- to medium-sized mammals (see, *inter alia*, Apps, 2000:85; Bothma, 2012; Brassine, 2011; Drouilly et al., 2017; Kamler et al., 2012; Minnie, 2016; Nattrass et al., 2020; Van de Ven et al., 2013).

Jackals are drawn to farmlands due to the abundance of potential prey they find there (Drouilly et al., 2017; Drouilly et al., 2018; Jansen, 2016). Sheep farmers regard jackals as the main culprits in their livestock losses and thus a major threat to their livelihoods. In 2018, predation losses on South Africa's commercial farms were estimated at ZAR2.8 billion per annum, with small-livestock farmers accounting for almost 84% of this figure (Turpie & Akinyemi, 2018). To put this into perspective, in 2019 the National Chairperson of both the National Wool Growers Association and the Predation Management Forum noted that, at approximately ZAR1.2 billion per annum, losses as a result of stock theft in South Africa amounted to less than half that caused by predation (RSG Geldsake, 2019). Farmers not only incur direct financial losses when they lose their livestock to jackal predation but also face major costs in attempting to fend off these mesopredators. In the words of Gawie (2017), an elderly farmer who has been farming with dorper sheep in the Kareeberg Local Municipality since 1970:

There's no other thing on which you spend more money than a jackal and a caracal, because guys have wrecked their vehicles, capsized them while hunting jackals. You hire a hunter at great expense to try and catch him. You electrify [boundary fences] and sacrifice nights in [the] cold ... to hunt. And that's all for a jackal.

Ranked in order of frequency, the five terms most commonly used by the livestock farmers I interviewed to describe jackals were: *skelm* [devious], *slim* [clever], *diewe* [thieves], *aanpasbaar* [adaptable] and *uitgeslape* [crafty] (Terblanche, 2020).⁷⁶ These predominantly negative terms are consistent with those used to describe jackals in the popular and scholarly literature already referred to. While the farmers and specialist predator hunters I interviewed applied them to the species in general, they were used most forcefully when referring to jackals that intruded on their farms. This is when jackals transgress the border between what farmers perceive as 'nature' (i.e., nature reserves and national parks) and 'culture' (i.e., human spaces, more particularly the farm). It is a significant moment in farmer–jackal conflict that confirms these animals as unnatural enemies. Once jackals have crossed this threshold, they “are perceived as both symbolic and real threats to the social order” (Arluke & Sanders, 1996:169–170), hence their construction by farmers in primarily negative, vilifying terms.

However, some farmers also admire certain characteristics of the animal, an admiration that is threaded through the general depiction of these animals as *ongediertes*. Farmers and predator hunters particularly admire the jackal's

⁷⁶ It is difficult to find a single English term that encompasses all the shades of meaning of either *skelm* or *slim*. *The Pharos Dictionary* (2010) offers the following translations: for *skelm*, cunning, sly, thief, devious, scheming, shifty, and stealthy; for *slim*, smart, clever, intelligent, brainy, astute, artful, crafty, cunning, guileful, sly and wily.

adaptability and resilience, even while they curse the consequences of these features for their farming (Frederich, 2017; Viljoen, 2017). A minority of farmers in the study also acknowledged that there was something appealing about the jackal, with Christiaan, a farmer now bordering the SKA core site, describing it as a “fascinating animal” (2017). Farmers’ ambivalence led Frederich, a predator hunter and farmer, to describe their relationship with jackals as a “love–hate” one (2017). This ambivalence is consistent with the ambiguity surrounding the depiction of the jackal in folktales as an impressively clever trickster (Terblanche, 2020).

Some individual jackals are even regarded as “super jackals”. These are jackals that are seen as exceptionally intelligent and crafty, as they prey not only on lambs but also large, adult sheep, and are particularly adept at escaping from the clutches of farmers and predator hunters. One of the author’s key informants, Niklaas, used this term in response to a presentation by a zoologist (on mammal responses to land-use change) at a SARAO information session that I attended in Carnarvon on 18 October 2017. In this exchange, Niklaas tried to convince the zoologist that the jackals in the Carnarvon district, i.e., the jackals found on the farms around the SKA core site, are different from the jackals in Protected Areas, where research such as that being presented by the zoologist is usually conducted (Terblanche, 2020:118). Interestingly, most of the predator hunters I interviewed were of the view that “super” jackals are not born with their extraordinary abilities. Rather, they have been able to learn from the mistakes made by farmers who only hunt as a hobby and/or make use of what the professionals regard as fly-by-night hunters – amateurs, including young schoolboys who want to earn some pocket money during their school holidays.

Worth noting is that farmers who acknowledge the jackal’s adaptability, resilience and intelligence share some common ground with life scientists. Over and above the ecological role that jackals fulfil, the ecologists I interviewed during my study were also impressed by the animal’s capacity to survive, as captured in the following comments:

[It is a] superbly intelligent, impressive animal. ... It knows how to assess a situation and adapt on its feet As a scientist, you have to take your hat off. ... They can bounce back from disturbance (Conrad, 2017).

It has sort of a resilience theme. It has been hunted, uh, hated for centuries and ... here it is! It’s thriving! ... They are still on their feet. They still have the next generation (James, 2017).

As discussed further below, this shared appreciation of the jackal’s abilities could provide a useful starting point for an open conversation among farmers, ecologists and predation management experts that could help forge a more effective jackal management plan for the SKA core site and surrounding farms.

Farmer–SKA conflict

The South African state has hailed the SKA for making a major contribution to both global science and national science capacity (Terblanche, 2020; Walker et al., 2019). At a global scale this astronomy installation promises to answer questions at the “frontiers of physics and cosmology, where scientists are seeking to identify and understand the fundamental laws and structures of the universe” (Gastrow, 2015:6). Nationally, the SKA is regarded as a major boost to the economy, through its investment in capacity building in the fields of physics, technology, engineering, and big data (SKA SA, 2015; see also Gastrow & Oppelt, 2019; Walker & Chinigò, 2018). The decision to turn its core site into a national park has also been hailed as a boost for conservation in the Nama Karoo (see Hoffman & Gillson, Chapter Eight, this volume).

Locally, in the small towns surrounding the SKA core site, SARAo has committed to community development projects in five focus areas: “investing in the youth; supporting community upliftment programmes; developing small to medium enterprises; nurturing learners’ talent, and ensuring that communication connectivity is not compromised” (SKA SA, 2016; see also Gastrow & Oppelt, 2019). In 2012, hopes were high in the Kareeberg that this major investment would boost the local economy and co-exist with sheep farming (Butler, 2018; Save the Karoo, 2017). However, by 2016/17, at the start of my fieldwork, relationships between SKA personnel and local communities had soured. By then the SKA development was seen to be threatening the “lifeline” of the small towns and having a wider “ripple effect” in the region, to quote one of my farmer participants (Ivan, 2017). In his 2016 report to the CSIR on the estimated impact of the SKA development on the local economy, agricultural economist Johan Kirsten noted that the “loss of a large number of slaughter animals caused by the cessation of farming activities [due to land acquisition for the SKA core site] is equivalent to 8.24% of the average annual slaughter volumes,” of the Carnarvon and Williston abattoirs. He added that the consequences were not limited to farmers but would also influence the economies of the two towns.

The merits of the SKA’s community development initiatives have been the subject of fierce debate but are not the focus of this chapter (on this see, *inter alia*, Binneman & Davis, 2021; Walker, Chinigò & Dubow, 2019; Walker, 2022). While farmers shared some of the concerns of local townspeople around the extent and spread of local gains from the project, their main complaint, expressed vociferously at SARAo public meetings, was that their specific needs, including around predator management, were not being addressed. Concerns about jackal predation were laid out forcefully at a public meeting I attended in Carnarvon on 17 May 2016, at the start of my fieldwork (see Figure 7.3 below). The meeting was billed as a public communication meeting between personnel of the then Department of

Science and Technology (DST) and SKA SA, and the Kareeberg Farmers' Forum, a local association that was established in response to the SKA's land acquisition programme. At the time, the Forum represented 16 of the 22 farmers whose farms had been earmarked for purchase or, if the negotiations failed, expropriation. Although the Forum ceased to exist after the land acquisition programme was over, it played an important role in 2016 and 2017 as a "united negotiating body" for farmers (Genis, 2016).

At the May 2016 meeting, the DST and SKA personnel had come prepared to discuss the progress of the SKA project, the land acquisition programme and the project's community development projects. However, the approximately one hundred farmers and townsfolk in attendance were much more interested in getting answers to their questions regarding the impact of the SKA on their livelihoods. At this meeting the Forum voiced members' concerns about the future of their farm workers and delays in the environmental impact assessment (EIA) of the SKA development.⁷⁷ Farmers also had questions about the security of their landownership and how to prevent trespassing by SKA SA personnel and subcontractors on their farms. Prominent in the discussion were farmers' fears that the SKA core site would become a haven for jackals and caracals.

At this meeting it was clear that the level of trust between farmers and the representatives of the SKA was very low. For farmers, the project was further evidence of their political and economic marginalisation in post-apartheid South Africa, in which the challenges they face, including around predation management, were not a political priority for the state.

I was struck by the way in which farmers' mistrust of the SKA was entangled with their adversarial relationship with jackals, which was also expressed at this meeting. During my fieldwork, further evidence emerged of parallels between farmers' views of the jackal as an 'unnatural' and devious threat to their livelihoods and of the SKA as another powerful intruder on their land, one that was, furthermore, enabling the jackal. For instance, in an interview in June 2017, Ivan, a well-known farmer in the Williston region, started by saying he missed his wife (who was away), but then joked: "Luckily, the jackals and the SKA keep me busy!" (Ivan, 2017). Later in the interview he returned to the relationship between jackals and the SKA, arguing that both were *skelms* who were in cahoots with one another. In his view, neither SARA O nor "*hulle jakkals*" [their jackals], as he described them, would stay within the SKA core site but would intrude onto his land. According to him, this intrusion, combined with the ongoing drought in the area, would make it impossible for him to continue farming successfully. As increased predation resulted in his stock numbers

⁷⁷ The EIA was a predecessor to the integrated Strategic Environmental Assessment (SEA) that took place in 2016/17. To view the SEA as well as the Integrated Environmental Management Plan for the SKA Phase 1 mid-frequency array, see SKA SA (n.d.b).

falling, his revenue would fall and eventually he would be forced to sell his land. However, its value would be depressed, because of both its falling productivity and ongoing uncertainty about whether SARAO was planning to buy up more farms to add to the SKA core site or not. Under these circumstances no farmer would want to buy his property so in the end only SARAO would be an interested buyer. In other words, this would be an opportunity for SARAO to expand the SKA core site at a favourable price for the state.



Figure 7.3 Public meeting organised by the Department of Science and Technology and Square Kilometre Array South Africa, Carnarvon, 17 May 2016 (Photograph: Renelle Terblanche)

Ivan was also adamant that the SKA and jackals were jointly impacting negatively on the local small towns whose economy depended on commercial farming. Both were threatening the wellbeing, not only of the individual farmer and his/her family, but also his/her labourers and their families as well as the economy of the broader community. In an interview in May 2017, Elsabe, the wife of Stefan, a farmer, raised similar concerns about the long-term consequences of the SKA development for the region:

What makes me angry, ... they [SARAO] said by 2050 they will be done. Then they no longer need it [the land]. Then they have made this piece bare. And then? I mean, they disadvantaged two towns. They took away thousands of sheep. They took away a lot of people's work. Farmers have been taken away. Life has been taken away. And then they just do not need it anymore. So ... they did not think any further.

Throughout my fieldwork, local farmers questioned SARAO's decision to establish the core site where it did, arguing that the SKA did not belong in this part of the Karoo. For them it was misplaced. They were not only concerned with the loss of farming land in an area well suited to sheep farming (Maghiel, 2017), but were also aggrieved by their lack of involvement in the decisions around South Africa's initial bid application in the early 2000s.

Niel Viljoen (interview, 2017), a Karoo farmer and respected predation management expert,⁷⁸ drew on both his knowledge of local community dynamics and his experience of being involved with SARAO as a consultant on predation management, in reflecting on farmers' sense of uncertainty and loss. He related it to their personal histories of struggle to make a decent living on their farms:

For years it has been a struggle of survival for all of them. And what the SKA has come and done, he has absolutely put the cherry on the cake. They have lost now. ... What he has done all his life to get there, get the child through school, ... and the piece of land, the economic unit, to get the child through university and ... to get him on his feet. So, a love developed for the land. The land personally brought him, um, not prosperity, but personal... milestones ... and as I said, it was a lifelong battle and the SKA is coming now and everything has [changed] within a day or two, or in a year or two.

According to Viljoen, farmers struggled to trust SARAO because, from their perspective, basic information on the scope and timing of the SKA project had been constantly subject to change since the purchase of the first two farms in its core site in 2008. He commented that the SKA "arrived here on the sly and bit the farmer in the ass", a description which resonates strongly with accounts of the cunning associated with jackals.

Worth noting is that in contrast to their views of the SKA as unreliable, farmers tended to regard jackals as far more of a known entity in terms of behaviour. Franco (2017), an elderly farmer from the Williston region whose farm neighbours the SKA core site, explained the difference in these terms:

78 Although his farm does not border the SKA core site, he has been in conversation with numerous farmers in that area regarding the potential impact of the SKA as well as the best problem-management strategies that they should implement.

No, no jackals do not keep me up at night. ... I grew up with them, it's part of your farming. You do not lie awake about that [jackals], but the SKA is a problem. He's a big problem because you do not know what's going on. Today they say this, tomorrow they say that. There is ... nothing which you can rely on.

In 2017, the community-based organisation, Save the Karoo, highlighted on its website how “irregularities, confusing facts, and contradictions have cast shadows of scepticism and suspicion” over SARAO and their motives. Part of the problem lay in the way in which farmers and townsfolk interpreted shifts in the design and optimal configuration of the SKA antenna dishes after 2012. A major example was the location and number of spiral arms that were required to extend from the SKA's core site. While the original plans presented at local community meetings showed five spiral arms, in 2016 SKA SA decreased the number to three. As a result, only 71 properties were identified as requiring servitudes, compared to the original estimate of 220 (SKA SA, 2017). However, far from being relieved, farmers responded with suspicion, treating this change as evidence of the duplicity of the SKA. Similar mistrust emerged in relation to the final number of farms needed for the core site, which decreased from an initial 36 to 32 farms.

While the managers of the SKA project were at pains to explain that the technology involved in the design and construction of the SKA is evolving, which is consistent with the evolving nature of the science of radio astronomy, the farmers living with the uncertainty about whether their farm might be targeted for purchase or a servitude, interpreted the shifts as examples of the ad-hoc planning and/or lack of transparency of the SKA. In the words of Franco (2017):

I have no guarantee that they [SARAO] will tell me in a year or two that they also want me [my farm] because I mean, ... they have no blueprint on which they work. ... They just go along and learn as time unfolds.

Although SARAO officials confirmed at an information session I attended in October 2017 that by then all the properties they needed to acquire had been purchased, farmers remained suspicious about the potential for the scope of the project to expand. In 2019 a representative of the National Wool Growers Association and the Predation Management Forum referred to “a total breach of trust”, which he blamed on the SKA:

...from the SKA's side, they say they were honest but as the project expands, new things emerge, but I don't believe it, because when you start with a project then you know where the end of the project is. So, you have to have a plan in place. So, I really think that wool was pulled over the farmers' eyes in that area, which is a very big frustration at this stage (Du Toit, 2019).

Arguably, hunting jackals gives farmers a false sense of control, hence authority, on their land. Even though lethal control methods are not working effectively, given that farmers continue to face an onslaught from jackal (and caracal), they persist with these tactics because this allows them to feel they are doing something by dealing with individual problem animals. Similarly, although farmers were not able to stop the development of the SKA as a major international project with state backing, during the land acquisition programme they targeted the individual SARAO personnel with whom they were interacting, who thus bore the brunt of their mistrust. I observed the verbal onslaught that SARAO's stakeholder engagement officer and land acquisition manager often faced from farmers at public meetings. As with individual jackals, these officials were relatively easy targets on whom individual farmers were able to take out their frustrations.

From the side of SARAO, one member of staff described how the SKA had been promoted by "outsiders" who were then "villainised" (SARAO stakeholder engagement officer, 2019). He used these terms in reflecting on the farming community's mistrust towards the science project that was on display at a workshop aimed at unpacking the disputes between the SKA and anti-SKA advocacy groups in March 2018.

Jackal management and the Meerkat National Park

For Kareeberg farmers, their two antagonists – jackals and the SKA – became bound together ever more tightly as interlinked problems by the state's decision to declare the farms they had bought for the SKA a protected area, dedicated to scientific research, with SANParks the designated land management authority. This saw the hostility of farmers towards SARAO personnel extend to the environmentalists and natural scientists who were brought in by SARAO to conduct environmental monitoring and advise on the future management of the site as a national park. Now Kareeberg farmers found that they were being expected not only to accommodate the SKA as a major land user in the district, but also to adopt new ways of co-existing with jackals, in line with what they were being told was scientific research – scientific research that was at odds with what the farmers regarded as local knowledge derived from their experience as commercial farmers (Terblanche, 2020).⁷⁹

Ecologists lauded the proclamation of the Meerkat National Park as a positive contribution to conservation that, as noted by Hoffman and Gillson in Chapter Eight of this volume, substantially increases the area of land in the Nama Karoo that has

79 Here it is worth noting that this local knowledge draws on a different set of experiences from that informing the local knowledge of small-scale communal farmers in Namaqualand, discussed by Cupido et al. in Chapter Five of this volume.

formal protection status. At the same time, natural scientists working with SARAO were promoting recent research that shows that lethal predator control is counter-productive for the farmers who are practising it. This is because eliminating individual problem animals leads to “increased livestock losses the following year”, with studies showing a “statistically significant and substantial relationship” between predators culled in one year and livestock losses the following year (Natrass et al., 2019:1 222, 1 226). For James (2017), an ecologist at the South African Environmental Observation Network (SAEON) who was tasked with environmental monitoring at the SKA core site, farmers should see the jackal as a “necessary ecological vector”, in part because it assists in controlling rodent and insect populations on farmlands. Thus, he argued in an interview with me, farmers should consider the jackal a friend, not a foe – an impressive figure for co-existence, rather than a threat. By extension, farmers should also regard the SKA as something that they should learn to live with, rather than resist (James, 2017).

Jackal management was a major issue at the local stakeholder workshops I attended in Carnarvon and Williston in April/May 2018. These were organised by SARAO and SANParks representatives specifically to discuss the development of the SARAO National Park Management Plan. Dian, a farmer and active specialist predator hunter in the Williston region, noted at the meeting in Williston on 24 April 2018 that most farmers were not against conservation. Rather, they were objecting to the top-down approach by scientists and the fact that “the decisions have already been made” (Terblanche, 2020:149). However, at these meetings, farmers and predator hunters generally expressed strongly negative views towards the proposed park as a haven for problem jackals that would plague their farms. At a closed meeting in May 2018 between SARAO and farmers neighbouring the SKA core site, Gys, a prominent Williston farmer in his mid-60s, exclaimed in exasperation: “They [jackals] are not just ordinary problem animals, they are *ongediertes!*” (Terblanche, 2020:118).

At these meetings the power imbalance between scientific and local knowledge was very evident. At one of them, a SARAO staff member told the assembled farmers:

The SKA’s official position is that we do not hunt jackal. ... But I will go back to management and say this is what the farmers say But we must justify our actions. Not only nationally but also internationally. Farmers’ opinions are not good enough, there must be scientific backing (Terblanche, 2020:153).

At the same time, during these discussions there were hints that commercial farmers and SKA management might share a common interest in securing the Meerkat National Park through strengthening its boundary fence. For the handful of farmers I interviewed who were willing to engage with ways in which SARAO

could mitigate the problems that the SKA development had produced for them, fixing the dilapidated fencing on the boundaries of the SKA site was seen as a possible area of assistance, one that would increase the effectiveness of jackal management around the park (Terblanche, 2020). Such an intervention would go against the grain of the movement within conservation to move away from 'fortress conservation' premised on tightly sealing off protected areas from surrounding lands (Jones & Murphee, 2004; Siurua, 2006). However, in a telephone conversation with me in July 2019, SARAO's stakeholder engagement officer elaborated on the interest that SARAO itself had in securing the borders of the park, and thereby enhancing security around what was a proclaimed National Key Point.⁸⁰ He noted that consideration was being given to erecting "a double fence on SARAO's expense" and, furthermore, possibly electrifying it, although that would have to be done "in consultation with the radio frequency specialist" (SARAO stakeholder engagement officer, 2019). At approximately 200 kilometres in length, the cost of erecting this new fence was estimated to be in the region of ZAR35 million.

While farmers interest in the fence was to keep animal trespassers inside the new park, SARAO's interest was to keep human trespassers outside the park. Thus by 2019, although many local people continued to have strong reservations about the SKA, the discussion of fencing was pointing to a potentially new phase in the relationship between the SKA, as the new landowner, and the farmers on the borders of its core site.

Conclusion

For both the farmers whose farms were bought up during the SKA's land acquisition programme and those now living on the perimeter of or near the new national park, the SKA has been an unwelcome intrusion into 'their' district. In large part this is because of farmers' fears about the impact of the SKA on the local, agriculture-based economy and their community and established social hierarchies. Very prominent among these fears are farmers' concerns about what the SKA and the declaration of its site as a national park will mean for their dealings with the local jackal population. They predict that jackals will become an even greater threat to livelihoods than they already are, as a result of the decline in farming activities in the area and what they anticipate will be the poor management of the new park, including its boundary fence.

80 According to South Africa's National Key Points Act of 1980 (RSA, 1980), areas related to the country's security, areas that are of strategic importance (such as in the case of the SKA core site) and/or those that are of public interest, may be declared as national key points by the Minister of Defence.

How best to manage the jackal as a major mesopredator has thus emerged as a potent concern and point of friction in relationships between the SKA, ecologists, and commercial farmers in the Upper Karoo. Given the very different perspectives of the parties on this issue, the benefits of farmers 'learning to live with the jackal', as advocated by ecologists, could be extended to the benefits of all three interest groups – farmers, SARAO and ecologists – learning to live with one another. This, however, is a process that will require far greater levels of interpersonal and institutional trust than was evident during the research presented here, along with collective action by all stakeholders to respect both scientific and local knowledge in developing management strategies for the park. In this regard, the issue of securing the perimeter of the SKA site could represent a useful starting point for dialogue, given the potential convergence of interests among farmers and SARAO on this issue. However, how this dynamic will play out in practice remains to be seen.

For white commercial farmers in the Kareeberg in the second decade of the twenty-first century, the jackal and the SKA were closely connected threats to both their livelihoods and what they have regarded as the 'natural' order of things in the Karoo. In addition to the financial and emotional costs associated with both these threats, farmers' animosity towards what they think of as intruders on their land also lies with the fact that their autonomy – being *baas van die plaas* – is under siege. Both jackals and the SKA contravene white commercial farmers' understanding of the 'natural', i.e., the social, order in the Karoo. Both undermine farmers' continued dominance over the land and what happens on it. The issue is not simply that they are both unwelcome threats, but also that the SKA development is seen as actively aiding the jackal and that farmers' understanding of how to deal with the serious problem of predation is treated dismissively.

This research supports a point made by Hytten (2009:18), that the social construction of an animal as either a pest or a protected species is "underpinned by different versions of the nature–culture dichotomy". The depiction of jackals as *skelm* by the farmers I interviewed is consistent with characteristics attributed to them in South African folktales, comic strips and fiction over generations. Despite mainstream ecological and scientific discourse about jackal behaviour and diet, these cultural artefacts reflect and reinforce the overwhelmingly negative views commercial farming communities have about these animals. As jackals and the SKA "dare to compete with humans" (Bough, 2006:394), they challenge not only commercial Karoo farmers' livelihoods but also their sense of community and emotional attachment to the Karoo as a place of extensive, family-owned sheep farms.

While major land-use changes are occurring in the Kareeberg and elsewhere in the Karoo, it is likely, as Walker et al. (2018:15) have argued, that livestock farming will continue to be the major land-use in much of this region into the foreseeable future. This means that it is incumbent on the state and life scientists to work with farmers in securing ecologically and socially sustainable livelihoods through effective predation management methods. The need for all the actors in this conflict, human and non-human, to find ways of co-existence will therefore remain.

Acknowledgements

This work is based on research supported by the South African Research Chairs Initiative (SARChI) of the Department of Science and Innovation (DSI) and the NRF of South Africa (Grant No. 98765). The financial assistance of the NRF towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.

References

- Apps, P. 2000. *Wild Ways: Field Guide to the Behaviour of Southern African Mammals*. Cape Town: Struik.
- Arluke, A. & Sanders, C.R. 1996. *Regarding Animals*. Philadelphia: Temple University Press.
- Atkinson, D. 2019. When Stars Collide: Competing Development Paradigms in the Central Karoo. *Journal of Southern African Studies*, 45(4):689–709. <https://doi.org/10.1080/03057070.2019.1645481>.
- Atkinson, D., Wolpe, R. & Kotze, H. 2017. *Socio-economic assessment of SKA phase 1 in South Africa*. [Online]. <http://www.skaphase1.csir.co.za/wp-content/uploads/2017/01/SocioEconomic-Assessment.pdf> [Accessed 27 January 2023].
- Becker, H.S. 1963. *Outsiders: Studies in the Sociology of Deviance*. London: The Free Press of Glencoe.
- Beinart, W. 2003. *The Rise of Conservation in South Africa: Settlers, Livestock, and the Environment 1770–1950*. New York: Oxford University Press. <https://doi.org/10.1093/oso/9780199261512.001.0001>.
- Benavides, P. 2013. Animal Symbolism in Folk Narratives and Human Attitudes towards Predators: An Analysis of their Mutual Influences. *Folklore*, 124(1):64–80. <http://dx.doi.org/10.1080/0015587X.2013.767484>.
- Binneman, A. & Davis, C. 2021. From Management to Engagement: How South Africa's Square Kilometer Array Project Transformed Its Interactions With Stakeholder Groups. In: A.P. Kaminski (ed.). *Space Science and Public Engagement: 21st Century Perspectives and Opportunities*. Amsterdam. Elsevier. 221–243. <https://doi.org/10.1016/B978-0-12-817390-9.00006-3>.
- Bothma, J.D. 2012. Literature review of the ecology and control of the black-backed jackal and caracal in South Africa. [Online]. <http://www.capenature.co.za/wp-content/uploads/2014/02/Literature-Review-of-the-Ecology-and-Control-of-black-backed-jackal-and-caracal-Bothma-2012.pdf>. [Accessed 8 June 2016].
- Bough, J. 2006. From value to vermin: A history of the donkey in Australia. *Australian Zoologist*, 33(3):388–397. <https://doi.org/10.7882/AZ.2006.013>.
- Brassine, M.C. 2011. The diet and ecological role of black-backed jackals, *Canis mesomelas*, in two conservation areas in the Eastern Cape province, South Africa. MSc thesis. Grahamstown: Rhodes University.
- Butler, S.S. 2018. Knowledge relativity: Carnarvon residents' and SKA personnel's conceptions of the SKA's scientific and development endeavours. MA thesis. Stellenbosch: Stellenbosch University.
- Chinigò, D. 2019. From the 'Merino Revolution' to the 'Astronomy Revolution': Land Alienation and Identity in Carnarvon, South Africa. *Journal of Southern African Studies*, 45(4):749–766. <https://doi.org/10.1080/03057070.2019.1642028>.
- Christiaan. 2017. Personal interview, 10 July. Farm in Kareeberg Local Municipality.
- Conrad. 2017. Personal interview, 16 October. Williston.
- De Prada-Samper, J.M. (ed). 2016. *The man who cursed the wind and other stories from the Karoo – Die man wat die wind vervloek het en ander stories van die Karoo*. Cape Town: African Sun Press.

- Decker, D.J. & Chase, L.C. 1997. Human Dimensions of Living with Wildlife: A Management Challenge for the 21st Century. *Wildlife Society Bulletin*, 25(4):788–795. <https://www.jstor.org/stable/3783724>.
- Drouilly, M., Natrass, N. & O’Riain, M.J. 2017. Dietary niche relationships among predators on farmland and a protected area. *The Journal of Wildlife Management*, 82(3):1–12. <http://dx.doi.org/10.1002/jwmg.21407>.
- Drouilly, M., Tafani, M., Natrass, N. & O’Riain, J. 2018. Spatial, temporal and attitudinal dimensions of conflict between predators and small-livestock farmers in the Central Karoo. *African Journal of Range & Forage Science*, 35(3&4):245–255. <http://dx.doi.org/10.2989/10220119.2018.1522669>.
- Drouilly, M., Natrass, N. & O’Riain, M.J. 2021. Beauty or beast? Farmers’ dualistic views and the influence of aesthetic appreciation on tolerance towards black-backed jackal and caracal. *PLoS ONE*, 16(3):1–20. <http://dx.doi.org/10.1371/journal.pone.0248977>.
- Du Toit, G. 2019. Personal interview, 3 April. Somerset West.
- Elsabe. 2017. Personal interview, 16 May. Farm in Karoo Hoogland Local Municipality.
- Franco. 2017. Personal interview, 18 May. Farm in Karoo Hoogland Local Municipality.
- Frederich. 2017. Personal interview, 11 May. Vanwyksvlei.
- Gastrow, M. 2014. The stars in our eyes: Representations of the Square Kilometre Array telescope in the South African media. PhD dissertation. Stellenbosch: Stellenbosch University.
- Gastrow, M. 2015. Science and the Social Media in an African Context: The Case of the Square Kilometre Array Telescope. *Science Communication*, 1–20. <http://dx.doi.org/10.1177/1075547015608637>.
- Gastrow, M. & Oppelt, T. 2019. The Square Kilometre Array and Local Development Mandates in the Karoo. *Journal of Southern African Studies*, 45(4):711–728. <https://doi.org/10.1080/3057070.2019.1642679>.
- Gawie. 2017. Personal interview, 12 May. Farm in Kareeberg Local Municipality.
- Genis, A. 2016. *Landelike insig: Wantroue oor grondverkope aan SKA*. [Online]. <http://m24lbarg01.naspers.com/argief/berigte/landbouweekblad/2016/05/06/LB/36/01.html> [Accessed 29 October 2016].
- Holm, N. 2012. Consider the Squirrel: Freaks, Vermin, and Value in the Ruin(s) of Nature. *Cultural Critique*, 80:56–95. <http://dx.doi.org/10.1353/cul.2012.0005>.
- Hytten, K.F. 2009. Dingo dualisms: Exploring the ambiguous identity of Australian dingoes. *Australian Zoologist*, 35(1):18–27. <https://doi.org/10.7882/AZ.2009.003>.
- Ivan. 2017. Personal interview, 28 June. Farm in Karoo Hoogland Local Municipality.
- James. 2017. Personal interview, 16 October. Williston.
- Jansen, C. 2016. Diet of key predators responsible for livestock conflict in Namaqualand, South Africa. MSc thesis. Stellenbosch: Stellenbosch University.
- Jones, B.T.B. & Murphee, M.W. 2004. Community-Based Natural Resource Management as a Conservation Mechanism: Lessons and Directions. In: B. Child (ed.). *Parks in Transition: Biodiversity, Rural Development and the Bottom Line*. London: Earthscan.
- Kamler, J.F., Klare, U. & Macdonald, D.W. 2012. Seasonal diet and prey selection of black-backed jackals on a small-livestock farm in South Africa. *African Journal of Ecology*, 50(3):299–307. <http://dx.doi.org/10.1111/j.1365-2028.2012.01324.x>.

- Kirsten, J.F. 2016. *An estimation of the agricultural economic and local economic impact of phase 1 of the SKA* (Final Draft). Pretoria: University of Pretoria. [Online]. <https://www.sarao.ac.za/wp-content/uploads/2019/03/Agriculture-Economic-Study.pdf> [Accessed 26 January 2023].
- Madden, F. 2004. Creating Coexistence between Humans and Wildlife: Global Perspectives on Local Efforts to Address Human–Wildlife Conflict. *Human Dimensions of Wildlife*, 9(4):247–257. <https://doi.org/10.1080/10871200490505675>.
- Maghiel. 2017. Personal interview, 4 July. Farm in Karoo Hoogland Local Municipality.
- Minnie, L. 2016. Effects of lethal management on black-backed jackal population structure and source-sink dynamics. PhD thesis. Port Elizabeth: Nelson Mandela Metropolitan University.
- Natrrass, N. & Conradie, B. 2015. Jackal Narratives: Predator Control and Contested Ecologies in the Karoo, South Africa. *Journal of Southern African Studies*, 41(4):19. <https://doi.org/10.1080/03057070.2015.1049484>.
- Natrrass, N., Conradie, B., Stephens, J. & Drouilly, M. 2019. Culling recolonizing mesopredators increases livestock losses: Evidence from the South African Karoo. *Ambio*, 49:1 222–1 231. <http://dx.doi.org/10.1007/s13280-019-01260-4>.
- Natrrass, N., Drouilly, M. & O’Riain, M.J. 2020. Learning from science and history about black-backed jackals *Canis mesomelas* and their conflict with sheep farmers in South Africa. *Mammal Review*, 50(1):101–111. <https://doi.org/10.1111/mam.12179>.
- Palmer, E. 1966. *The Plains of Camdeboo*. Rivonia: Lowry Publishers.
- Pharos Dictionary*. 2010. Cape Town: NB Publishers.
- Redpath, S.M., Gutiérrez, R.J., Wood, K.A., Sidaway, R. & Young, J.C. 2015. An introduction to conservation conflicts. In: S.M. Redpath, R.J. Gutiérrez, K.A. Wood & J.C. Young (eds). *Conflicts in conservation: Navigating towards solutions*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9781139084574>.
- Republic of South Africa (RSA). 1980. National Key Points Act 102 of 1980. Pretoria: Government Printing Works.
- RSG Geldsake. 2019. Radio Sonder Grense. [Radio broadcast]. 12 March.
- SARAO stakeholder engagement officer. 2019. Written response, 17 July. Stellenbosch.
- Save the Karoo. 2017. SKA is ruining the Karoo’s future [Online]. <http://savethekaroo.com/> [Accessed 7 October 2018].
- Siurua, H. 2006. Nature Above People: Rolston and “Fortress” Conservation in the South. *Ethics and the Environment*, 11(1):71–96. <http://dx.doi.org/10.1353/een.2006.0006>.
- Square Kilometre Array South Africa (SKA SA). 2015. Promising future for young achievers, *SKA SA Northern Cape News*, 1:4.
- Square Kilometre Array South Africa (SKA SA). 2016. SKA SA extends a hand of cooperation, *SKA SA Northern Cape News*, 3:1.
- Square Kilometre Array South Africa (SKA SA). 2017. Overview of SKA SA programmes: Input to Kareeberg Municipality IDP. Carnarvon: Square Kilometre Array South Africa.
- Square Kilometre Array South Africa (SKA SA). n.d.a. LAP South Africa Land Acquisition Programme. Information Brochure. [Online]. http://www.ska.ac.za/wp-content/uploads/2016/06/lap_brochure.pdf [Accessed 26 January 2023].

- Square Kilometre Array South Africa (SKA SA). n.d.b. Strategic Environmental Assessment for SKA Phase 1 Mid-Frequency Array. [Online]. <https://www.ska.ac.za/about/strategic-environmental-assessment/> [Accessed 26 January 2023].
- Terblanche, R. 2020. *Ongediertes: A critical qualitative study of farmer–black-backed jackal conflict and its management around the Square Kilometre Array core site in the Northern Cape, South Africa*. PhD dissertation. Stellenbosch: Stellenbosch University.
- Turpie, J.K. & Akinyemi, B.E. 2018. The socio-economic impacts of livestock predation and its prevention in South Africa. In: G. Kerley, S. Wilson & D. Balfour (eds). *Livestock predation and its management in South Africa: A scientific assessment*. Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela University.
- Van de Ven, T.M.F.N., Tambling, C.J. & Kerley, G.I.H. 2013. Seasonal diet of black-backed jackal in the Eastern Karoo, South Africa. *Journal of Arid Environments*, 99(3):23–27. <http://dx.doi.org/10.1016/j.jaridenv.2013.09.003>.
- Van Niekerk, J. 2018. Afrikaans stories of jackal and hyena: Oral and written traditions. *Tydskrif vir Letterkunde*, 55(3):80–95. <https://doi.org/10.17159/2309-9070/tvl.v.55i3.5511>.
- Viljoen, N. 2017. Personal interview, 20 May. Farm in Ubuntu Local Municipality.
- Walker, C. 2022. Out of bounds: Environmental justice and the Square Kilometre Array radio telescope in South Africa's Northern Cape Karoo. In: G. Wynn, J. Carruthers & N.J. Jacobs (eds). *Environment, Power, and Justice: Southern African Histories*. Athens OH: Ohio University Press.
- Walker, C. & Chinigò, D. 2018. Disassembling the Square Kilometre Array: Astronomy and development in South Africa. *Third World Quarterly*, 39(10):1–19. <https://doi.org/10.1080/01436597.2018.1447374>.
- Walker, C., Chinigò, D. & Dubow, S. (eds). 2019. Karoo Futures: Astronomy in Place and Space. Special issue, *Journal of Southern African Studies*, 45(4):667–790. <https://doi.org/10.1080/03057070.2019.1654664>.
- Walker, C., Milton, S.J., O'Connor, T.G., Maguire, J.M. & Dean, W.R.J. 2018. Drivers and trajectories of social and ecological change in the Karoo, South Africa. *African Journal of Range & Forage Science*, 35(3&4):157–177. <http://dx.doi.org/10.2989/10220119.2018.1518263>.
- Wild, S. 2012. *Searching African Skies: The Square Kilometre Array and South Africa's Quest to hear the Songs of the Stars*. Johannesburg: Jacana Media.
- Wittenberg, H. 2014. The Boer and the Jackal: Satire and resistance in Khoi orature. *Critical Arts*, 28(4):593–609. <http://dx.doi.org/10.14426/mm.v11i1.24>.

Chapter 8

Conserving the Karoo: Traditional approaches, new developments, and future challenges

M. Timm Hoffman and Lindsey Gillson

The conservation context

The Karoo is a semi-arid to arid region in the central and western parts of South Africa and comprises two biomes, which differ in size, geology, rainfall, biodiversity, and land use (Mucina & Rutherford, 2006). The Nama Karoo biome covers 19.5% of South Africa and receives its rain predominantly in the summer months. The Succulent Karoo biome covers 6.5% of the country and rain falls predominantly in winter (Walker & Hoffman, Chapter One in this volume). Both are dwarf shrublands, but the Succulent Karoo is higher in plant species richness and endemism, especially within the Aizoaceae comprising predominantly leaf succulent dwarf shrubs. Around 6 350 species of vascular plants occur in the Succulent Karoo, of which nearly 40% are endemic to the biome. Although the Nama Karoo is less well-studied it has far fewer species (ca. 2,147) with low levels of endemism (Mucina & Rutherford, 2006).

Both of these biomes, hereafter referred to collectively as ‘the Karoo’, have a long history of human use, notably pastoralism and mining (Walker & Hoffman, Chapter One). Such activities have often impacted negatively on the environment with important consequences for current and future land users (Milton & Dean, 2021). For example, degradation, due to overgrazing and ploughing, especially in the nineteenth and early twentieth centuries (Hoffman et al., 2018a) has increased the dominance of unpalatable plants and has resulted in a shift from perennial to annual plants (Todd & Hoffman, 2009). This has reduced forage quality and resilience to drought and has had negative effects on biodiversity and ecosystem services (Boardman et al., 2010; Le Maitre et al., 2009). Overgrazing has been driven by several historical factors, including a boom in wool prices in the first half of the twentieth century, as well as the disruption of traditional transhumant and other adaptive grazing practices (Cupido et al., Chapter Five in this volume).

Further restrictions to land access were also implemented in the colonial and apartheid eras, when subsistence agropastoralists were forced into overcrowded commonage areas (Beinart, 2018; Samuels et al., 2018). Kraaling exacerbated degradation by increasing the daily movement of livestock and concentrating many animals in a small area (McManus et al., 2018). Rangeland degradation has been worsened by the introduction of alien species such as *Prosopis* spp. to boost fodder provision. Mining has also impacted on the landscape and its biodiversity (Carrick & Kruger, 2007). Restoration efforts have met with varying degrees of success as re-establishing vegetation cover is challenging in the dry conditions and veld recovery may take decades or even centuries (Henschel et al., 2018; Seymour et al., 2010).

Given the pressures that face the Karoo, what role has conservation played to prevent, reduce, or mitigate these impacts and how should it respond to future threats? The implementation of national legislation from the 1960s opened the way for the designation of protected and conservation areas. However, it was the recognition of the distinct biodiversity of the Succulent Karoo in the 1990s, which coincided with the emergence of an international focus on global biodiversity hotspots (Myers, 1988; Myers et al., 2000), that resulted in an exponential increase in the area of the Karoo under formal conservation protection. Biodiversity hotspots are areas of exceptional biological diversity, but which are under significant threat from habitat loss. The realisation that the Succulent Karoo was an area of unparalleled plant, insect, and reptile diversity (Cowling et al., 1999), galvanised efforts to conserve the region, for example through the Critical Ecosystem Partnership Fund (CEPF) and the Succulent Karoo Ecosystem Program (SKEP). The success of these initiatives has depended on the participation of private landowners and stewardship schemes. The fall in wool prices and subsequent and ongoing destocking of the Karoo (Hoffman et al., 2018a), has, in turn, created opportunities for conservation of land that was formerly in high demand for livestock farming. The reduction in state support for commercial livestock production and the relatively recent emergence of game farming and ecotourism as economically viable options for landowners has provided additional incentives for the expansion of conservation related activities in the Karoo (Manyani, Chapter Six).

Despite these efforts, the open landscapes of the Karoo, where sheep and goat farming once dominated, have been reduced, or fragmented in places through the introduction of new forms of land use (Walker & Hoffman, Chapter One). Despite the progress in protecting biodiversity inside and outside of Protected Areas (PAs), several corporate and state actors with interests in the mining and energy sectors wish to exploit the natural assets and resources of the Karoo. For example, in the last two decades, significant numbers of wind turbines and photovoltaic installations have been established in the region (Hoffman et al., 2018a). This renewable energy

infrastructure is associated with many kilometres of transmission lines, which have a significant impact on large flying birds (Dean et al., 2018). Prospecting rights for oil, gas, and diamond mining along the west coast of South Africa and Namibia have recently been granted (Masterson, 2021). Applications for the mining of uranium and several heavy metals in the Northern Cape are also under consideration. If mining for shale gas (fracking) occurs, large parts of the Nama Karoo biome could be affected with negative consequences for the region's biodiversity (Todd et al., 2016; Xaba, Chapter Eleven). In the last few years, the theft of succulent plants and selected insects and reptiles from the Succulent Karoo biome has emerged as a significant threat to the region's biodiversity (Maluleke & Shibambu, 2021). In some cases, entire populations of Conophytums and other highly valued succulent plants have been removed and sold to both local and international collectors.

In this chapter, we argue that the rise of conservation and expansion of the protected area network in the Karoo has not been the same for the two biomes. Rather, differences in biodiversity and land-use history, as well as how these have been portrayed have played an important role in the different conservation trajectories for the two biomes. We further argue that an evolving set of policies and instruments have been used effectively by both the local and international community to increase the area under conservation protection, especially in the Succulent Karoo biome. We first describe the different types of areas that have been set aside for conservation in the Karoo and their combined sizes. We then show how the history of protected area expansion has differed between the Nama Karoo and Succulent Karoo biomes. We highlight the local, national, and international stakeholders who have influenced these changes and outline the impact of a few key institutions, initiatives, and individuals. The few studies that explore the contribution that conservation makes to regional economies are summarised. We also explore how the approach to conservation in the Karoo has changed over time in response to financial constraints, declining institutional capacity, and efforts to find a more inclusive model of conservation management. Finally, we suggest several alternative and complementary approaches to the protected area model of conservation, which are necessary to better integrate conservation and development in a more sustainable manner.

An overview of Protected Areas (PAs) and Conservation Areas (CAs) in the Karoo

The South African Department of Forestry, Fisheries, and the Environment (DFFE) is legally obliged to maintain a register and GIS inventory of all areas set aside for conservation in the country (DFFE, 2022a). A major distinction is made between lawfully declared and gazetted Protected Areas (PAs) and Conservation Areas (CAs), which are also managed for biodiversity conservation but are not declared

and gazetted. In this arrangement, PAs enjoy greater protection under law than is the case for CAs and are also far more restrictive in terms of the purposes for which the land may be used. Information, such as the size and date of declaration for PAs and CAs, are maintained in two separate databases (DFFE, 2022a, 2022b). Several types of environmental protection are also recognised within the main PA and CA categories (Department of Environmental Affairs (DEA), 2013). The different types of Protected Areas that occur in the Karoo include World Heritage Sites, National Parks, Nature Reserves, Protected Environments, Mountain Catchment Areas, and Forest Wilderness Areas while the types of Conservation Areas in the Karoo include Biosphere Reserves and Botanical Gardens (Box 8.1). Other Effective Area-Based Conservation Measures (OECMs) is a term that has recently gained traction and includes a range of conservation approaches with varying degrees of protection. Some of the types of areas under conservation protection also have a few sub-types, with their own provenance and legally circumscribed, conservation mandate. Foremost among the laws that delimit the categories, types and sub-types is the National Environmental Management Act (NEMA) (107/1998) and its complementary legislation, such as the Protected Areas Act (57/2003) and the Biodiversity Act (10/2004). Paterson (2009), SANBI (2018a) and De Vos et al. (2019) provide useful summaries of the legal framework for conservation protection in South Africa and its historical development. Pool-Stanvliet (2013) outlines the legislative challenges as they pertain to the designation of Conservation Areas within UNESCO's 'Man and the Biosphere Programme' in South Africa.

Box 8.1 **The main types and sub-types of conservation protection in the Karoo within the Protected Area (PA) and Conservation Area (CA) categories, as found in two separate registers maintained by the South African Department of Forestry, Fisheries, and the Environment (DFFE), and a description of their main characteristics (More formal and lengthier definitions may be found in DEA (2013), SANBI (2018a) and StatsSA (2021))**

PROTECTED AREAS (PAs) – Legally declared and gazetted in accordance with the National Environmental Management: Protected Areas Act, (57/2003) and amendments unless stated otherwise. GIS inventories of all PAs are maintained in the South African Protected Areas Database (SAPAD) (DFFE, 2022a).

World Heritage Sites: A cultural or natural area of outstanding international importance worthy of protection. Declared in terms of the World Heritage Convention Act (49/1999) and included in the World Heritage List maintained by the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

National Parks: Protected areas of national or international importance managed by the South African National Parks for the conservation of biodiversity, landscapes, and cultural heritage assets in the national parks system of South Africa.

Nature Reserves: Areas with significant biodiversity and other features of scientific, cultural, historical, or archaeological interest in need of long-term protection. Provision is also made for the sustainable use of goods and services by local communities in nature reserves and for these areas to provide for recreation and tourism opportunities. Formally declared Nature Reserves may be under the authority of a province, municipality, or private landowner.

Protected Environments: Areas with important biological diversity and other features of scientific, cultural, historical, or archaeological value occurring outside of world heritage sites and nature reserves which can be protected from development by the collective action of landowners to ensure the sustainable use of natural resources.

Mountain Catchment Area: Usually located in important water catchment areas, MCAs are managed for sustainable streamflow, conservation, recreation, and other related activities under the Mountain Catchment Areas Act (63/1970) (and its various updates).

Forest Wilderness Area: A special protected area declared by the Minister in terms of the National Forests Act (84/1998) primarily for scientific research or environmental monitoring purposes.

CONSERVATION AREAS (CAs) – Not legally declared and gazetted although they may enjoy some form of international or national designation. GIS inventories of all CAs are maintained in the South African Conservation Areas Database (SACAD) (DFFE, 2022b).

Biosphere Reserves: Internationally designated natural areas of global or regional biological conservation significance which form part of UNESCO's Man and the Biosphere (MAB) Programme. Land use can range from full conservation protection in core areas to buffer zones and transition areas where the ecologically sustainable use of natural resources is accepted (Nations, 2001; Pool-Stanvliet & Coetzer, 2020).

Botanical Gardens: State land considered suitable for the establishment of a botanical garden which may be declared by the Minister in terms of the National Environmental Management: Biodiversity Act (10/2004) for the establishment, protection, research, and display of plants.

Other Effective Area-Based Conservation Measures (OECMs) or Biodiversity Partnership Areas: (e.g., Conservancies, Stewardships). These are arrangements between landowners that are not recognised in terms of South African environmental legislation as protected areas. They contribute to the wider conservation estate. Biodiversity conservation is sometimes an ancillary rather than a primary objective (Mitchell et al., 2018).

The extent of the protected area network in the Karoo

For this chapter, data indicating the extent of PAs and CAs in the Karoo were derived from different sources. The area covered by the main types of PAs in the Nama Karoo and Succulent Karoo biomes was taken directly from Statistics South Africa (StatsSA) (2021). This is an official record compiled according to international standards and draws on information in the South African Protected Areas Database (SAPAD) (DFFE, 2022a) up to the end of 2020. Data for the Biosphere Reserves

and Botanical Gardens (i.e., the two types of CAs found in the Karoo) are not provided in Statistics South Africa (StatsSA) (2021) and were, therefore, derived from an examination of the South African Conservation Areas Database (SACAD) (DFFE, 2022b) up to the end of the first quarter of 2022. Data for individual National Parks and the different types of Nature Reserves, which are also not provided in StatsSA (2021), were computed from the South African Protected Area Database (SAPAD) (DFFE, 2022a) up to the end of the first quarter of 2022. To determine these values, spatial data were downloaded from SAPAD and SACAD and overlain on the 2018 Vegetation Map of South Africa (SANBI, 2018b). Sites that overlapped with the Succulent Karoo and Nama Karoo biomes were identified and their area summed for each biome. A summary table of the number and areal extent (ha) of all PAs and CAs in the Karoo, derived from these sources, is shown in Table 8.1, and their spatial arrangement across the two Karoo biomes is displayed in Figure 8.1 below.

Table 8.1 The number and areal extent (ha) of different types of Protected Areas (PAs) and Conservation Areas (CAs) and their percentage area covered relative to the total area of the Nama Karoo biome (comprising 24 828 214 ha) and the Succulent Karoo biome (8 366 177 ha) (StatsSA, 2021; DFFE, 2022b)⁸¹

Category and type of conservation protection	Nama Karoo			Succulent Karoo		
	No.	Area (ha)	%	No.	Area (ha)	%
PROTECTED AREA (PA)						
World Heritage Site	0	-	-	2	94 023	1.1
National Park	7	282 880	1.1	3	301 943	3.6
Nature Reserve	38	124 697	0.5	54	220 748	2.6
Protected Environment	5	147 866	0.6	0	-	-
Mountain Catchment Area	0	-	-	9	3 613	0.04
Forest Wilderness Area	0	-	-	2	162	0.002
Total PA	50	555 443	2.2	70	620 489	7.3
CONSERVATION AREA (CA)						
Biosphere Reserve	1	84 797	0.3	2	705 967	9.2
Botanical Garden	0	-	-	2	3 308	0.04
Total CA	1	84 797	0.3	4	709 275	9.2
Total PA & CA	51	640 240	2.5	74	1 329 764	16.6

81 Data for the World Heritage Sites and Biosphere Reserves show only the portions not overlapping with other types of PAs.

This accounting shows that the two biomes differ substantially in terms of the area and proportion of the biome allocated to the different conservation categories and types (Table 8.1, Figure 8.1). The main differences lie in the extent of the biome designated as World Heritage Sites, Protected Environments and Biosphere Reserves. Nearly 800 000 ha of the area set aside for conservation protection in the Succulent Karoo biome is designated either as a World Heritage Site or Biosphere Reserve, with the latter making up nearly 90% of this total. The largest World Heritage Site in the Succulent Karoo biome is the Richtersveld Cultural and Botanical Landscape. It covers 94 023 ha of land not already allocated as a National Park or Nature Reserve (StatsSA, 2021), and forms part of the larger |Ai-|Ais/Richtersveld Transfrontier Park with Namibia. By comparison, the Gouritz Cluster Biosphere Reserve (GCBR) covers an area of 705 967 ha in the Succulent Karoo biome, which is 7.5 times larger than this. Nearly 90% of the Karoo component of the GCBR occurs in the Succulent Karoo biome, with only about 10% represented in the Nama Karoo biome.

In contrast with the Succulent Karoo biome, there are no World Heritage Sites in the Nama Karoo biome, and the GCBR is the only Biosphere Reserve in this biome (Table 8.1). Instead, the recent emphasis in the Nama Karoo biome has been on the establishment of Protected Environments, of which there are five, comprising nearly 20% of the total area under conservation protection in the biome. Conversely, Protected Environments are not represented at all in the Succulent Karoo biome according to the StatsSA report (2021).

The total area set aside for National Parks in the Karoo is more evenly allocated between the two biomes, although the proportion of the biome comprising National Parks is three times greater in the Succulent Karoo than the Nama Karoo biome (Table 8.1). For example, 282 880 ha are contained in seven National Parks in the Nama Karoo biome (1.1% of the biome) and 301 943 ha in three National Parks in the Succulent Karoo biome (3.6%). The average size of these parks is also 2.4 times greater in the Succulent Karoo than the Nama Karoo biome. Furthermore, the Meerkat National Park near Carnarvon in the Nama Karoo biome has only recently been declared (in 2020) (on this see Terblanche, Chapter Seven), and its 134 955 ha have more than doubled the area conserved by National Parks in the biome.

The number of reserves and total area conserved in Nature Reserves are also greater in the Succulent Karoo biome than in the Nama Karoo biome (Table 8.1). The former supports 220 748 ha in 54 Nature Reserves, while the latter has 38 Nature Reserves, comprising 124 697 ha. Although relatively small in terms of the area that they cover, nine mountain catchment areas, two forest wilderness areas and two botanical gardens are types of PAs and CAs that are found in the Succulent Karoo biome only. Protected Environments, on the other hand, are only found in the Nama Karoo biome and comprise more than a quarter of the area within the PA category (StatsSA, 2021).

Overall, there is currently a 6.6 times greater proportion of the Succulent Karoo biome (16.6%) under some form of conservation protection than is the case for the Nama Karoo biome (2.5%) (Table 8.1). However, if the CAs (i.e., land associated with the biosphere reserves and botanical gardens) are excluded from this comparison, then only 7.3% of the Succulent Karoo biome and 2.2% of the Nama Karoo biome are protected.

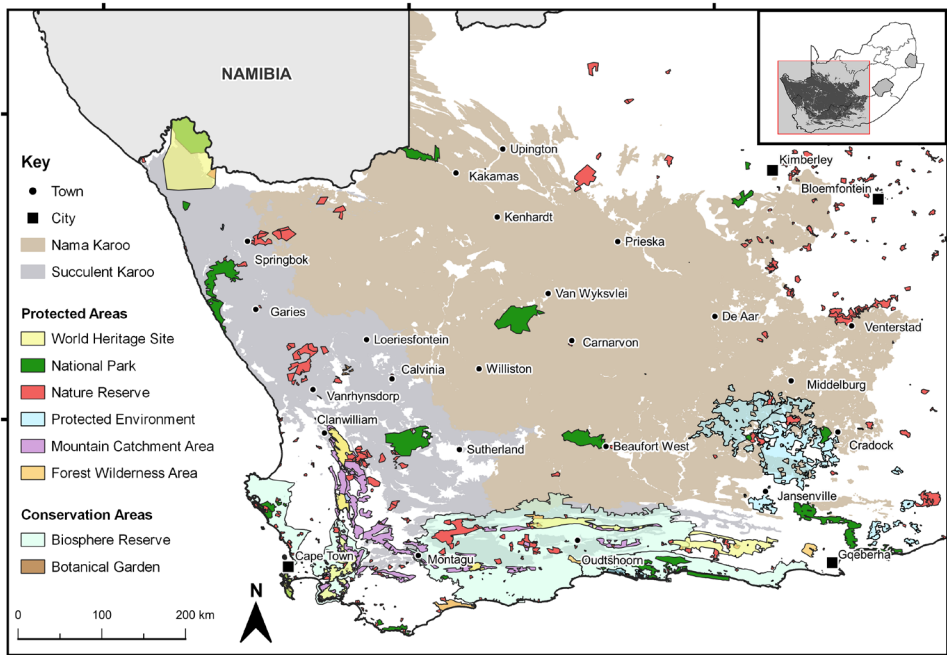


Figure 8.1 The distribution of different conservation types in the Nama Karoo and Succulent Karoo biomes

Historical development of the protected area network in the Karoo

The greater focus on conservation in the Succulent Karoo biome relative to the Nama Karoo biome has not always been the case. The two biomes have experienced different histories in terms of how the area under formal conservation protection has increased over time (Figure 8.2), as well as the contribution that has been made by landowners and civil society. In 1970, just before Edwards (1974) reported on the conservation status of South African vegetation, only 1 518 ha (0.02%) of the Succulent Karoo biome and 53 940 ha (0.2%) of the Nama Karoo biome was

formally protected in either a national park or nature reserve (StatsSA, 2021). Edwards (1974) considered this lack of protection for the vegetation of the Karoo region in general to be one of the “major conservation deficiencies” in South Africa.

Reasons for this deficiency included the lack of systematic conservation planning approaches and tools, as well as an inadequate policy framework. The Karoo was also perceived as a rangeland with limited tourist potential and there was little appreciation for the spectacular diversity and high levels of diversity and endemism that existed in the flora of the Succulent Karoo especially. This meant that efforts before 1990 were somewhat ad hoc and poorly co-ordinated, which resulted in an unrepresentative system of reserves (Paterson, 2009) focused, in part, on the protection of large mammals (e.g., mountain zebra). This changed with the advent of systematic conservation planning as both an academic and practical discipline (Cowling & Pressey, 2003). The area under conservation protection also increased because of the revision of South Africa’s conservation legislation, noted earlier, which regulated the planning, protection, and use of the country’s biodiversity. It was by using these conservation planning tools (Lombard et al., 1999) within the country’s newly crafted legislative framework that the National Protected Area Expansion Strategy (NPAES) for South Africa was first developed in 2008 (DEA, 2008) and then updated in 2016 (DEA, 2016). This strategy sets 20-year targets for protected area expansion, maps their distribution, and makes recommendations on how to achieve them.

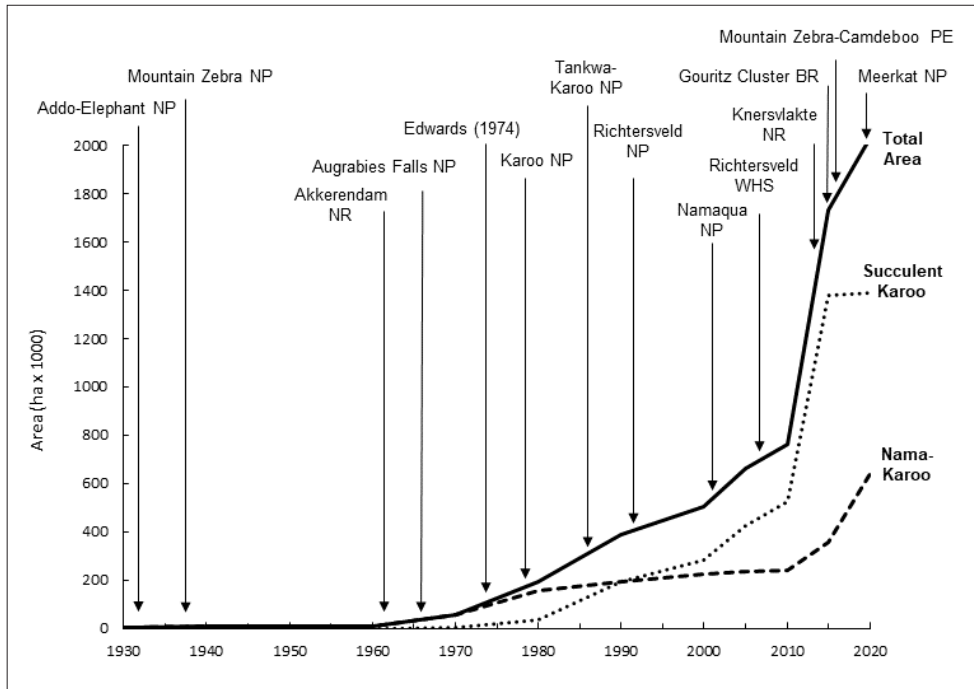


Figure 8.2 The accumulated area (ha ×1 000) under conservation protection in the Nama Karoo and Succulent Karoo biomes from 1930–2020 (DFFE, 2022a, 2022b) (BR = Biosphere Reserve, NP = National Park, NR = Nature Reserve, PE = Protected Environment, WHS = World Heritage Site)

Several interrelated developments over the last three decades, which have drawn on and contributed to the NPAES, have also had a profound influence on the development of conservation in the Karoo. These developments have been led, not only by the state through its national and provincial conservation agencies, but also by what Paterson (2009) refers to as “non-statutory biodiversity strategies, plans and programmes”. NGOs, private landowners, and individuals such as Leslie Hill (who established the Leslie Hill Succulent Karoo Trust in 1995) have also made significant contributions to the expansion of the area under conservation protection in the Karoo. However, conservation success has only been possible through the many partnerships and collaborations that have developed between government agencies and the wider national and international conservation community, together with the involvement and support of civil society. Some of the key developments and partnerships that are responsible for this success are discussed below.

The expansion of national parks and nature reserves

National parks and nature reserves form the nucleus around which conservation protection in the Karoo has developed. For example, 88% (45/51) of all areas set aside for conservation protection in the Nama Karoo biome comprises either a national park or a nature reserve (Table 8.1 on page 206). For the Succulent Karoo this figure is 77% (57/74). Because national parks are relatively large conservation entities, nearly all the major upticks in the area under conservation in the Karoo prior to 2001 are because of the establishment of a national park (Figure 8.2).

There are differences in the timing of the establishment of national parks in the two biomes as well as in the reasons for their establishment. The core areas for five of the seven national parks in the Nama Karoo biome were established prior to 1980 (Table 8.2; Figure 8.2). The exceptions are Meerkat National Park (2020) and Mokala National Park (2007). While some conservation benefits are derived from the establishment of the Meerkat National Park, it was created primarily because its land-use objectives are compatible with those of the Square Kilometre Array (SKA), an internationally aligned astronomical facility in the region (Terblanche, Chapter Seven). Mokala National Park replaced Vaalbos National Park, which was first established in 1986, and then de-proclaimed in 2002 because of a land restitution claim. Although the Camdeboo National Park was declared in 2005, the original area around Graaff-Reinet where the national park is located, is the former Karoo Nature Reserve, which was established in 1979. By comparison, the three national parks in the Succulent Karoo biome were only established from 1986 onwards, primarily to protect the internationally acclaimed biodiversity of this biome.

Nature Reserves in the DFFE register (DFFE, 2022a) may be assigned to one of four main sub-types according to their management authority (Table 8.3). The number, area, and average size of each of these different sub-types of PAs differ between the two biomes, except for municipal nature reserves, which are similar, but form a minor component of the PA network in both biomes. There are more provincial nature reserves in the Succulent Karoo biome than in the Nama Karoo biome. Those in the Succulent Karoo are also larger on average and cover a greater area and proportion of the biome. Conversely, private nature reserves in the Nama Karoo biome are larger. In terms of their average size and cover a larger area and proportion of the biome than those in the Succulent Karoo biome. Stewardship Reserves in the Nama Karoo biome are also larger on average, covering a greater total and proportional area than those in the Succulent Karoo biome. However, the four stewardship sites in the Nama Karoo occur immediately adjacent to the Succulent Karoo biome in the Bushmanland region, close to the Gariep River. They were established primarily to protect the highly endemic inselberg floras of

the Succulent Karoo, which occur on small, quartzitic mountains arising from the more extensive Bushmanland plains. Because of this, they are more appropriately associated with conservation initiatives linked to the Succulent Karoo biome than the Nama Karoo biome.

Table 8.2 A list of the 10 national parks in the Karoo showing the area (ha) and proportion (percentage) of the national park occurring in either the Nama Karoo or Succulent Karoo biomes, together with their date of establishment⁸²

Name of National Park	Area of NP (ha)	Area in biome (ha)	%	Year declared
NAMA KAROO (NK)				
Addo-Elephant NP	137 742	110	0.1	1931
Mountain Zebra NP	20 369	6 407	31.5	1937
Augrabies Falls NP	48 254	47 031	97.5	1966
Karoo NP	82 231	79 365	96.5	1979
Camdeboo NP	18 686	3 075	16.5	2005
Mokala NP	25 984	4 752	18.3	2007
Meerkat NP	134 955	125 837	93.2	2020
Total area NK (or average %)	468 221	266 577	56.9	
SUCCULENT KAROO (SK)				
Tankwa Karoo NP	142 269	94 971	66.8	1986
Richtersveld NP	170 280	58 740	34.5	1991
Namaqua NP	136 818	122 466	61.5	2001
Total area SK (or average %)	449 368	276 178	59.2	
Grand Total	917 589	542 755		

⁸² Values differ slightly from those in Table 8.1 because of differences in the date when information was acquired from DFFE (2022a) and biome delimitations.

Table 8.3 The four main sub-types of nature reserves in the Nama Karoo biome and Succulent Karoo biome showing their number, area (ha), percentage of the total area protected by all nature reserves, and average size (ha)

Sub-type of Nature Reserve	Nama Karoo				Succulent Karoo			
	No.	Area (ha)	% Total area	Average size (ha)	No.	Area (ha)	% Total area	Average size (ha)
Provincial	8	40 957	31.3	5 120	11	161 129	71.9	16 113
Municipal	5	1 318	1.0	264	4	1 540	0.7	385
Private	21	60 148	45.9	2 864	33	48 043	21.4	1 449
Stewardship	4	28 512	21.8	7 128	6	13 352	6.0	2 225
Total (or average)	38	130 935	100	3 446	54	224 064	100	4 149

Each of the four main sub-types of nature reserves in the Karoo has a unique development trajectory which form a series of overlapping phases. Because there are only minor differences in the pattern of development in the two Karoo biomes, they are shown together in Figure 8.3. The nine municipal nature reserves in the Karoo were all established in the period from 1960–1982, with no additions in the last 40 years. Thirteen of the 19 provincial nature reserves in the Karoo were established in the period from 1980 to 1994. Since then, new reserves, managed by provincial authorities have only been established in the Succulent Karoo biome. The largest of these is the 90 000 ha Knersvlakte Nature Reserve, which was established by CapeNature in 2014, with support from WWF-SA and the Leslie Hill Succulent Karoo Trust. The growth in the number of nature reserves since 1994 has come largely from private landowners. The number of new private nature reserves peaked in the first decade of the twenty-first century, when 16 new reserves were added. From 2010 onwards, greater emphasis has been on the establishment of stewardship nature reserves, with nine of the 10 reserves declared since 2020. Many of these developments align with major political changes in South Africa, including a shift in national, provincial, and local government priorities, as well as increased interest in conservation among private landowners in the post-apartheid era.

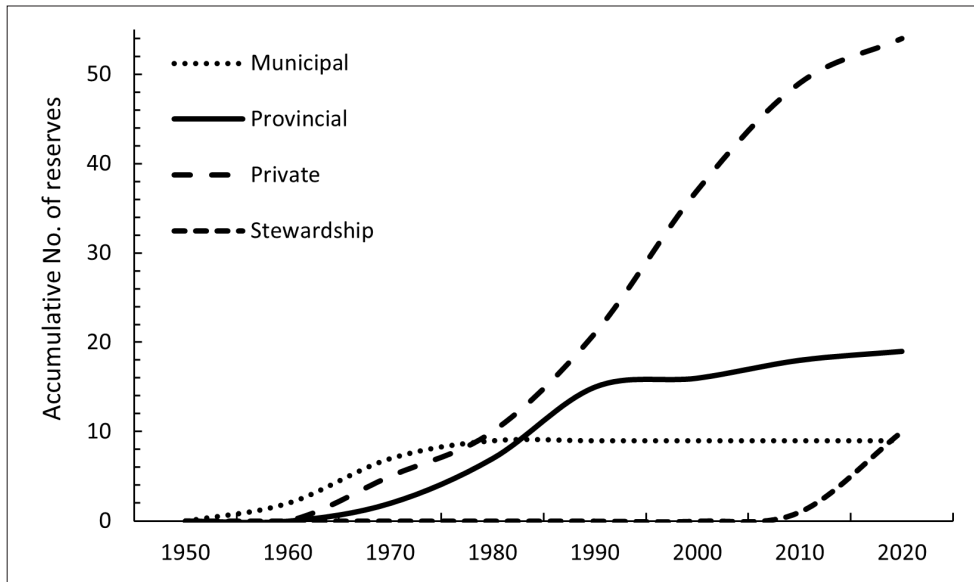


Figure 8.3 Smoothed lines showing the cumulative number of different sub-types of nature reserves in the Nama Karoo and Succulent Karoo biomes since 1950

Non-statutory biodiversity strategies, plans and programmes

There was a steady increase in the area under conservation protection in the last two decades of the twentieth century, especially in the Succulent Karoo biome, with major contributions arising from the establishment of the Tankwa Karoo, Richtersveld and Namaqua National Parks (Figure 8.2). The first two decades of the twenty-first century, however, have witnessed an exponential increase in the area under conservation protection across both Karoo biomes, mainly through the creation of a few ‘mega reserves’ in the region. For the Succulent Karoo biome this has occurred primarily through the establishment of the Richtersveld World Heritage Site in 2007, and the Gouritz Cluster Biosphere Reserve in 2014. The development of the Mountain Zebra-Camdeboo Protected Environment in 2015, as well as the recently declared Meerkat National Park in 2020, are the main contributors to the recent increase in area under conservation protection in the Nama Karoo biome.

The development of these mega reserves has its origins, in part, in a series of international and national, non-statutory biodiversity strategies, plans and programmes (Paterson, 2009). South Africa joined the international community after democratic elections in 1994 and provided important contributions to global debates on environmental issues and sustainable development. For the Succulent

Karoo biome, the success of the new conservation initiatives resulted from the formal recognition of the winter rainfall Karoo as being separate from the summer rainfall Karoo (Bayer, 1984; Rutherford & Westfall, 1986) with strong floristic and phylogenetic affinities to the winter rainfall fynbos and renosterveld vegetation of the Cape (Bergh et al., 2014). The subsequent inclusion of the Succulent Karoo biome as part of the Greater Cape Floristic Region (Snijman, 2013) widened both its national and international profile, with important consequences for the support of conservation action in the region.

This recognition coincided with the emergence of Conservation International's focus on global biodiversity hotspots (Myers, 1988; Myers et al., 2000). These are areas of exceptional biological diversity, but which are under significant threat from habitat loss. The realisation that the Succulent Karoo was an area of unparalleled plant, insect, and reptile diversity (Cowling et al., 1999) and arguably the "richest desert in the world", provided the impetus for a concerted, internationally funded effort to conserve the region. Foremost among these funding initiatives was the Critical Ecosystem Partnership Fund (CEPF) which began its support for the Succulent Karoo biome in 2003 (Anonymous, 2003). CEPF funding created an overarching framework, called the Succulent Karoo Ecosystem Program (SKEP), for conservation of the region, with political support and local stakeholder participation central to this strategy (Anonymous, 2012). Between 2003–2012, SKEP facilitated the mainstreaming of conservation into policy and practice through the provision of over USD8 million awarded to more than 50 organisations working in Namibia's Sperrgebiet and South Africa's Succulent Karoo biome. Beneficiaries included state institutions, as well as NGOs and local community organisations. Several areas that enjoy some form of conservation protection today, including the largest of these, the Gouritz Cluster Biosphere Reserve, and the Mountain Zebra-Camdeboo Protected Environment, emerged from the SKEP initiative supported by CEPF funding (Anonymous, 2012). The willingness of private landowners to participate in these initiatives has been critical to their success, especially since they complement statutory reserves in being able to conserve critically important habitats and landscapes (Gallo et al., 2009).

Private landowners have also played a pivotal role in the establishment of the Mountain Zebra-Camdeboo Protected Environment in the Nama Karoo biome in the Eastern Cape. The development of this Protected Environment was facilitated initially by a partnership between Wilderness Foundation (a South African-based NGO) and SANParks, and enjoyed early support from the CEPF (Norval, 2015). The region was identified as a priority in the National Protected Area Expansion Strategy (NPAES) (DEA, 2008). It comprises the Sneeuwberg Centre of Endemism and supports several large mammal species on the IUCN's Red List (e.g., mountain zebra, black rhino). It also provides a potential climate-change adaptation corridor

linking the Mountain Zebra National Park with the Camdeboo National Park, and protects the area from detrimental developments and threats to its biodiversity (Botha, 2017). Conservation protection takes the form of voluntary contractual agreements with private landowners that, when the Protected Environment was declared in 2016, included 67 landowners (DFFE, 2016). Wildlife ranching, hunting, and conservation-friendly agricultural land-use practices, including livestock grazing and nature-based tourism, co-exist on the mosaic of properties in accordance with the government-approved management plan developed by the Mountain Zebra-Camdeboo Protected Environment Landowner's Association (Botha, 2017) (see also Manyani, Chapter Six for an analysis of these mixed approaches to agriculture and conservation in the Karoo).

The Leslie Hill Succulent Karoo Trust

Individual landowners have made substantial contributions to the expansion of nature reserves and protected environments in the Karoo. However, no individual has made as significant a contribution as Leslie Hill who established the Leslie Hill Succulent Karoo Trust in 1995. This entity has been central to the rapid increase in area under conservation protection experienced in the Succulent Karoo biome in the last two decades (Figure 8.2). Leslie Hill (1908–2003) had a long-standing interest in plant conservation, which developed from his early involvement with the National Botanical Gardens and Council of the Botanical Society (Hoffman & Rourke, 2003). He travelled frequently in the Karoo, from as early as the 1950s, often accompanying well-known horticulturalists and taxonomists to the region. Through these trips he developed an appreciation of the uniqueness of the Succulent Karoo flora and the need for its protection.

The Trust is administered by the World Wide Fund for Nature – South Africa (WWF-SA), as part of its Land Programme (Forsythe & Coetzee, 2021), and has the expansion of the protected area network in the Succulent Karoo biome as one its main objectives. This is achieved either through direct land purchase or through stewardship agreements between private landowners and established conservation agencies. This is undertaken within the targets set for the National Protected Area Expansion Strategy (DEA, 2016). Since its inception, the Trust has added more than 230 000 ha to the protected area network, primarily through its investment in the Knersvlakte Nature Reserve, Namaqua National Park, Anysberg Nature Reserve, and Goegap Nature Reserve. In the last decade, it has also played a key role in the establishment of several Stewardship Nature Reserves in the Bushmanland region. WWF-SA's Land Programme and the development of partnerships with all the major national and provincial conservation agencies in the Succulent Karoo as well as with many of the NGOs active in the region (e.g., Wilderness Foundation, Conservation South Africa) has played a central role in the success of the Trust (Forsythe & Coetzee, 2021). Besides its contribution to the

expansion of the protected area network, the Trust has also supported research into some of the main threats to the Succulent Karoo, including land degradation (Bell et al., 2021), the illegal trade in succulent plants, and mining. In recognition of Leslie Hill's contribution to the conservation of the Succulent Karoo biome, he was the first person to be acknowledged as having made a Gift to the Earth by the World Wide Fund for Nature's international office as part of their Living Planet Campaign (Hoffman & Rourke, 2003).

The effect of Karoo PAs on local and regional economies

While several studies exist on the impact that protected area such as national parks have on the socio-economic development of surrounding communities in South Africa (Saayman & Saayman 2010; Spenceley & Goodwin, 2007), very few of these studies have been undertaken in the Karoo. One exception is that of Saayman et al. (2009), who investigated the socio-economic impact of the Karoo National Park near Beaufort West in the Nama Karoo biome. This 82 231 ha national park (DFFE, 2022a) acts largely as a stopover destination for people travelling between Cape Town and Johannesburg. Saayman et al. (2009) showed that between 8–20% of the turnover in local businesses, such as restaurants, guesthouses, retailers, and service stations was attributed to the presence of the Karoo National Park. They further calculated that about 244 people were either directly or indirectly employed because of opportunities created by the park. This amounts to the creation of employment opportunities for about 3.34% of all households in Beaufort West. While lower than the contributions made by more popular parks in the southern and eastern Cape regions, such as the Addo Elephant National Park, Wilderness National Park and Tsitsikama National Park, the contribution of the Karoo National Park to the regional economy is still considered in a positive light by local businesses and households in the region (Saayman & Saayman, 2010).

Another study is that of James et al. (2007), who investigated the value of flower tourism to the Namaqua National Park in the Succulent Karoo biome. A questionnaire survey was used to interview visitors to the park in the 2002 spring flowering season. Using a travel cost method to analyse the data from a sample taken from the more than 9 700 visitors, James et al. (2007) concluded that the economic value that flower viewing alone brings to the region is significantly greater than the cost of maintaining the park. Estimates of the value of flower tourism to the regional economy, through spending on transportation and accommodation, ranged from ZAR9.4 to ZAR15.3 million (adjusted for inflation). However, this is a substantial underestimate since additional inputs to the local and regional economy were not calculated by James et al. (2007). These include the contributions made by the Namaqua National Park to direct employment, as well as indirect employment through, for example, the management of contracts within the government's Expanded Public Works Programmes.

Further analyses of the effects of conservation on local and regional economies are needed, especially considering the effect of the COVID-19 pandemic, which has had such a devastating impact on the South African tourism sector (Dube, 2021). The long-term sustainability of conservation practices should also be evaluated in relation to other forms of land use, such as commercial agriculture on privately owned farms (Manyani, Chapter Six) and subsistence livestock production, which is carried out in the communal areas of Namaqualand (Cupido et al., Chapter Five) as well as on some commonages in the Karoo (Walker & Vorster, Chapter Four). Such an analysis could build on the work of James et al. (2005), who developed a model of the change in primary and secondary production within these three sectors and calculated the economic profitability of each. Their results suggest that conservation areas have the highest levels of edible plant production over time and made the greatest contribution to the regional economy relative to the other two forms of land use. For example, profits for the communal and private farming sectors were about ZAR48 per ha per year (adjusted for inflation), while those for the conservation sector were as much as 2.7 times greater than this, if the contribution of tourists to the regional economy was included in the analysis. James et al. (2005) make the important point, however, that each sector values its contributions differently and that to make comparisons across such divergent sectors is challenging. What they do not discuss are the ethical and social justice issues around tourism, especially the concerns about who stands to gain most from such developments. Those individuals with skills and capital and existing businesses often benefit the most from the range of tourism initiatives in the Karoo such as astro-tourism, heritage tourism and even nature-based tourism, while the majority of people derive little benefit (Walker & Vorster, Chapter Four).

Alternative approaches to conservation and their application in the Karoo

The exponential increase in the area set aside for environmental protection in the Karoo (Figure 8.2 on page 210) is an important conservation success story in South Africa. However, not everyone views this as a cause for celebration, including some neighbouring communities (Simelane et al., 2006). Critics emphasise that protected areas exclude many other social, economic, and cultural forms of land use, such as subsistence livestock production (Benjaminsen et al., 2006). While global needs, which privilege environmental sustainability, are served by an expanded protected area network, detractors argue that local needs, centred on livelihood security and poverty alleviation, are ignored in the process (Simelane 2006; but see Saayman & Saayman, 2010 and earlier discussion on this topic). Benjaminsen et al. (2008) further suggest that many subsistence farmers who live in the communal areas of Namaqualand wish to expand their land holdings as part of South Africa's post-1994

land reform programme, yet find themselves in competition with the conservation sector for land. An increase in the area under conservation in the Karoo has also been criticised by commercial livestock producers on the grounds that it increases the amount of suitable habitat for predators. Some private landowners suggest that mesopredator populations, such as jackal and caracal, increase in neighbouring protected areas and threaten their commercial livestock operations (Drouilly et al., 2018; Drouilly & O’Riain 2019; Terblanche, Chapter Seven).

Such criticisms of conservation form part of a broader, international challenge to the traditional protected area model, which is often labelled as a ‘fortress’ approach to the conservation of natural environments. Criticisms include those related to philosophical, ethical, financial, institutional, political, and practical issues (Siurua, 2006; Vedeld et al., 2012). Future conservation approaches for the Karoo, therefore, should consider the social-economic realities of the region as well as its exceptional biodiversity. Alternative ways of integrating biodiversity conservation and human wellbeing are emerging that operate outside of the formal Protected Area designation and integrate conservation and the restoration of biodiversity more broadly with development goals that integrate wildlife protection with people’s needs. For example, the biodiversity stewardship category of the Biodiversity Partnership Area provides for Stewardships and OECMs. Such partnerships provide opportunities for blending biodiversity gains alongside other priorities including economic considerations (IUCN WCPA, 2018; Mitchell et al., 2018). National policy guidelines on conservation and the sustainable use of South Africa’s biodiversity are in preparation (DFFE, 2022c). New legislation, which will give effect to these guidelines, will undoubtedly follow.

The conservation of biodiversity will increasingly require an intersectional approach if it is to succeed. Intersectionality includes consideration of food security, health, poverty reduction and adaptation to climate change, together with the prevention of biodiversity loss and maintenance of ecological function. While definitions and applications of sustainable development are debated, and in some cases contested, the idea of intergenerational equity (Holmberg & Sandbrook, 2019) underpins the United Nation’s (UN) Sustainable Development Goals (SDGs) (UN, 2015), which are core to these intersectional approaches to conservation. Specifically, those goals relating to climate action and life on land (SDGs 13 and 15), as well as benefits in the form of poverty alleviation, food security, health, water, energy and in some cases gender equality (SDGs 1, 2, 3, 5, 6, 7), contain both development and environmental or ecological dimensions. A conceptual model of this nexus approach is shown in Figure 8.4 (Midgley et al., 2012). In this model, sustainability is the over-arching principle, and comprises biodiversity and ecosystem conservation, socio-economic benefits, and climate change adaptation. Ecosystem-based Adaptation (EbA), defined by the Convention on Biological

Diversity as “the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change as part of an overall adaptation strategy,” (Midgley et al., 2012:11) resides at the centre of this model. The approach integrates climate, social and ecological aspects and aims to help restore ecosystem services and buffer communities and livelihoods (Bourne et al., 2016). Intersectional approaches to conservation are vital in areas such as the Succulent Karoo, where high levels of species richness and endemism coexist in some places alongside high levels of poverty and unemployment, as well as harsh environmental conditions that contribute to food, water, and livelihood insecurity (Le Maitre et al., 2009; Walker et al., 2018). A nexus approach to sustainable development has been advocated, although to date there are few studies that evaluate the effectiveness of such approaches. Furthermore, even though transdisciplinary approaches that include co-design and co-evaluation with stakeholders are frequently advocated, evaluation and assessment are needed that consider ethics, values, and power dynamics between stakeholders (Biggs et al., 2022; Liu et al., 2018).

The many pressures on vegetation described in the introduction to this chapter have led to the degradation of biodiversity and the benefits it provides to people, including water provision, erosion control, grazing and harvestable resources. The maintenance and restoration of ecosystem services (Black et al., 2016) depends on skilful management of the environment that is adapted to local context and environmental change. The condition of the vegetation and wetlands needs particular attention if livelihoods centred on pastoralism and nature-based tourism are to be sustained. Forage and water, as well as medicinal plants and firewood, are important resources that are often managed through informal agreements (Cohen, 2020). Integration of traditional ethno-ecological knowledge of plant diversity and animal grazing preferences derived from pastoralists (see Cupido et al., Chapter Five) would allow for better land-use planning and provide for a wider range of ecosystem services (Samuels et al., 2018). In contrast, further subdivision of land could further increase marginalisation (Cohen, 2020).

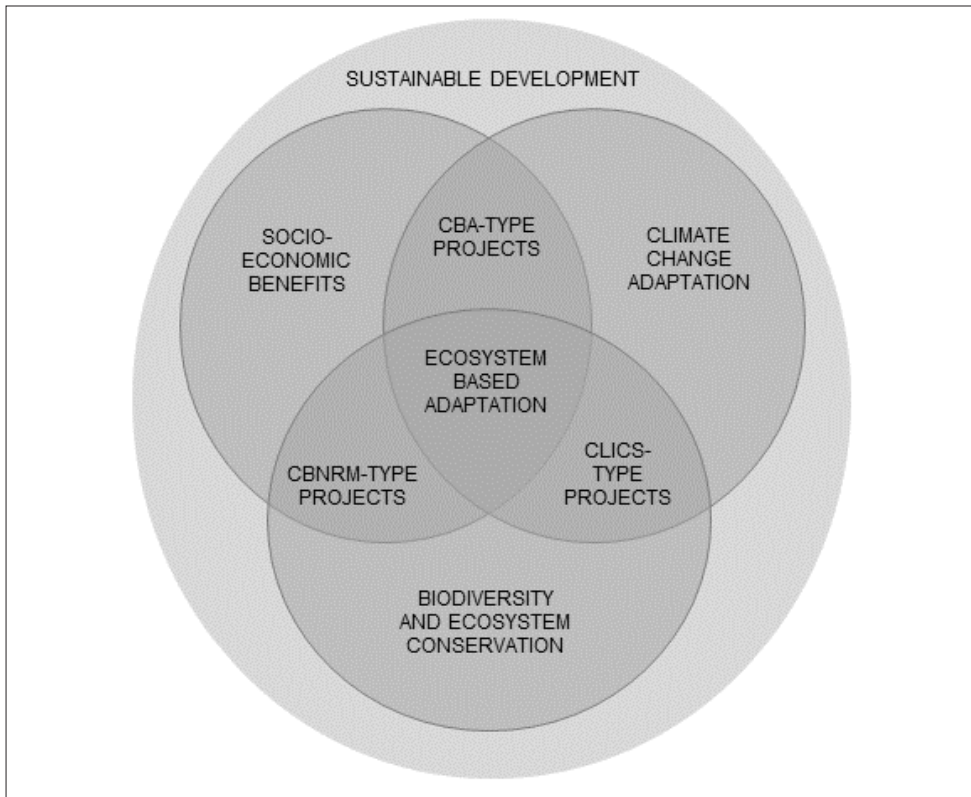


Figure 8.4 A conceptual framework for how biodiversity and ecosystem conservation is embedded within sustainable development and intersects with socio-economic benefits and climate change adaptation (redrawn from Midgley et al., 2012) (CBA = community-based adaptation projects; CBNRM = community-based natural resource management projects, CLICS = climate-change integrated land-use strategies)

Wetlands have been particularly impacted by agriculture, as they are key resource areas and provide numerous ecosystem services, biodiversity, and adaptation benefits as they retain water and forage through the summer dry period, as well as providing habitat, erosion control and flow regulation (Black et al., 2016). However, many of the wetlands in the Karoo are degraded through overgrazing and cultivation. A study in the high-altitude wetlands of the Kamiesberg, in Namaqualand, showed

that even though wetland restoration is more costly than conventional approaches to improving water and animal fodder security (e.g., boreholes, provision of extra fodder from external sources), there are long-term and wider societal benefits that add to the direct benefits for landowners (Black et al., 2016). For example, the Working for Wetlands programme not only provides benefits to the environment and wetland ecosystems, but also provides employment opportunities (Kotze et al., 2019). Such diversified income streams are important in buffering livelihoods against environmental shocks, which can affect livestock farmers particularly badly.

Climate change is likely to exacerbate already precarious livelihoods through increasing frequency of droughts, for example, which will impact livestock production. Key to the success of this approach is the building of adaptive capacity in the face of a warming, drying and more extreme climate (Bourne et al., 2012). Farmers are working with Conservation South Africa to improve climate resilience and veld condition through climate resilient breed improvement, veld restoration and wetland rehabilitation (Muller et al., 2017). In the Karoo, although most households have multiple income streams which often include government grants and remittances from family members who work in urban areas, many livelihood resources depend directly or indirectly on ecosystem services through agricultural production, water provision, etc. (Black et al., 2016). Bourne et al. (2016) developed a spatial tool that integrates biome stability and social vulnerability to identify priority areas for Ecosystem-based Adaptation. They used GIS-based multi-criteria analysis and vegetation distribution models to combine information regarding the social-ecological vulnerability of these ecosystems, as well as the critical ecosystem services that they provide. This approach allows prioritisation of those areas that are most vulnerable to climate change, where poverty is high and where livelihoods are directly dependent on ecosystem services (Kotze et al., 2019).

The mainstreaming of environmental and ecological concerns into sustainability planning requires trans- and interdisciplinary work that can integrate scientific, ecological, social, economic, and environmental concerns (Hoffman et al., 2018b; Walker et al., 2018). To achieve this, partnerships are required (SDG 17) between different academic disciplines, as well as various stakeholder groups, so that knowledge can be integrated and applied in developing workable solutions for coupled social-ecological problems (Samuels et al., 2018). Hoffman et al. (2018b) suggest that research will be most effective in addressing complex social-ecological problems if researchers build in both interdisciplinary and applied dimensions to their research. In addition to academic integration, inclusive processes of knowledge co-creation are needed so that communities can “participate meaningfully in determining what sustainable development in their particular contexts means,

both now and for the future” (Walker et al., 2018: 72). Favretto et al. (2021) have identified nine interrelated principles to building common and inclusive knowledge, that include co-designing and co-production, wide participation, building on existing networks, as well as acknowledging context and history. Such networks and partnerships require consideration of power dynamics and societal values, policies and management practices that are place-based and include local and indigenous knowledge (Biggs et al., 2022).

Future directions

It seems likely, given the climatic and socioeconomic conditions of the region, that extensive agriculture will persist as an important livelihood stream in the Karoo. The area is unsuitable for intensive agriculture except where a perennial water source is available such as along the Gariep River. Therefore, a land-sparing or wildlife-friendly approach to conservation is vital, including livestock production and wetland restoration that enhance adaptation to climate change. Such an approach has the potential to be compatible with biodiversity conservation, because some indigenous plants and animals benefit from extensive farming and because domestic animals are to some extent a facsimile of past herbivore guilds, which have been dramatically reduced in the Karoo (Drouilly & O’Riain, 2019). Nevertheless, even if destocking raises hopes for improved veld condition (Hoffman et al., 2019), recovery of vegetation diversity is slow. In addition, there are also challenges in terms of mammal conservation, particularly carnivores. Wild dogs, hyenas, lions, and most leopards were exterminated from Karoo farms in the late nineteenth century (Beinart, 2018). Poisoning and slaughtering continued into the twentieth century and large carnivores and mesopredators are still persecuted today (Terblanche, Chapter Seven). Working with farmers to manage stock in ways that are wildlife friendly can reduce stock losses and improve mammalian biodiversity (Schurch et al., 2021). Furthermore, despite the importance of climate change, relatively little research has focused on its impacts (Hoffman et al., 2021) and Ecosystem-based Adaptation approaches are likely to become increasingly important.

Urbanisation, wind and solar developments, mining, fracking, and astronomy will all continue to shape the landscape and protected areas will remain vital to protecting the Karoo’s unique flora. There is concern, however, that the protected area associated with the Square Kilometre Array, for example, may benefit biodiversity to the detriment of local communities, and could weaken stewardship approaches that aim to restore the coupling of local sustainable livelihoods and conservation (Terblanche, Chapter Seven). While protected areas are likely to

remain a cornerstone of conservation in the Karoo, more creative ways of managing protected areas are needed, ways which include better integration of livelihoods and encourage stewardship while considering local context and the impacts of climate change. For example, the Karoo contains a rich cultural heritage both in terms of the recent, as well as in the ancient past and the history of landscapes needs to be woven into conservation planning. In the Richtersveld National Park, for example, a contract between SANParks and the local community allows for the park to be managed contractually and for grazing of livestock to continue in the park, consistent with conservation of the flora (Walker et al., 2018). The Richtersveld World Heritage Site was co-created with the Nama community to protect both the floral and cultural elements of the landscape (Walker et al., 2018). Such models integrate biodiversity conservation with stewardship, wildlife friendly farming and locally appropriate nature-based tourism (Hausmann et al., 2017)

Acknowledgements

We thank Sally Mashele and Hana Petersen for providing much of the conservation area data upon which this chapter is based. Thanks also to Patrick O'Farrell and Andrew Skowno for pointing out key data sources.

References

- Anonymous. 2003. *Ecosystem profile. The Succulent Karoo Hotspot. Namibia and South Africa*. Critical Ecosystem Partnership Fund, Conservation International. Final Version. [Online]. https://www.cepf.net/sites/default/files/final.succulentkaroo.ep_.pdf [Accessed 11 February 2023].
- Anonymous. 2012. *Annual Portfolio Overview. Succulent Karoo Biodiversity Hotspot. Through Close of Program, December 2012*. Critical Ecosystem Partnership Fund, Conservation International. [Online]. <https://www.cepf.net/sites/default/files/succulent-karoo-2012-annual-portfolio-overviewl.pdf> [Accessed 1 February 2023].
- Bayer, M.B. 1984. The Cape flora and the Karoo – a winter rainfall biome versus a fynbos biome! *Veld & Flora*, March 70(1):17–19. [Online]. https://journals.co.za/doi/epdf/10.10520/AJA00423203_2883 [Accessed 1 August 2022].
- Beinart, W. 2018. An overview of themes in the agrarian and environmental history of the Karoo since c. 1800. *African Journal of Range & Forage Science*, 35:191–202. <http://dx.doi.org/10.2989/10220119.2018.1508070>.
- Bell, W., Hoffman, M.T. & Visser, V. 2021. Regional land degradation assessment for dryland environments: The Namaqualand Hardeveld bioregion of the Succulent Karoo biome as a case study. *Land Degradation & Development*, 32:2 287–2 302. <http://dx.doi.org/10.1002/ldr.3900>.
- Benjaminsen, T.A., Rohde, R., Sjaastad, E., Wisborg, P. & Lebert, T. 2006 Land Reform, Range Ecology, and Carrying Capacities in Namaqualand, South Africa. *Annals of the Association of American Geographers*, 96(3):524–540. <http://dx.doi.org/10.1111/j.1467-8306.2006.00704.x>.
- Benjaminsen, T.A., Kepe, T. & Bråthen, S. 2008. Between Global Interests and Local Needs: Conservation and Land Reform in Namaqualand, South Africa. *Africa*, 78:221–244. <https://doi.org/10.3366/E0001972008000144>.
- Bergh, N.G., Verboom, G.A., Rouget, M. & Cowling, R.M. 2014. Vegetation types of the Greater Cape Floristic Region, in N. Allsopp, J.F. Colville & G.A. Verboom (eds). *Fynbos: Ecology, evolution and conservation of a megadiverse region*. Oxford: Oxford University Press. 1–26. <https://doi.org/10.1093/acprof:oso/9780199679584.003.0001>
- Biggs, R., Clements, H.S., Cumming, G.S., Cundill, G., de Vos, A., Hamann, M., Luvuno, L., Roux, D.J., Selomane, O., Blanchard, R., Cockburn, J., Dziba, L., Esler, K.J., Fabricius, C., Henriksson, R., Kotschy, K., Lindborg, R., Masterson, V.A., Nel, J.L., O'Farrell, P., Palmer, C.G., Pereira, L., Pollard, S., Preiser, R., Scholes, R.J., Shackleton, C., Shackleton, S., Sitas, N., Slingsby, J.A., Spierenburg, M., Tengo, M. & Reyers, B. 2022. Social-ecological change: insights from the Southern African Program on Ecosystem Change and Society. *Ecosystems and People*, 18(1):447–468. <http://dx.doi.org/10.1080/26395916.2022.2097478>.
- Black, D., Turpie, J.K. & Rao, N. 2016. Evaluating the cost-effectiveness of ecosystem-based adaptation: Kamiesberg wetlands case study. *South African Journal of Economic and Management Sciences*, 19:702–713. <https://doi.org/10.4102/sajems.v19i5.1395>.
- Boardman, J., Foster, I., Rowntree, K., Mighall, T. & Gates, J. 2010. Environmental Stress and Landscape Recovery in a Semi-Arid Area, The Karoo, South Africa. *Scottish Geographical Journal*, 126:64–75. <http://dx.doi.org/10.1080/14702541003711038>.

- Botha, B. 2017. *Mountain Zebra-Camdeboo Protected Environment Management Plan for the period 2017–2022*. [Online]. https://www.mzcpce.co.za/documents/Final%20management%20plan_June%202017%20final.pdf [Accessed 1 February 2023].
- Bourne, A., Donatti, C., Holness, S. & Midgley, G. 2012. A climate change and vulnerability assessment for the Namakwa District Municipality: Full technical report. September 2012. Cape Town: Conservation South Africa. [Online]. <https://www.yumpu.com/en/document/read/7988874/vulnerability-assessment-executive-summary-namakwa-district> [Accessed 1 February 2023].
- Bourne, A., Holness, S., Holden, P., Scorgie, S., Donatti, C.I. & Midgley, G. 2016. A socio-ecological approach for identifying and contextualising spatial ecosystem-based adaptation priorities at the sub-national level. *PLoS ONE*, 11:e0155235. <https://doi.org/10.1371/journal.pone.0155235>.
- Carrick, P.J. & Kruger, R. 2007. Restoring degraded landscapes in lowland Namaqualand: Lessons from the mining experience and from regional ecological dynamics. *Journal of Arid Environments*, 70:767–781. <http://dx.doi.org/10.1016/j.jaridenv.2006.08.006>.
- Cohen, J.B. 2020. Water, justice and wellbeing in the Kamiesberg, Namaqualand: Reflecting on local histories in the context of the Anthropocene. *Wiley Interdisciplinary Reviews: Water*, 7:e1484. <http://dx.doi.org/10.1002/wat2.1484>.
- Cowling, R.M. & Pressey, R.L. 2003. Introduction to systematic conservation planning in the Cape Floristic Region. *Biological Conservation*, 112:1–13. [http://dx.doi.org/10.1016/S0006-3207\(02\)00418-4](http://dx.doi.org/10.1016/S0006-3207(02)00418-4).
- Cowling, R.M., Esler, K.J. & Rundel, P.W. 1999. Namaqualand, South Africa – an overview of a unique winter-rainfall desert ecosystem. *Plant Ecology*, 142:3–21. <http://dx.doi.org/10.1023/A:1009831308074>.
- De Vos, A., Clements, H.S., Biggs, D. & Cumming, G. 2019. The dynamics of privately protected areas in South Africa over 83 years. *Conservation Letters*, 12:e12644. <http://dx.doi.org/10.1111/conl.12644>.
- Dean, W.R.J., Seymour, C.L. & Joseph, G.S. 2018. Linear structures in the Karoo, South Africa, and their impact on biota. *African Journal of Range & Forage Science*, 35:223–232. <https://doi.org/10.2989/10220119.2018.1514530>.
- Department of Environmental Affairs (DEA). 2008. National protected area expansion strategy for South Africa 2008. Pretoria: Department of Environmental Affairs. [Online]. <https://cer.org.za/wp-content/uploads/2010/05/National-Protected-Areas-Expansion-Strategy-2008.pdf> [Accessed 1 February 2023].
- Department of Environmental Affairs (DEA). 2013. PACA database. Classification and definition of protected areas and conservation areas. Pretoria: Department of Environmental Affairs. [Online]. <https://egis.environment.gov.za/> [Accessed 1 August 2022].
- Department of Environmental Affairs (DEA). 2016. *National protected area expansion strategy for South Africa 2016*. Pretoria: Department of Environmental Affairs. <https://rebrand.ly/yjzax1q> [Accessed 1 February 2023].

- Department of Forestry, Fisheries and the Environment (DFFE). 2016. *Minister Edna Molewa declares Mountain Zebra and Camdeboo protected environment*. Pretoria: Department of Forestry, Fisheries and Environment. [Online]. <https://www.gov.za/speeches/minister-environmental-affairs-declared-mountain-zebra-and-camdeboo-protected-environment> [Accessed 1 August 2022].
- Department of Forestry, Fisheries and the Environment (DFFE). 2022a. *South Africa Protected Areas Database (SAPAD_OR_2021_Q4)*. Version 2021. [Online]. <https://egis.environment.gov.za/> [Accessed 25 April 2022].
- Department of Forestry, Fisheries and the Environment (DFFE). 2022b. *South Africa Conservation Areas Database (SACAD_OR_2021_Q4)*. Version 2021. [Online]. <https://egis.environment.gov.za/> [Accessed 25 April 2022].
- Department of Forestry, Fisheries and the Environment (DFFE). 2022c. Consultation on the draft White Paper on conservation and sustainable use of South Africa's biodiversity 2022. *Government Gazette*, 685(46687), Notice 2252 of 2022. 8 July. [Online]. <https://www.dffe.gov.za/node/2055> [Accessed 1 August 2022].
- Drouilly, M. & O'Riain, M.J.O. 2019. Wildlife winners and losers of extensive small-livestock farming: a case study in the South African Karoo. *Biodiversity and Conservation*, 28:1 493–1 511. <https://link.springer.com/article/10.1007/s10531-019-01738-3>.
- Drouilly, M., Tafani, M., Nattrass, N. & O'Riain, J. 2018. Spatial, temporal and attitudinal dimensions of conflict between predators and small-livestock farmers in the Central Karoo. *African Journal of Range & Forage Science*, 35:245–255. <http://dx.doi.org/10.2989/10220119.2018.1522669>.
- Dube, K. 2021. Implications of COVID-19 induced lockdown on the South African tourism industry and prospects for recovery. *African Journal of Hospitality, Tourism, and Leisure*, 10(1):270–287. <http://dx.doi.org/10.46222/ajhtl.19770720-99>.
- Edwards, D. 1974. Survey to determine the adequacy of existing conserved areas in relation to vegetation types. A preliminary report. *Koedoe*, 17:2–37. <http://dx.doi.org/10.4102/koedoe.v17i1.901>.
- Favretto, N., Shackleton, S., Sallu, S.M. & Hoffman, T. 2021. Editorial for Special Issue: "Collaboration and Multi-Stakeholder Engagement in Landscape Governance and Management in Africa: Lessons from Practice". *Land*, 10:285. <https://doi.org/10.3390/land10030285>.
- Forsythe, K. & Coetzee, J. (eds). 2021. *ZA5116 Leslie Hill Succulent Karoo Trust expanded programme of work. Annual Report 2021*. Unpublished report, Cape Town: WWF-SA.
- Gallo, J.A., Pasquini, L., Reyers, B. & Cowling, R.M. 2009. The role of private conservation areas in biodiversity representation and target achievement within the Little Karoo region, South Africa. *Biological Conservation*, 142:446–454. <http://dx.doi.org/10.1016/j.biocon.2008.10.025>.
- Hausmann, A., Slotow, R., Fraser, I., & Di Minin, E. 2017. Ecotourism marketing alternative to charismatic megafauna can also support biodiversity conservation. *Animal Conservation*, 20:91–100. <http://dx.doi.org/10.1111/acv.12292>.
- Henschel, J.R., Hoffman, M.T. & Walker, C. 2018. Introduction to the Karoo Special Issue: Trajectories of Change in the Anthropocene. *African Journal of Range & Forage Science*, 35:151–156. <http://dx.doi.org/10.2989/10220119.2018.1535214>.

- Hoffman, M.T. & Rourke, J. 2003. The making of a legacy: Tributes to a plant lover – Leslie Hill 1908–2003. *Veld & Flora*, 89(2):44. [Online]. https://journals.co.za/doi/epdf/10.10520/AJA00423203_3192 [Accessed 25 April 2022].
- Hoffman, M.T., Cowling, R.M., Petersen, H. & Walker, C. 2021. Karoo research update: Progress, gaps and threats. *South African Journal of Science*, 117(1/2):Article #8695. <http://dx.doi.org/10.17159/sajs.2021/8695>.
- Hoffman, M.T., Rohde, R.F. & Gillson, L. 2019. Rethinking catastrophe? Historical trajectories and modelled future vegetation change in southern Africa. *Anthropocene*, 25:100189. <http://dx.doi.org/10.1016/j.ancene.2018.12.003>.
- Hoffman, M.T., Skowno, A., Bell, W. & Mashele, S. 2018a. Long-term changes in land use, land cover and vegetation in the Karoo drylands of South Africa: Implications for degradation monitoring. *African Journal of Range & Forage Science*, 35:209–221. <http://dx.doi.org/10.2989/10220119.2018.1516237>.
- Hoffman, M.T., Walker, C. & Henschel, J.R. 2018b. Reflections on the Karoo Special Issue: towards an interdisciplinary research agenda for South Africa's drylands. *African Journal of Range & Forage Science*, 35:387–393. <http://dx.doi.org/10.2989/10220119.2018.1540910>.
- Holmberg, J. & Sandbrook, R. 2019. Sustainable Development: What Is to Be Done? In: J. Holmberg (ed.). *Policies for a Small Planet*. New York: Routledge. 19–38. <http://dx.doi.org/10.4324/9780429200465-1>.
- IUCN WCPA. 2018. PARKS. *The International Journal of Protected Areas and Conservation* 24: Special Issue. Gland, Switzerland: IUCN. [Online]. https://parksjournal.com/wp-content/uploads/2018/08/PARKS-24.1-10.2305IUCN.CH_2018.PARKS-24.1.en-Low-Res.pdf [Accessed 1 August 2022].
- James, I., Hoffman, M.T., Cowling, R.M., Roberts, R., Campbell, B.M., Boumans, R. & Allsopp, N. 2005. *Valuing Namaqualand's natural resources: The costs and benefits of communal, commercial and conservation land use practices in Namaqualand incorporating ecological, economic and social values*. Unpublished workshop report. Cape Town: Leslie Hill Institute for Plant Conservation, University of Cape Town. [Online]. <https://tinyurl.com/4masb6df> [Accessed 14 August 2022].
- James, I., Hoffman, T., Munro, A., O'Farrell, P. & Smart, R. 2007. The economic value of flower tourism at the Namaqua National Park, South Africa. *South African Journal of Environmental Management Studies*, 4:442–456. <http://dx.doi.org/10.4102/sajems.v10i4.1058>.
- Kotze, D., Milne, B., Huller, H. & Nieuwoudt. 2019. Pressures on the wetland hotspot regions of the Northern Cape. *The Water Wheel*, 18:27–31. [Online]. https://wrc.org.za/wp-content/uploads/WW-Jan-Feb-2019_web.pdf [Accessed 8 April 2022].
- Le Maitre, D.C., O'Farrell, P., Milton, S., Atkinson, D., Lange, W.D., Egoh, B., Ryeres, B., Colvin, C., Maherry, A. & Bignaut, J. 2009. *Assessment and Evaluation of Ecosystem Services in the Succulent Karoo Biome*. Pretoria: Council for Scientific and Industrial Research (CSIR).
- Liu, J., Hull, V., Godfray, H.C.J., Tilman, D., Gleick, P., Hoff, H., Pahl-Wostl, C., Xu, Z., Chung, M.G., Sun, J. & Li, S. 2018. Nexus approaches to global sustainable development. *Nature Sustainability*, 1(9):466–476. <http://dx.doi.org/10.1038/s41893-018-0135-8>.
- Lombard, A.T., Hilton-Taylor, C., Rebelo, A.G., Pressey, R.L., & Cowling, R.M. 1999. Reserve selection in the Succulent Karoo, South Africa: coping with high compositional turnover. *Plant Ecology*, 142:35–55. <http://dx.doi.org/10.1023/A:1009866126729>.

- Maluleke, W. & Shibambu, N.F. 2021. Exploring illegal harvesting and theft of the selected South African endangered and indigenous plants on the Red Data List: Case studies of rural areas. *ADRRJ Journal of Arts and Social Sciences*, 18,3(6):244–295. [https://doi.org/10.55058/adrijass.v18i3\(6\)%20October-December.777](https://doi.org/10.55058/adrijass.v18i3(6)%20October-December.777).
- Masterson, M. 2021. 'Miners are ripping up the West Coast'. *Daily Maverick*, 168, 9 Jan 2021. [Online]. <https://www.dailymaverick.co.za/article/2021-01-09-miners-are-ripping-up-the-west-coast/>. [Accessed 11 February 2023]
- McManus, J., Goets, S.A., Bond, W.J., Henschel, J.R., Smuts, B. & Milton, S.J. 2018. Effects of short-term intensive trampling on Karoo vegetation. *African Journal of Range & Forage Science*, 35:311–318. <https://doi.org/10.2989/10220119.2018.1529706>.
- Midgley, G., Marais, S., Barnett, M. & Wągsaether, K. 2012. *Biodiversity, Climate Change and Sustainable Development – Harnessing Synergies and Celebrating Successes*. Pretoria: South African National Biodiversity Institute (SANBI). [Online]. <https://www.sanbi.org/wp-content/uploads/2018/03/biodiversity-climate-change-and-sustainable-development.pdf> [Accessed 5 August 2022].
- Milton, S.J. & Dean, W.R.J. 2021. Anthropogenic impacts and implications for ecological restoration in the Karoo, South Africa. *Anthropocene*, 36:100–307. https://ui.adsabs.harvard.edu/link_gateway/2021Anthr..3600307M/doi:10.1016/j.ancene.2021.100307.
- Mitchell, B.A., Fitzsimons, J.A., Stevens, C.M. & Wright, D.R. 2018. PPA or OECM? Differentiating between privately protected areas and other effective area-based conservation measures on private land. *Parks*, 24:49–60. <http://dx.doi.org/10.2305/IUCN.CH.2018.PARKS-24-SIBAM.en>.
- Mucina, L. and Rutherford, M.C. (eds). 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute.
- Muller, H., Gardiner, M. & Jansen, C. 2017. Growing sustainability in Namaqualand's communal rangelands. *Red Meat/Rooivleis*, 8:84–88. [Online]. <https://journals.co.za/doi/pdf/10.10520/EJC-ad9aae95d> [Accessed 15 August 2022].
- Myers, N. 1988. Threatened biotas: 'Hot spots' in tropical forests. *Environmentalist*, 8:187–208. <https://doi.org/10.1007/bf02240252>.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A.B. & Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature*, 403:853–858. <http://dx.doi.org/10.1038/35002501>.
- Nations, J.D. 2001. Biosphere Reserves, in N.J. Smelser & P.B. Baltes (eds). *International Encyclopedia of the Social and Behavioral Sciences*. Amsterdam: Elsevier. 1 231–1 234. <https://doi.org/10.1016/B0-08-043076-7/04166-8>.
- Norval, M. 2015. Camdeboo-Mountain Zebra National Park Corridor: Opportunities for conservation and socio-economic development. *USDA Forest Service Proceedings*, 74:41–149. <https://www.fs.usda.gov/research/treearch/48574>.
- Paterson, A.R. 2009. Legal framework for protected areas: South Africa. *IUCN-EPLP*, 81:1–47.
- Pool-Stanvliet, R. 2013. A history of the UNESCO Man and the Biosphere Programme in South Africa. *South African Journal of Science*, 109:(9/10), Art. #a0035. <http://dx.doi.org/10.1590/sajs.2013/a0035>.

- Pool-Stanvliet, R. & Coetzer, K. 2020. The scientific value of UNESCO biosphere reserves. *South African Journal of Science*, 116:(1/2), Art. #7432. <http://dx.doi.org/10.17159/sajs.2020/7432>.
- Rutherford, M.C. & Westfall, R.H. 1986. The Biomes of South Africa: an objective categorisation. *Memoirs of the Botanical Survey of South Africa*, 63:1–94.
- Saayman, M. & Saayman, A. 2010. Regional Development and National Parks in South Africa: Lessons Learned. *Tourism Economics*, 16(4):1 037–1 064. <http://dx.doi.org/10.5367/te.2010.0007>.
- Saayman, M., Saayman, A. & Ferreira, M. 2009. The socio-economic impact of the Karoo National Park. *Koedoe*, 51(1): Art. #158. <http://dx.doi.org/10.4102/koedoe.v51i1.158>.
- Samuels, M.I., Swarts, M., Schroeder, A., Ntombela, K. & Cupido, C. 2018. Through the lens of a herder: insights into landscape ethno-ecological knowledge on rangelands in Namaqualand. *Anthropology Southern Africa*, 41:136–152. <https://doi.org/10.1080/23323256.2018.1462091>.
- South African National Biodiversity Institute (SANBI). 2018a. *Biodiversity Stewardship Guideline*. Developed by Wilson, N., Kershaw, P., Marnewick, D. & Purnell, A. Pretoria: Department of Environment, Forestry and Fisheries.
- South African National Biodiversity Institute (SANBI). 2018b. The vegetation map of South Africa, Lesotho and Swaziland, in L. Mucina, M.C. Rutherford & L.W. Powrie (eds). *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute. Online Version: 2018. https://www.researchgate.net/publication/287992846_The_vegetation_of_South_Africa_Lesotho_and_Swaziland.
- Schurch, M.P., McManus, J., Goetz, S., Pardo, L.E., Garnor, D., Samuels, I., Cupido, C., Couldridge, V. and Smuts, B. 2021. Wildlife-Friendly Livestock Management Promotes Mammalian Biodiversity Recovery on a Semi-Arid Karoo Farm in South Africa. *Frontiers in Conservation Science*, 2:6. <http://dx.doi.org/10.3389/fcosc.2021.652415>.
- Seymour, C.L., Milton, S.J., Joseph, G.S., Dean, W.R.J., Dithobolo, T. & Cumming, G.S. 2010. Twenty years of rest returns grazing potential, but not palatable plant diversity to Karoo rangeland, South Africa. *Journal of Applied Ecology*, 47:859–867. <http://dx.doi.org/10.1111/j.1365-2664.2010.01833.x>.
- Simelane, T.S., Kerley, G.I.H., Knight, M.H. 2006. Reflections on the relationships between communities and conservation areas of South Africa: the case of five South African national parks. *Koedoe*, 49: Art. #a121. <https://doi.org/10.4102/koedoe.v49i2.121>.
- Siurua, H. 2006. Nature Above People: Rolston and “Fortress” Conservation in the South. *Ethics and the Environment*, 11:71–96. <http://dx.doi.org/10.1353/een.2006.0006>.
- Snijman, D.A. 2013. Plants of the Greater Cape Floristic Region. 2, The extra Cape Flora. *Strelitzia*, 30: 1–543.
- Spenceley, A. & Goodwin, H. 2007. 7. Nature-Based Tourism and Poverty Alleviation: Impacts of Private Sector and Parastatal Enterprises In and Around Kruger National Park, South Africa. *Current Issues in Tourism*, 10:255–277. <http://dx.doi.org/10.21832/9781845410766-007>.

- Statistics South Africa (StatsSA). 2021. *Natural Capital Series 2: Accounts for Protected Areas, 1900 to 2020*. Discussion document D0401.2. Produced in collaboration with the South African National Biodiversity Institute and the Department of Forestry, Fisheries and the Environment. Pretoria: Statistics South Africa.
- Todd, S.W. & Hoffman, M.T. 2009. A fence line in time demonstrates grazing-induced vegetation shifts and dynamics in the semi-arid Succulent Karoo. *Ecological Applications*, 19: 897–1 908. <http://dx.doi.org/10.1890/08-0602.1>.
- Todd, S.W., Hoffman, M.T., Henschel, J.R., Cardoso, A.W., Brooks, M. & Underhill, L.G. 2016. The potential impacts of fracking on biodiversity of the Karoo Basin, South Africa. In: J. Glazewski & S. Esterhuysen (eds). *Hydraulic fracturing in the Karoo: Critical legal and environmental perspectives*. Cape Town: Juta Publishers South Africa. 190–213.
- United Nations (UN) 2015. Sustainable Development Goals. New York: United Nations Organization.
- Vedeld, P., Abdallah, J.M., Wapalila, G. & Songorwa, A. 2012. Protected areas, poverty and conflicts: A livelihood case study of Mikumi National Park, Tanzania. *Forest Policy and Economics*, 21:20–31. <https://doi.org/10.1016/j.forpol.2012.01.008>.
- Walker, C., Milton, S.J., O'Connor, T.G., Maguire, J.M. & Dean, W.R.J. 2018. Drivers and trajectories of social and ecological change in the Karoo, South Africa. *African Journal of Range & Forage Science*, 35:157–177. <http://dx.doi.org/10.2989/10220119.2018.1518263>.

Chapter 9

A just transition in the Karoo? Renewable energy and the limits of job creation and community development in Loeriesfontein

Boitumelo Malope

In 2011 South Africa released its *National Climate Change Response White Paper*, which set out the principles that would guide the country's transition to a low-carbon economy. The principles include equity, which involves "ensuring a fair allocation of effort, cost and benefits in the context of the need to address disproportionate vulnerabilities, responsibilities, capabilities, disparities and inequalities" (Department of Environmental Affairs (DEA), 2011:12). Since then, debates on what has come to be described as a just transition to a low-carbon economy in South Africa have largely focused on how to mitigate the negative economic and social impacts that the urgently needed shift from fossil fuels to renewable energy will have on the coal-producing regions of the country, in particular, the coal-rich province of Mpumalanga. This province, which is where most of South Africa's electricity is generated by Eskom, the country's struggling national power utility, has become a battleground at the interface between the need for climate change mitigation on the one hand, and calls for socio-economic transformation on the other. Here advocacy around environmental and social justice has been particularly strong.

Absent from this critically important debate are voices from the host communities in the areas where renewable energy projects are being constructed, many of them in the marginalised Northern Cape Karoo. As noted in the Introduction to this volume, the Northern Cape has become a prime area for investment in renewable energy, with 59 of the 112 large-scale renewable energy projects secured through the country's flagship Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) by 2021 (Independent Power Producer (IPP) Office, 2021). So, what does a just transition to cleaner sources of energy look like from this region, and how much are local communities benefitting from the REIPPPP?

In this chapter, these questions are explored through a case study of the development of two wind farms outside the small, politically and economically marginalised town of Loeriesfontein, in the Hantam Local Municipality of the Northern Cape. The two farms in question are the adjoining Loeriesfontein 2 and Khobab wind farms, which are situated approximately 60 kilometres to the north of Loeriesfontein, and have been developed by Mainstream Renewable Power, an international company with a significant footprint in Africa (henceforth 'Mainstream' in the text). The site was under construction between 2015 and 2017, and the farms have been operational since 2018. Loeriesfontein is one of five small towns in the local municipality, but the only one to qualify for the local economic development commitments that renewable energy companies are required to undertake in terms of the REIPPPP policy framework. The other towns are Calvinia (the largest of the five towns and the local municipality's administrative centre), Brandvlei, Nieuwoudtville, and the tiny hamlet of Middelpos. Figure 9.1 below shows the location of the wind farms, as well as areas identified for further renewable energy projects as of 2022. Although not in operation or under construction at the time of my fieldwork, two other projects (one solar, one wind) were at different stages of development as part of the REIPPPP.

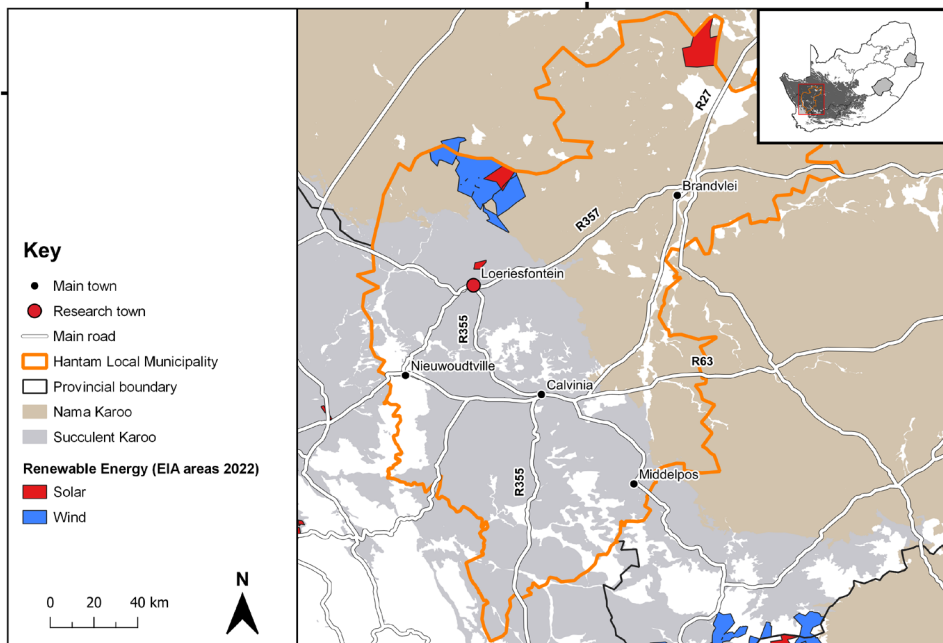


Figure 9.1 Loeriesfontein in the context of the Hantam Local Municipality, showing renewable energy sites as of 2022

This chapter is based on research conducted for my doctoral dissertation (Malope, 2022). The focus here is mainly on the challenges and contestations that arose around local job creation during the construction phase of the Loeriesfontein 2 and Khobab wind farms, but I include a brief look at the community development projects undertaken by the Independent Power Producer (IPP) between 2016 and 2019, in which time several protests erupted in Loeriesfontein. My primary fieldwork was conducted between 2017 and 2019, when I was able to conduct in-depth interviews with 25 Loeriesfontein residents (described as worker informants below) who were employed on the wind farms during the construction phase, mostly in temporary, unskilled jobs. In this period, I was also able to interview five community leaders and three IPP employees, while spending time in the town observing social dynamics and interacting informally with a range of people in different settings.⁸³ This fieldwork was supplemented with interviews with key players in the national debate on the just transition, attendance at renewable energy sector conferences, and extensive documentary analysis between 2017 and 2021. In addition, I drew on the socio-economic household survey that was conducted in Loeriesfontein in 2019 by the SARChI Research Chair within which my doctoral research was located. (This survey is discussed more fully by Walker and Vorster in Chapter Four of this volume.)

What this research has shown is that while investment in renewable energy can undoubtedly deliver major socio-economic benefits nationally, the benefits for struggling households in the places where the energy is being generated are far less assured. Straddling the core themes of job creation and community development, this chapter offers insights on the limitations but also the potential of the REIPPPP, from the vantage point of a small Karoo town where investment in social and economic development is sorely needed. It thus enlarges the geographical scope of the debate on the just transition in South Africa, by bringing developments in the host communities for renewable energy projects into sharp focus. While the nation and planet are set to benefit from South Africa's shift to renewable sources of energy, I argue that the industry's claims about local development gains cannot be taken at face value. However, I go beyond this critique to argue that while the renewable energy sector's contribution to local employment over the medium to longer term is inherently limited, it could make a far more significant contribution to community development in both the short and the longer term than is currently the case. This, however, requires a shift in the prevailing policy-political debate on South Africa's energy transition, to pay more attention to the renewable energy sector's contribution to community development than the current preoccupation with the sector's job creation credentials entertains.

83 Pseudonyms or general descriptions are used for informants in references to these interviews.

My discussion thus extends the debate on the disjuncture between national goals and local benefits from developmental projects around mining and the Square Kilometre Array (SKA) (Walker et al., 2019) to the energy sector. It underscores the importance of local struggles over questions of meaningful participation and equity, and complements Borchardt's discussion of household energy poverty in De Aar in Chapter Ten of this volume.

The discussion begins with a brief review of the terms of the just transition debate and my understanding of sustainable development. This is followed by an overview of the REIPPPP and a critical assessment of both its job creation claims and community development obligations. Thereafter I turn to my case study. After brief background accounts of the town and the development of the two wind farms, I assess the nature of the labour market in Loeriesfontein and its consequences for job creation, before turning to local perceptions of the wind farms during their construction phase. While the building of the wind farms produced a noticeable short-term boost to local jobs and household incomes, the nature of the jobs on offer locally meant that this did not translate into a sustained contribution towards eradicating household poverty over the longer term. I then consider the IPP's record on community development in the town. Despite the evident problems in how projects have been conceptualised and implemented, I argue that there is an as-yet untapped potential for meaningful local community development through the country's investment in renewable energy. Properly leveraged, the funds committed to social and economic development projects by the renewable energy sector, coupled with the dividends accruing to local shareholders through the community trusts that IPPs have been required to set up, could contribute significantly to sustainable livelihoods in the Karoo and give substance to calls for a just transition to renewable energy.

The just transition and sustainable development

While the need for a just transition featured in the DEA's *Climate Change Response White Paper* of 2011, the policy-political debate on what this means has been largely driven by the trade union movement in SA, drawing on work done by the International Labour Organization (ILO) and the concept of "decent work" (ILO 1999, 2015). The ILO defines decent work as "productive work for women and men in conditions of freedom, equity, security and human dignity" (ILO 1999:3). This definition rests on four pillars: 1) job creation, 2) rights at work, 3) social protection and 4) social dialogue. In 2015, after successfully lobbying for the concept to be included in the Paris Agreement that was signed at the 21st Conference of the Parties (COP21) (under the United Nations Framework Convention on Climate Change), the ILO released guidelines for a just transition in which "decent work" was assigned a central role (ILO, 2015).

As early as 2012, the National Union of Metalworkers of South Africa (NUMSA) passed a resolution at its Ninth National Congress on the need for a socially owned renewable energy sector that would be “made up of a mix of energy parastatals, cooperatives, municipal-owned entities and other forms of community energy enterprise” (NUMSA, 2012). Implicit in NUMSA’s resolution was an understanding of a “just transition” to renewable energy, which gained national traction from 2018, on the back of an ultimately unsuccessful court interdict that the union attempted to bring that year, along with Transform RSA, a non-profit company (Malope, 2022). The interdict, which is discussed further below, was intended to stop Eskom from signing purchasing power agreements (PPAs) with 27 renewable energy IPPs, on the grounds that this would lead to the closure of coal-powered stations, with devastating consequences for the households and communities that depend on these jobs. For its part, the South African Wind Energy Association (SAWEA) countered the interdict attempt by highlighting the long-term benefits for South Africa of investing in renewable energy while Greenpeace Africa, a prominent environmental non-governmental organisation (NGO), touted the 100 000 full-time equivalent jobs that the REIPPPP was expected to create. This, they argued, would more than compensate for those that would be lost in the coal sector (Malope, 2022).

In their arguments, both sides failed to consider the needs and interests of the renewable energy sector’s host communities. NUMSA’s centering of working-class people in South Africa’s energy transition is critically important, but their understanding of this constituency did not incorporate the people living in proximity to renewable energy projects nor consider their context-specific needs. Equally, the renewable energy sector did not see the need to anchor its advocacy around jobs and clean energy at the national level in the daily challenges of life in the places where the energy is being produced.

In my dissertation, I develop the argument that for the transition to renewable energy to be truly just, it has to be aligned with the advancement of sustainable development in these communities as well. The understanding of sustainable development with which I have worked is one developed by Holden and colleagues (2016, 2018), which encompasses three cross-cutting and non-negotiable “moral imperatives” that need to be addressed in tandem with each other: satisfying human needs, ensuring social equity, and respecting environmental limits. While Holden et al. recognise that “poverty, injustice, and environmental degradation interact in complex and potent ways,” (2018:18), and that policy development needs to be attuned to different national circumstances, they identify six broad policy goals for sustainable development that are certainly relevant in contemporary South Africa and the Karoo. These are: eradicating poverty; enhancing human capabilities; ensuring democratic participation; ensuring the fair distribution of resources;

mitigating climate change, and safeguarding the integrity of the biosphere. Applying their analysis to the renewable energy sector's development responsibilities in Loeriesfontein means that, at a minimum, IPPs must strive for meaningful community participation in decision-making about local development projects. Job creation needs to be consistent with the 'decent work' criteria elaborated by the ILO, and community development projects should advance efforts to eradicate extreme poverty, build human capabilities, and guard against appropriation of the benefits by local elites. In the development of these projects in the construction phase, damage to the already vulnerable environment must be minimal and the protection of biodiversity taken seriously.

South Africa's Renewable Energy Independent Power Producer Procurement Programme

The REIPPPP was launched in 2011, the year in which South Africa hosted the Conference of the Parties (COP 17) in Durban. The programme was designed to operationalise both the country's *White Paper on Energy Policy* of 1998 (Department of Minerals and Energy (DME), 1998) and *White Paper on Renewable Energy* of 2003 (ibid.). It was introduced at a time when the electricity supply crisis was starting to unfold in South Africa, in parallel with political interference by Eskom's management board (Malope, 2022). The programme is guided by South Africa's Integrated Resource Plan (IRP), a planning document which sets out time frames and policy parameters for moving from the country's current heavy reliance on coal to generate electricity, to a cleaner mix of energy sources (Department of Minerals Resources and Energy (DMRE), 2019); the country's roadmap for the period 2010–2030 was first issued in 2010 and revised in 2019.

The REIPPPP has involved a series of bid windows during which IPPs compete to win a percentage of the megawatts (MW) allocated in each round through a "power purchase agreement" (PPA). Bid windows 1 to 4 ran from 2011 to 2015 and bid window 5 from 2019 (DMRE, 2019). (The PPAs for the two Loeriesfontein wind farms were adjudicated in bid window 3, in 2013.) After four successful bid windows, the programme ran into resistance that reflected the intense contestation around energy policy at the time and slowed down the rollout of the REIPPPP. The first indication of resistance came in 2016 from Eskom, by then under increasing financial strain. Because the power utility is the sole buyer of the electricity generated by the renewable sector, the PPAs form part of Eskom's primary energy costs. Eskom argued that the expansion of the programme under conditions of surplus generation capacity would increase the price of electricity. It then simply delayed signing the PPAs for bid windows 3.5 and 4, which were only finally signed in April 2018 (Malope, 2022:126).

In March 2018, a second and politically more powerful expression of resistance emerged, with the attempt by NUMSA and Transform RSA to interdict the conclusion of the PPAs under bid windows 3.5 and 4 (NUMSA, 2018). As already indicated, NUMSA, a former affiliate of the Congress of South African Trade Unions (COSATU) until its expulsion in 2014, is an advocate of a socially-owned renewable energy sector that is designed to protect against job losses and benefit local communities, in particular those in the coal-producing areas of the country (NUMSA, 2012). In a series of newspaper articles debating the merits of the REIPPPP in 2018, Irvin Jim, NUMSA's Secretary-General, questioned the veracity of the job creation numbers projected for bid windows 3.5 and 4, and reaffirmed the union's call for a "just transition". While the court interdict was not successful, the litigation pushed the idea of a just transition firmly into the national debate. Since then, organised labour has insisted that the ILO's Guidelines for a just transition must be the standard to be followed in South Africa. This puts the idea of 'decent work' at the centre of the transition and cautions against a 'one size fits all' approach.

The REIPPPP's Economic Development Scorecard

The body adjudicating bids is the IPP Office, acting on behalf of the DMRE. The scorecard for evaluating bids has two main elements: the cost competitive price (i.e., the tariff) and an Economic Development Scorecard that sets out various socio-economic considerations against which IPP bids will be assessed. In the first four bid windows, the tariff component counted for 70% of the final score, while the Economic Development Scorecard accounted for the remaining 30%: a not insignificant weighting. In the fifth bid window, however, the weighting was adjusted to allocate a full 90% to the tariff and just 10% to the Economic Development Scorecard. This reweighting reduced the economic development commitments of IPPs to essentially a minor administrative hurdle, easily overcome with a set of tick-box undertakings. This shift reflects the growing urgency around bringing renewable energy into the national energy mix, under conditions of mounting electricity supply constraints. Though not applicable to this case study, which predates these changes to the Scorecard, this significantly reduced weighting makes the concerns raised in this chapter around community development even more relevant.

Table 9.1 below sets out the seven items on the Economic Development Scorecard that were applicable across bid windows 1 to 4. The first four categories make specific reference to local communities, while projects' host communities can also be targeted to varying degrees under categories five and six, depending on the locality of the project site. For the Scorecard, "local community" is defined as a community living within a 50-kilometre radius of the project, with black people within these communities singled out as the target beneficiary group (Department of Energy (DoE), 2015:98). This understanding draws from South Africa's Mining Charter and Social Labour Plan, but it is particularly ill-suited to the Karoo, where

local municipalities administer very large areas that contain several widely dispersed small towns. In the case of Loeriesfontein, the town was deemed to qualify for this status because it is the closest town in the Hantam Local Municipality to the two wind farms, even though it is actually around 60 kilometres from them.

Table 9.1 The REIPPPP's Economic Development Scorecard (IPP Office, 2021)

Category	Objective
1. Socio-economic development	Address socio-economic needs of local communities
2. Enterprise and development	The development of emerging enterprises, including emerging enterprises located in local communities; and on procuring from black enterprises and enterprises owned by black women
3. Ownership	Ownership by South African entities, with 5% of shares to be held by community trust
4. Job creation	Emphasis on jobs for South African Citizens, black people, women, youth from local communities
5. Skills development	Contributions made by the project company to improve the skills of employees, learners at higher education institutions, and disabled persons
6. Local content	Percentage of the total value of the project to be spent on South African goods and services
7. Management Control	Involvement of black people, in particular black women in board directorship, senior and executive management

In terms of job creation (category 4 above), in 2015 the DoE “estimated that utility-scale projects awarded in bid windows 1 to 4 would create 109 443 ‘job years’ over a 20-year period, encompassing both the construction and operational phases” (DoE, 2015:95). At the end of 2021, the IPP Office reported that at that stage, 63 291 job years had been created for South African citizens through projects awarded in bid windows 1 to 4 (IPP Office, 2021). Of these, 76% (48 110) were in the construction phase, with the balance in the operational phase.

However, a great deal of caution is needed in interpreting the data. In 2018, the authors of a study commissioned by SAWEA noted that while “studies ... have generated a significant amount of data and information on actual and possible employment implications ... it is nevertheless very hard to get a good sense of what all these studies are collectively confirming. Individually they are often misleading” (Tyler & Steyn, 2018:2–3). A major problem lies with the concept of job years that is used to measure job creation, which does not reflect the actual number of people employed or for how long. This is because in the REIPPPP, one job year is

equivalent to one person in full-time employment for one year.⁸⁴ Thus, if one person is employed for a second year, the sector would have generated two job years, even though only one person was employed. In practice, four job years could mean four people each employed for a year, or two people each employed for two years, or one person employed for four years. These are very different scenarios for communities such as Loeriesfontein, with high levels of unemployment and poverty.

While all the projects from bid windows 1 to 4 created employment opportunities for local people during their construction phase, the jobs on offer were mostly temporary, low-skilled and low-waged, as my case study confirms. Most of the employment opportunities associated with the manufacturing of components were located outside the country while those in South Africa were not located in the Northern Cape. In the case of the Loeriesfontein wind farms, only one of the key components of wind turbines was manufactured in South Africa – the tower, which was manufactured at Atlantis in the Western Cape, by a subsidiary of a Spanish-owned company, Gestamp Renewable Industry. The other components (the rotor, hub, nacelle, and generator) were imported from Siemens Gamesa Renewable Energy, a turbine manufacturing company also headquartered in Spain. Here it is also worth noting that only one of the three Special Economic Zones linked to the renewable energy sector that were established in South Africa in 2014 is located in the Northern Cape, in Upington.⁸⁵ The main training centre associated with the renewable energy sector, the South African Renewable Energy Technology Centre at the Cape Peninsula University of Technology, is also outside the Northern Cape, in Bellville in the Western Cape.

With regard to the socio-economic development (SED) and enterprise development (ED) impact of the REIPPPP (categories 1 and 2 in the Economic Development Scorecard above), an important point to note is that the commitments made by IPPs at the bidding stage were only required to kick in once the project was operational and generating revenue through the sale of electricity to Eskom. Any undertakings before then were purely goodwill projects, at the discretion of the developer. Already in 2012/13 researchers raised concerns about the potential problems this delay could cause (Tait, 2012; Wlokas, Boyd, & Andolfi, 2012). This concern was borne out by protests in Loeriesfontein in 2015/16 (discussed further below).

At the end of 2021, the IPP Office reported a total contribution of ZAR22.8 billion had been committed to SED initiatives through bid windows 1 to 4, of which ZAR18.5 billion had been allocated to local communities as defined by the programme (ibid.). With regards to the ED contribution, the IPP Office reported that

84 This method of calculation was “embraced” by US President Barak Obama’s transition administration to justify a USD787 billion stimulus package (Milstead, 2011).

85 The other two are at Atlantis in the Western Cape and Richards Bay in KwaZulu-Natal.

commitments by IPPs between bid windows 1 to 4 stood at ZAR7.2 billion, of which R5.6 billion had been allocated to local communities (ibid.). Five sectors were receiving the bulk of both SED and ED funding: enterprise development, education and skills development, social welfare, healthcare, and general administration.

A potentially very important component of the Economic Development Scorecard is that of the community trusts as a vehicle for local ownership in renewable energy projects (category 3 in Table 9.1 above). While it is touched on this in this chapter, the potential of these trusts is an issue for further scrutiny as they become more prominent disbursers of funds over time. The community trusts set up in terms of bid windows 1 to 4 stand to receive some ZAR25.5 billion net income over the 20 years of the operational phase of the projects awarded in these bid windows – a huge capital fund that will require very careful management if it is not to be squandered or misappropriated (Malope, 2022).

From the outset of the REIPPPP, researchers have raised questions about the scope and effectiveness of the economic development responsibilities of IPPs. While some have pointed to the potential of the SED and ED funds in community development (Wlokas et al., 2012), serious concerns have also been raised about the difficulties the renewable energy IPPs in South Africa can be expected to face in this regard, given that community development is not their primary mandate. Already in 2012/13 researchers were concerned about how to ensure that funds would be spent in the best interests of the wider community and not captured by local elites or wasted on small, ad-hoc projects (Wlokas et al., 2012; Tait, Wlokas & Garside, 2013). This concern was certainly pertinent in Loeriesfontein, with the ward committee playing a central role in facilitation between IPPs and potential local beneficiaries during the construction phase of the two wind farms.

Loeriesfontein: A case study of (mis)development

The history of Loeriesfontein has already been described by Walker and Vorster in Chapter Four of this volume. Its roots lie in a history of first settlement and then dispossession in the nineteenth century involving a group of Basters, a social group comprising people of mixed indigenous and settler parentage that emerged in the colonial period (Davids, 2021). During the apartheid period, this history of dispossession intensified, with the descendants of the Basters officially classified as 'coloured' by the state. In 1968, the apartheid government implemented the Group Areas Act of 1950 in the town, leading to the enforcement of residential segregation and the majority of the population being forced to live in a small area designated for them on the edge of the town (see Figure 4.4 on page 103).

As laid out more fully by Walker and Vorster in Chapter Four, poverty and unemployment are severe in Loeriesfontein, reflecting the marginalisation of the region. The 2019 SARChI survey (which was conducted after the mini boom associated with the construction phase of the wind farms) found 39% of the economically active workforce in the town were unemployed. Significantly, the survey also established that close to a quarter (23%) of the unemployed had worked on the wind farms in the construction phase, but only 4% of those in employment in 2019 were still working there (Vorster, 2019:6). The survey data did not find any gender differences in the town's unemployment rate, but age and education levels were significant determinants of employment status. Sixty per cent of the unemployed were in the 20–29 age bracket and unemployment among those without a matric certificate was much higher than among the small number of people with a matric or post-school qualification. Outside the tiny middle class made up of local business owners (mainly white), along with teachers, nurses, government officials and the like, most of those in employment were working in irregular, unskilled and low-wage jobs as general, farm and domestic workers. Almost half of all wage earnings reported by survey respondents fell below ZAR2 500 a month, while 46% of households in the survey reported social grants as their main source of income (ibid.).

As already noted, Loeriesfontein is the only town in the local municipality to have benefitted from the local economic development requirements of the REIPPPP, because it comes closest to the programme's definition of 'local' in terms of its relative proximity to the Loeriesfontein 2 and Khobab wind farms. This has generated tensions within the municipal council, which sits in Calvinia (approximately 140 kilometres away via the tar road to Nieuwoudtville), with understandable resentment among the councillors representing the other towns in the municipality (Malope, 2022). When I asked a key informant, a local business person, if he thought the municipality welcomed the SED projects in Loeriesfontein, he responded:

I think so, but have you heard of the term money? If money comes into your whole sphere, then people get angry: you are getting more than me. Then jealousy comes in and everything else. At this stage there's a lot of dispute on whether Loeriesfontein should have an advantage or whether the whole Hantam Municipality should benefit from the wind farms ... but I don't want to step in the arena (Business person, 2018).

The allocation of SED and ED spend to Loeriesfontein town means that only one of the seven wards in the municipality is benefitting. This has intensified political contestation over this ward, which has shifted between the Democratic Alliance (DA) and the African National Congress (ANC) in successive local government elections (Malope, 2022).

Background on the two wind farms

The Loeriesfontein 2 and Khobab wind farms were developed by Mainstream in partnership with its African subsidiary, Lekela Power (which operates through Lekela Power in Egypt, Ghana, Senegal, and South Africa) (Mainstream, 2020). The environmental impact assessment (EIA) was conducted by SiVEST Environmental Division, with the main contractor and sub-contractor being two of South Africa's major construction companies, Murray & Roberts Consortium and Construction & Consolidated Power Projects. Each farm has 61 wind turbines with 138 MW and 137 MW of installed capacity respectively. Although regarded as separate projects, the two farms were constructed in tandem on adjoining, privately owned farmland rented from the owner.

The community trusts are expected to accrue just over ZAR1 billion in income, money which will start to flow once their debt repayment obligations are satisfied.⁸⁶ In its bid presentation to the National Energy Regulator of South Africa (NERSA) in 2013, Mainstream estimated that a total of ZAR450 million would be generated for SED projects over the 20-year period of the commercial operation of the two farms, with a further ZAR181 million in total for ED (Mainstream, 2014). Thus, according to Mainstream, including the ZAR1 billion in income from community trusts, the two wind farms were projected to generate in the region of ZAR1.6 billion for developments that would benefit the community. The projections are staggering in the context of a town of around 3 000 residents, with the levels of poverty described by Walker and Vorster in Chapter Four in this volume.

SiVEST's EIA estimated the construction phase would create 569 new jobs over a two-year period, 313 of which would be sourced locally. The bulk of the other 256 jobs were projected to come from the rest of South Africa, while 36 highly skilled technical positions would be sourced from outside South Africa. The projected 569 jobs were duly translated into 1 138 job years, "given the two-year construction period" (SiVEST, 2012:230). After the projects were built, Lekela Power reported that 70% of the workforce during construction had come from Loeriesfontein and that these workers had also benefitted directly from the skills development programmes put in place (Lekela Power, 2017). Most of the jobs were on-site, linked to the construction of roads and preparing the site ahead of the erection of the turbines. However, other indirect jobs were created as well, such as cleaners at local bed-and-breakfast establishments and additional staff at the local supermarket.

86 Their 5% shareholding was financed through loans from the Development Bank of South Africa and ABSA Bank Limited.

Missed opportunities, protests and local politics, 2015–2018

Local informants told a more muted story about the number of jobs actually created through the construction of the wind farms. One well-informed key informant estimated that at the height of the construction phase, there were around 600 people on site, of whom only 100 were local people from Loeriesfontein (Paul, 2018). These figures were consistent with what another key informant closely involved in the project told me in February 2019 (Menzi, 2019). This informant also commented that many of the complaints by local people about the construction process concerned the lowly status of the jobs available to them:

But we [local people] are not getting prized jobs, [just] manual labour jobs. Why cannot we be trained to drive the machines? Because they are not only better paying jobs, but how much skill is required since we are drivers (Menzi, 2019).

Construction between 2015 and 2017 coincided with a severe drought in the region and briefly stimulated the depressed economy of the town. This brief economic boost created unrealistic expectations around job creation, which were not adequately managed, which then impacted negatively on the rollout of community development projects (discussed further below) (Malope, 2022). Dissatisfaction in the town led to two community protests, the first in 2015 and the second in 2016. While the first protest was triggered by issues linked to employment, the broader context was the build-up to the 2016 local government elections, on the back of the 2014 national elections. According to one of my key informants, the main contractor did not do the basics in terms of community liaison when it first arrived in Loeriesfontein in 2015. Instead of setting up clear and independent recruitment channels, its representatives were seen to be using the informal and racially charged networks that Mainstream had already established:

They didn't advertise jobs, they went to the same sources that Mainstream had told them that its ok to go to, all white, and they started getting people to work. Completely inappropriate, no process (Menzi, 2019).

Murray & Roberts also came with its own team of permanent employees. From the outset, then, local work seekers felt excluded from the opportunities associated with the construction. On 16 June 2015, a protest involving a sizable number of people took place outside the Murray & Roberts' offices in town. The protest was resolved with the intervention of the ward councillor who, concerned about the consequences for the upcoming 2016 local government elections, suggested that the 10-member local ward committee become the community's representative forum to spearhead development. In addition to this forum, Murray & Roberts also employed a Community Liaison Officer (CLO), a local person from Loeriesfontein, to deal with community members' employment-related concerns.

At first these arrangements seemed to be working. However, over time perceptions took hold in Loeriesfontein that the ward committee members and “outsiders” were benefitting unduly from the local employment opportunities and service contracts (Councillor, 2017). At this stage the IPP’s SED and ED commitments had not yet kicked in – these were only required once the projects were operational – but it had initiated a number of so-called goodwill projects (discussed further below). However, communication with the larger Loeriesfontein community on how future SED and ED commitments would be rolled out and how the goodwill projects differed from them was poor. According to the councillor, the ward committee was not representing the community’s interests but its own: a contract for taxi services to transport workers between the town and the construction site, as well as a tender for waste recycling of cable offcuts had gone to its members (Malope, 2022).

The accumulation of grievances culminated in the second community protest, which took place over two days in April 2016, three months before the local government elections scheduled for August that year. In the lead-up to this protest a list of community grievances and demands was presented to both Mainstream and Murray & Roberts, who delivered a response to them at a community meeting in the Loeriesfontein Sports Hall on 8 April (Mainstream, 2016; Councillor, 2018). In their response, the IPP summarised the community grievances under seven headings: 1) project management attitudes towards employees and those actively seeking employment from the Loeriesfontein community; 2) procurement and recruitment opportunities and contracts being awarded to outsiders not locals; 3) high expectations from the community due to previous promises made by the company; 4) the CLO role not functioning as intended; 5) insufficient social investment in and upliftment of the community by the project company; 6) low tolerance levels for peaceful resolutions with ultimatums to project management by the community, and 7) employee-related grievances. All seven issues speak not simply to the problems of communication between the IPP and ordinary members of the community, but also to the levels of mistrust and feelings of disempowerment in the community as the high hopes local people had initially placed in the wind farm development were disappointed.

In their response to these grievances, Mainstream acknowledged that employment opportunities were limited during the construction period and made a qualified commitment to prioritising the Loeriesfontein community “where possible”, while also stating that this would “not [be] at the expense of quality” (Mainstream, 2016:5). The company also defended the community projects that were supported during the construction phase in terms of the REIPPPP (in which the developer’s SED commitments only applied once the construction phase was over). Thus, they argued, the projects that they had supported were discretionary: “Any social investment being made during construction is purely based on [the] goodwill of the contractors working in the area and is at their total discretion through sponsorships” (Mainstream, 2016:7).

Table 9.2 shows the beneficiaries of the discretionary goodwill projects initiated during the construction phase as of April 2016: once-off contributions to the local primary and high schools, as well as two business contracts, which went to members of the ward committee. The expenditure on the school projects amounted to ZAR180 000 while the contribution towards the two businesses was over ZAR600 000.

Table 9.2 IPP spend on goodwill projects in Loeriesfontein by April 2016 (Mainstream, 2016)

Project	Cost
Loeriesfontein Primary School: jungle gym installation	R 43 000
Loeriesfontein High School hostel: bedroom refurbishment	R 83 000
Loeriesfontein High School: "Back to School" roadshow; donation of textbooks	R 22 500
Loeriesfontein Primary School: transport sponsorship for sports activities	R 32 000
Loeriesfontein Primary School: site visit to wind farm	In kind
Development of taxi transport company	[over R 600 000]
Development of waste recycling company	

Dissatisfaction with the response led to protests a few days later (13–14 April), with community members temporarily blocking the road leading to the wind farm site with rocks. The protest was quelled but the frustrations resulting from the different perceptions around the IPP's local development responsibilities lingered on. After the second community protest the DA councillor narrowly won the Loeriesfontein ward but the ANC retained its overall majority in the local municipality. The ward committee in Loeriesfontein was dissolved by the ANC-controlled council and a Social Ills Committee (which was formed in 2016 specifically to address 'social ills' such as alcohol abuse and public disorder, seen to have been brought on by the construction boom) became the de facto community representative body (Maria, 2018).

Job creation and decent work

In this section, the nature of local job creation and how it measures up to the notion of decent work is explored. Most of the 25 people I interviewed as worker informants in 2018 had been employed on short-term contracts during the construction period, in occupations falling into the category of general work and classified as low- or semi-skilled (flag bearers, drivers, bricklayers, carpenters). Local employment opportunities started to decline at the point of erecting the wind turbines, which

requires specialist skills not sourced in Loeriesfontein. Only two of my 25 worker informants were still employed at the time of my interviews. One was a former general worker who had a post-matric qualification (a national diploma in drama studies) and was retained as an office administrator. The other was a former general worker who had been retained as a security guard. This low rate of absorption fits with the findings from the 2019 SARChI household survey (Vorster, 2019).

Consistent with the demographic profile of the town, all but one of the 25 informants self-identified as 'coloured'. The one exception (who had been born in Namibia) described himself as a Baster. Unsurprisingly, given the male-dominated nature of construction work in South Africa (StatsSA, 2020), on-site employment opportunities during the construction phase disproportionately favoured men and only three of my worker informants were women. One was employed as a driver to transport crane operators between Loeriesfontein and Cape Town International Airport (422 kilometres away); between these trips she worked on site as a general worker. The other two women worked for Murray & Roberts in Loeriesfontein itself – one as a cleaner and one as an office administrator.

The majority of informants (15) were under 30, with only one (a man) over the age of 50. He had 30 years of experience in the construction industry and worked as a shutterhand. Most (20) had previous working experience, which was a consideration in their recruitment. However, consistent with the education profile of the town more generally, most had not completed high school, which limited the range of jobs for which they could be considered. Only two had a post-matric qualification, as shown in Table 9.3 below.

Table 9.3 Educational level of worker informants in Loeriesfontein

Educational level	Number
Primary and lower	2
Grade 8-10	16
Grade 11-12	5
Post matric and diploma	2
Total	25

The notion of a job year would be very hard to apply to six of these 25 informants, three of whom were employed on site for between one and three months, and three for between four and six months. Another seven were employed for between six months and a year, and eight for a period of between one and two years. Two had more than one short-term spell of work during the construction phase, one of whom was retrenched but later rehired by the same contractor.

Table 9.4 shows the reported gross monthly income of my 25 worker informants while they were employed. This shows that the wages from working on the construction of the wind farms were very attractive compared to the going wage for general workers that was established through the SARCHI household survey, with the lowest paid of the informants earning ZAR2 000 more than the median monthly household income of ZAR3 000 recorded through the SARCHI survey in the town (Vorster, 2019).

Table 9.4 Gross monthly income of worker informants in Loeriesfontein

Income range	Number
R5 001 - R5 500	5
R5 600 - R6 000	5
R6 001 - R7 000	7
R7 001 - R8 000	6
R10 000+	1
Declined to answer	1
Total	25

The local job creation during construction could be seen to address, if only temporarily, the first pillar of the ILO’s decent work framework. However, although remuneration was relatively high in the context of the local labour market, the second, third and fourth pillars of the framework – workers’ rights, social protection, and social dialogue – were either not in place or were only present to a limited degree. In part this was because of the short-term nature of the employment contract. While there was formal compliance with basic conditions of service, some of my worker informants reported inadequate amenities compared to those provided on site for the skilled workers and managers. Furthermore, few had benefitted from opportunities for skills development (Malope, 2022).

Interestingly, one of the strongest themes to emerge during my interviews around the notion of decent work, one that is not explicitly addressed in the ILO framework, concerns work as a source of dignity and a positive sense of self. For example, one worker informant’s response to a question about what he thought decent work involved, emphasised the issue of pride:

Decent area, cleanliness, work that you [are] proud of it – when you do the work, you want to do [it] for the rest of the life. You are happy, glad to stand up in the morning to go to work, ‘cause you know that is your pride. Provide food on the table. You know when you come to work, that is what I’m good at, that is my passion (Frank, 2018).

For most of my worker informants, this sense of job satisfaction was missing. On whether the work he did counted as decent work, another one remarked that “it was not really a decent job because it is not what I really wanted to do, I just did it ‘cause I didn’t have money and I needed money and there’s no work so I had to take it ...” (Buta, 2018).

Community development and sustainable development

For the ward councillor in 2017, the main benefit flowing from the construction of the two wind farms was the boost to local employment it had generated. Local shops had also gained from the uptick in business, although the reach of this benefit was limited: “If they [the developers] could procure something here, we only have one shop, at that time we only had Spar, we now have PEP, but that’s white business” (Councillor, 2017). Not included in this assessment at this stage was the potential contribution to community development, once the wind farms were in operation and the IPP’s SED and ED commitments began to kick in.

In 2018, both wind farms were reported to have generated revenue of ZAR17.2 million for SED and ZAR6.8 million for ED, with a combined total of R24 million.⁸⁷ As already indicated, these amounts are not insignificant. However, an evaluation of the impact of these funds has to go beyond the quantum of money reported as spent or allocated and assess the actual projects they supported in terms of their contribution to local sustainable development. Here the three moral imperatives of satisfying human needs, ensuring social equity, and respecting environmental limits discussed earlier become relevant.

Table 9.5 show a list of community projects that were targeted for support from the company’s SED and ED allocation in 2018, once the wind farms had started operations. These were clustered in the following sectors: agriculture, education, health, and construction.⁸⁸ They reflect the priorities of the Social Ills Committee, which had been established after the 2016 protests and ensured that SED and ED funds were directed towards the sectors it favoured, in education, healthcare, policing and social welfare. This is consistent with the pattern around SED and ED projects reported by the IPP Office which are clustered around education and skills development, healthcare, social welfare, enterprise development and general project administration (Malope, 2022). While these are all important sectors, the actual projects that are supported often have limited reach while some duplicate the services that should be the responsibility of the state.

87 This information comes from an audio recording made at a community meeting by one of my key informants.

88 A partial list of the projects can be found at <https://loeriesfonteinwind.co.za/category/news/>

Table 9.5 List of planned community development projects in Loeriesfontein from 2018 (Mainstream, 2017)

Project Name	Focus Area	Year
1. Agricultural capacity building programme	Agriculture	2018
2. Renovations at Community Health Care Centres	Infrastructure: health	2018/2019
3. Multi-Purpose Community Centre	Infrastructure	2018/2019
4. High School infrastructure repairs	Infrastructure: education	2018
5. Renovations of sports facilities in town	Infrastructure: sport and arts	2018/2019
6. Upgrading of roads to hospital and police station	Infrastructure: roads	2019/2020
7. Bursary / Skills Fund	Higher education	2018 onwards

The agricultural capacity building programme is an interesting project because it went beyond the parameters of SED set out in the REIPPPP’s Economic Development Scorecard. It was actually an inclusive drought-relief project that was aimed at local farmers regardless of race, at a time when the region was dealing with a crippling drought.

In this time the role of the Social Ills Committee became a further source of tension. A community leader told me in September 2018 that one of the report-back community meetings regarding the SED and ED spend degenerated into chaos (Community leader, 2018). As in 2016, community grievances centred on the perceived lack of transparency regarding the management of community development funds and the criteria used by Mainstream in choosing projects to support. Poor communication continued to drive misunderstandings and mistrust. In the words of one community member, a young man whom I interviewed in May 2018: “The problem is there will be [money] available, money will be available and will be paid quarterly from 2018 ... However, there’s no communication on how it will be allocated” (Buta, 2018). Another key informant complained to me about the lack of long-term planning and commitment to holistic community development in the way projects were supported: “You must think holistically. See, if I donate a computer, you must donate a teacher for three years to teach the kids... I can’t just dump on you here ... look at paint, they donated paint ... but it’s just sitting there” (Municipal official, 2018).

In 2019, a former senior management employee in Mainstream formed the Loeriesfontein Work and Grow Primary Co-operative, which then became the vehicle for driving SED and ED community initiatives. Accountability to local residents was still a problem, with no community participation forums called to discuss SED and ED initiatives in that year. As already described, one of the

grievances Mainstream had identified already in April 2016 was the perception that its social investment initiatives were insufficient. The high expectations amongst community members brought on by the construction of the two wind farms created the conditions in which misunderstandings and miscommunication between the IPP, on the one hand, and community members, on the other, continued once the wind farms became operational. The lack of community participation in decision-making around SED and ED initiatives remains a problem.

Conclusion

At the time of finalising this chapter (late 2022) the World Bank had approved a ZAR9 billion loan to Eskom for the decommissioning and repurposing of its Komati coal-fired station to use renewable energy and batteries, while also retraining its workers to mitigate job losses and create new opportunities (World Bank, 2022). South Africa was experiencing chronic 'loadshedding' (i.e., controlled interruption of electricity supply to consumers), which was polarising debates over the country's energy mix and, along with a wider political crisis within the ruling party, overshadowing debates on climate change. In this context the focus in the energy debate was very much on coal and coal-producing areas.

Using the two key themes of employment creation and community development, this chapter has drawn attention to the need to expand this focus to include renewable energy host communities, many of them in the Northern Cape Karoo. The key question is not whether the transition to a low-carbon economy is necessary to avert the global climate crisis – it is – but who should shoulder the costs of the transition, and how, and in what form the benefits of investing in renewable energy should be distributed within South Africa, nationally, regionally and locally. In addressing this issue, it is essential to include renewable energy's supply areas in the understanding of 'local' and direct far more careful policy attention to giving content to the just transition in these areas.

This case study makes clear that in the Northern Cape Karoo local employment opportunities under the REIPPPP are largely confined to the construction phase and are limited in terms of their longer-term economic impact. This is because of the nature of construction and the fact that the programme's local content requirements extend to the manufacturing sector in South Africa more broadly, beyond the localities where projects are constructed. The maximisation of local labour participation from host communities is predicated on skills development training, but even with more effective programmes in place, the post-construction absorption of workers in places like Loeriesfontein can be expected to remain low, given low levels of secondary schooling and beyond. The improvement of educational outcomes would likely facilitate employment opportunities (assuming

people do not migrate to larger centres), but this requires interventions that go beyond what the IPPs can offer. While currently the construction phase creates more jobs than the operations phase, further opportunities for employment creation are located elsewhere in the renewable energy value-chain. These, however, lie largely outside the Northern Cape, thus requiring suitably qualified people from the province to migrate in order to access them.

More potential lies in the contribution of the renewable energy sector to community development through the SED and ED commitments and, in the longer term, the community trusts. However, my research has found that local patronage networks are a stumbling block to broader and inclusive community development. Lack of transparency in the award of contracts to local service providers and minimum community participation in and corporate accountability around which community development initiatives receive support are major issues of concern. These weaknesses raise questions about the value for local people of the return on the millions of rands being spent by IPPs in the name of community development, as mandated by the REIPPPP. There is significant potential in the community trusts, which will require careful planning and effective and accountable leadership if the money is to be operationalised in a meaningful way. Beyond this, an issue that I have not considered in this chapter is the prospect of a socially-owned renewable energy sector that could be of long-term benefit to marginalised communities such as Loeriesfontein and, potentially, be funded by the community trusts.

While no single sector can be expected to solve South Africa's socio-economic challenges in general, and structural unemployment in particular, at the local level the renewable energy sector is uniquely positioned to make a meaningful contribution to the diversification of livelihoods in its host towns through SED, ED and community-trust funding. More work needs to be done on how funds can be leveraged to address the eradication of widespread household poverty. In Loeriesfontein, the transition to renewable energy offers some green shoots, but any commitment to the just transition here will need to be rooted in a deeper understanding of local needs and long-term sustainability.

Acknowledgements

This work is based on research supported by the South African Research Chairs Initiative of the Department of Science and Innovation (DSI) and National Research Foundation (NRF) of South Africa (Grant No. 98765). The financial assistance of the NRF towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the author and are not necessarily to be attributed to the NRF.

References

- Business person. 2018. Personal interview, 10 May, Loeriesfontein.
- Buta. 2018. Personal interview, 6 May. Loeriesfontein.
- Community leader. 2018. Personal interview, 4 September. Loeriesfontein.
- Councillor. 2017. Personal interview, 28 November. Loeriesfontein.
- Councillor. 2018. Personal interview, 7 May. Loeriesfontein.
- Davids, S. 2021. Contested land: A case study of land reform on the municipal commonage in Loeriesfontein, Northern Cape Province. MA thesis. Stellenbosch: Stellenbosch University.
- Department of Energy (DoE). 2015. *The State of Renewable Energy in South Africa*. Pretoria: Department of Energy.
- Department of Environmental Affairs (DEA). 2011. *National Climate Change Response White Paper*. Pretoria: Department of Environmental Affairs.
- Department of Minerals and Energy (DME). 1998. *White Paper on the Energy Policy of the Republic of South Africa*. Pretoria: Department of Minerals and Energy.
- Department of Minerals and Energy (DME). 2003. *White Paper on the Renewable Energy Policy of the Republic of South Africa*. Pretoria: Department of Minerals and Energy.
- Department of Mineral Resources and Energy (DMRE). 2019. *Integrated Resource Plan (IRP2019)*. Pretoria: Department of Mineral Resources and Energy. [Online]. <http://www.energy.gov.za/IRP/2019/IRP-2019.pdf> [Accessed 30 March 2017].
- Frank. 2018. Personal interview, 8 May. Loeriesfontein.
- Holden, E., Linnerud, K., Banister, D., Schwanitz, V.J. & Wierling, A. 2018. *The Imperatives of Sustainable Development; Needs, Justice, Limits*. New York: Routledge. <https://doi.org/10.4324/9780203022177>
- Holden, E., Linnerud, K. & Banister, D. 2016. The Imperatives of Sustainable Development. *Sustainable Development*, 25(3):1–14. <http://dx.doi.org/10.1002/sd.1647>.
- Independent Power Producer Office (IPP Office). 2021. Independent Power Producers Procurement Programme (IPPPP): An Overview. As at December 2021. Pretoria. [Online]. <https://www.ipp-projects.co.za/Publications> [Accessed 30 June 2022].
- International Labour Organisation (ILO), 2015. *Guidelines for a just transition towards environmentally sustainable economies and societies for all*. Geneva: Switzerland. [Online]. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_432859.pdf [Accessed 30 June 2020].
- International Labour Organization (ILO). 1999. Report of the Director-General: Decent work, [Conference proceedings]. International Labour Conference, 87th Session. Geneva: Switzerland.
- Jim, I. 2018. IPPs fail test for 'just transition' from fossil fuel – NUMSA. *Fin24*. 29 July. [Online]. <https://www.news24.com/fin24/economy/labour/news/the-green-war-part-1-20180729> [Accessed 29 July 2018].
- Lekela Power. 2017. Loeriesfontein wind farm celebrates all turbines in place. *Lekela Power*. [Online]. <https://lekela.com/news/loeriesfontein-wind-farm-celebrates-all-turbines-in-place/> [Accessed 4 May 2018].

- Mainstream Renewable Power. 2014. Presentation to NERSA. 20 February 2014. Strand Tower Hotel, Cape Town. [Online]. [http://www.nersa.org.za/Admin/Document/Editor/file/Consultations/Electricity/Presentations/South%20Africa%20Mainstream%20Renewable%20Power%20Khobab%20Wind%20\(Pty\)%20LTD.pdf](http://www.nersa.org.za/Admin/Document/Editor/file/Consultations/Electricity/Presentations/South%20Africa%20Mainstream%20Renewable%20Power%20Khobab%20Wind%20(Pty)%20LTD.pdf) [Accessed 10 February 2018].
- Mainstream Renewable Power. 2016. Response to Community List of Demands received 08 April 2016 at Community Meeting in Sports Hall, Loeriesfontein. Cape Town: Mainstream Renewable Energy.
- Mainstream Renewable Power. 2017. Economic Development Focus 2017–2020. Cape Town: Mainstream Renewable Energy.
- Mainstream Renewable Power. 2020. COVID equipment provided to Hantam area. Cape Town: Mainstream Renewable Energy. [Online]. <https://khobabwind.co.za/covid-equipment-provided-to-hantam-area/> [Accessed 10 December 2020].
- Malope B.J. 2022. Power struggles: An exploration of the contribution of renewable energy to sustainable development, decent work and the “just transition” through a case study of wind farm development outside Loeriesfontein, Northern Cape Province (2011–2020). PhD dissertation. Stellenbosch: Stellenbosch University.
- Maria. 2018. Personal interview, 4 May 2018. Loeriesfontein.
- Menzi. 2019. Personal interview, 26 February. Loeriesfontein.
- Milstead, D. 2011. Confusion over ‘job years’. *The Globe and Mail*, 29 April 2011. [Online]. <https://www.theglobeandmail.com/report-on-business/economy/economy-lab/confusion-over-job-years/article613985/> [Accessed 30 June 2022].
- Municipal official. 2018. Personal interview, 12 May. Loeriesfontein.
- National Union of Metalworkers of South Africa (NUMSA). 2012. Building a Socially Owned Renewable Energy Sector in SA. NUMSA 9th National Congress, June 2012. Unpublished report. [Online]. http://numsa.org.za/wpcontent/uploads/2013/03/00123_1_building_a_sociallyowned_re_sector_in_sa.pdf [Accessed 5 December 2020].
- Paul. 2018. Personal interview, 10 September. Cape Town.
- SiVest. 2012. Proposed Construction of Wind Farms near Loeriesfontein, Northern Cape Province, South Africa. Final Environmental Impact Report. Umhlanga Rocks: SiVest.
- Statistics South Africa (StatsSA). 2020. Construction Industry, 2020. Pretoria: Statistics South Africa.
- Tait, L. 2012. The potential for local community benefits from wind farms in South Africa. MA thesis. Cape Town: University of Cape Town.
- Tait, L. Wlokas, H. & Garside, B. 2013. *Making Communities Count: Maximising Local Benefit Potential in South Africa’s REIPPPP*. London: International Institute for Environment and Development.
- Tyler, E. and Steyn, G. 2018. An overview of the employment implications of the South African power sector transition. Cape Town: Meridian Economics. [Online]. https://sawea.org.za/wp-content/uploads/2018/07/Employment-implications-SA-power-sector-transition_final.pdf [Accessed 30 October 2018].
- Vorster J. 2019. Loeriesfontein: Socio-economic characteristics. Research Report, DSI/NRF SARCHI Research Chair in the Sociology of Land, Environment and Sustainable Development, Department of Sociology and Social Anthropology, Stellenbosch University.

- Walker, C., Chinigò, D. & Dubow, S. (eds). 2019 . Karoo Futures: Astronomy in Place and Space . Special issue, *Journal of Southern African Studies*, 45(4):667–790. <https://doi.org/10.1080/03057070.2019.1654664>.
- Wlokas, H., Boyd, A. & Andolfi, M., 2012. Challenges for local community development in private sector-led renewable energy projects in South Africa: An evolving approach. *Journal of Energy in Southern Africa*, 23(4):46–51. <http://dx.doi.org/10.17159/2413-3051/2012/v23i4a3177>.
- World Bank. 2022. World Bank Group President David Malpass' Visit to Komati Power Station Highlights the Plant's Repurposing from Coal to Clean Energy. Press release: 2022/024/AFE. Washington DC: The World Bank. [Online]. <https://www.worldbank.org/en/news/press-release/2022/11/07/world-bank-group-president-david-malpass-s-visit-to-komati-power-station-highlights-the-plant-s-repurposing-from-coal-to> [Accessed 7 November 2022].

Chapter 10

Shedding light on energy poverty: Household energy challenges in De Aar, a renewable energy hub in the Northern Cape

Stephanie Borchardt

De Aar, formerly a major railway junction in the eastern Karoo, is today a significant renewable energy hub. Currently, there are six Independent Power Producer (IPP) projects in the Emthanjeni Local Municipality (ELM), in which De Aar is the administrative centre. Four are solar farms and two are wind farms that together are feeding a total of 479 megawatts (MW) into South Africa's national electricity grid (see Figure 10.1 below).⁸⁹ According to one 2021 report, the combined output of just the two wind farms in operation in the municipality was sufficient to power some 300 000 households per annum (CHN Energy Investment Group, 2021). Given that in 2021 the total number of households in the local municipality was put at 12 668 (ELM, 2021b:38), this means that the renewable energy projects around De Aar could potentially meet the electricity needs of the entire local municipality and still have a huge surplus to feed into the national grid.

89 A further solar IPP was approved during bid window 5 and an application submitted for another 80-megawatt solar photovoltaic (PV) plant during bid window 6. Note that Figure 10.1 shows projects at the environmental impact assessment (EIA) stage, not only finally approved or operational projects.

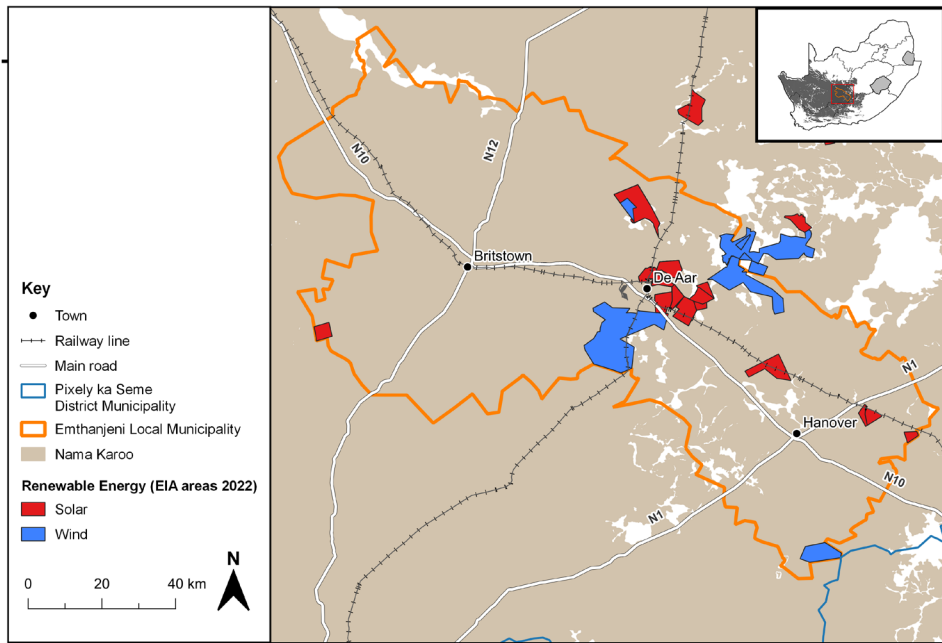


Figure 10.1 Emthanjeni Local Municipality, showing De Aar and renewable energy sites as of 2022

However, what is striking about De Aar from an energy perspective, is that while renewable energy projects have proliferated on its doorstep, the majority of local townspeople are energy-poor. Serving local consumers directly is not how South Africa’s Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has been designed. The electricity this programme generates is sold into the national grid. Local consumers have to buy their electricity from the local municipality, which procures it from Eskom, South Africa’s national utility, which currently controls the generation, transmission and distribution of electricity. In the case of De Aar, the ELM is one of many municipalities that rely heavily on electricity sales to generate revenue but are struggling to maintain municipal electricity infrastructure and service their Eskom debt.

This chapter provides a case study of the challenges that poor households are facing in Kareeville, a poor, working-class neighbourhood in De Aar, around meeting their energy needs, in the midst of the massive investment in generating electricity from the abundant solar and wind resources of the Karoo. Research that I carried out between 2017 and 2021 in Kareeville found that although households

are connected to the grid via prepaid electricity meters, most struggle to pay for the electricity they need every month.⁹⁰ Consumption has to be rationed to the point of going without electricity at times, while residents rely on a mixture of supplementary fuels – firewood, paraffin and gas in portable cylinders – to meet basic energy needs for cooking, washing and heating. Kareeville residents can see the solar panels and wind turbines from their suburb but are not benefitting from this investment in terms of a secure, affordable, and environmentally friendly supply of electricity to their homes. Feeding the electricity meter is a major budgeting headache within households and managing household energy needs is a source of generational and gendered tensions. Furthermore, similar to what Malope has described for Loeriesfontein in the previous chapter (Chapter Nine), few have benefitted from the investment in renewable energy around the town, whether in the form of direct or indirect job creation or the socio-economic development (SED) programmes the renewable energy companies are required to fund. In my household survey, only seven out of 50 respondents mentioned that a household member had been employed during the construction phase of a renewable energy plant. None of the seven had retained the job after construction was over.

The disjuncture between national and local energy needs sits at the heart of this chapter, which focuses on the neglected issue of household energy poverty in the Karoo, despite the major investment in the renewable energy sector in this region. This calls for a review of how this investment can not only be used to leverage local development benefits for the municipality more effectively, but also become a source of reliable and affordable electricity for poor households. This chapter thus complements the previous chapter by Malope, on the contribution of renewable energy projects to decent work and community development in Loeriesfontein in the Hantam Local Municipality. It also adds to the discussion on socio-economic conditions in small Karoo towns by Walker and Vorster in Chapter Four.

Understanding energy poverty is complex (Bouzarovski & Petrova, 2015; Simcock, Frankowski & Bouzarovski, 2021). While there are different approaches to measuring the threshold for determining energy poverty, most consider access and affordability in relation to household expenditure. Vermaak, Kohler and Rhodes (2014:129) define it narrowly as “the lack of access to modern energy services, be they electricity, heating or cooking fuels, necessary for human development.” However, as argued by Krupa and Burch (2011:6 255), the absence of an electricity connection does not necessarily indicate that a household is poor. Conversely, as this study shows, connectivity to the electricity grid does not mean that households

90 This research, which began as a MA project, was for a PhD in Sociology at Stellenbosch University (Borchardt, 2023). Fieldwork was disrupted by the outbreak of the COVID-19 pandemic and associated lockdown in South Africa in 2020/21.

are not energy-poor. Furthermore, energy poverty cannot be reduced to a simple financial calculation (Van der Kroon et al., 2015). Locality, climate, the nature of livelihoods, household size and structure all need to be considered.

Yet regardless of the particular metrics used, there is widespread agreement that energy poverty is endemic in many parts of South Africa, with poor households generally spending proportionately more of their household income on securing energy than wealthier households (Anneck, 1994; Eberhard & Van Horen, 1995; Cousins, 1998; City of Cape Town Metropolitan Municipality, 2003; CURES, 2009; Mohlakoana, 2014; Ismail & Khembo, 2015; Kimenia & Van Niekerk, 2017; Ledger, 2021). This chapter contributes to this literature by highlighting energy poverty in the Karoo while also drawing attention to the disconnect between local energy needs in De Aar and the major investment in renewable energy around the town. This begs the question: could the renewable energy sector be repurposed to benefit local communities directly, through supplying electricity to households consistently, at an affordable price, as well as indirectly, through its contribution to community development more generally? While answering this question fully is beyond the scope of this chapter, it serves as an important reference point. At the time of writing, there were some flickers of recognition of alternative policies in this regard: in July 2022, President Cyril Ramaphosa announced that legislative changes would make it possible for municipalities to procure energy from IPPs directly (South African Government, 2022). Additional changes planned as part of the President's Energy Action Plan are, however, not assured.

My discussion is structured as follows. The next section briefly reviews the development of policies on expanding poor household's access to electricity and investing in renewable energy in post-apartheid South Africa. The second section provides an overview of De Aar, its embattled energy infrastructure, and its development as an important renewable energy hub. My research findings on household energy poverty are provided in section three, on socio-economic conditions in my study site, and sections four and five, on the energy challenges faced by households in Kareeville. This low-income residential area was established during the apartheid era as a 'coloured' group area and today is still inhabited almost exclusively by people considered 'coloured' in post-apartheid South Africa.

The methodology for my study involved a household survey on socio-economic conditions and energy consumption in Kareeville; in-depth, follow-up interviews with 17 local residents purposively selected from survey respondents; interviews with key informants; observation, and documentary analysis. The survey was administered to a random sample of 50 households in Kareeville in October 2017, while the in-depth follow-up interviews followed in April 2018. The key informant interviews were conducted throughout my fieldwork with officials from the local municipality and non-governmental organisations (NGOs) in De Aar, as well as

with representatives of the renewable energy companies in the area.⁹¹ Although I am not claiming this case study is strictly representative of all poor neighbourhoods in De Aar, it does bring the issue of household energy poverty in the Karoo more generally into sharp relief.

Energy policy in post-apartheid South Africa: access to electricity and renewable energy

Electricity as a basic socio-economic right

In 1988, Eskom, South Africa's national electricity parastatal, claimed to have the fifth largest generation capacity in the western world in terms of installed capacity (Eskom, 1988:3). At the time, however, a mere 44% of South African households had access to electricity, most of them white and located in urban areas (Eskom, 1994:19). After the democratisation of South Africa in 1994, the Department of Minerals and Energy's *White Paper on Energy Policy* of 1998 identified five primary policy objectives. One was to increase the access to and affordability of energy services for all households in South Africa. The others were to improve energy governance, stimulate the development of the energy and energy sub-sectors, address energy-related environmental impacts, and secure supply by diversifying the country's energy sources away from its reliance on coal-fired power plants (Department of Minerals and Energy (DME) 1998:23–29). In 2001, the DME was emphatic that the massive electrification of disadvantaged communities was necessary "to stimulate economic activity and improve the quality of life" (2001: viii). The provision of electricity was thus seen as not simply an economic enabler, but as a basic socio-economic right (Gaunt, 2003:1).

In 1994, Eskom had itself made a set of commitments in line with the government's Reconstruction and Development Programme (RDP): that by 2000 it would have lowered the cost of electricity by 15%, electrified an additional 750 000 homes and contributed ZAR50 million per year to the electrification of rural schools and clinics (Eskom, 1994). The ensuing electrification rollout programme was a success measured in terms of the number of households connected to the national grid. Basic access to electricity increased to 88% of households as of March 2016.⁹² In the Northern Cape, the Integrated National Electrification Programme saw 136 280 houses connected to the grid between 1994 and 2014 (Department of Energy (DoE), 2014).

91 Pseudonyms or general descriptions are used in references to informants in this chapter.

92 <https://www.gov.za/about-government/government-programmes/inep> [Accessed: 14 April 2022]

However, the affordability of electricity for poor households soon became a point of contestation (Gaunt, 2003:2). While Eskom managed to connect more than three million houses to the grid between 1994 and 2002 (Eskom, 2002:24), in the same period some 3.25 million households suffered disconnections due to non-payment (McDonald, 2002:12). In response to rising concerns around the affordability of electricity, in April 2003 the government adopted a Basic Electricity Support Tariff Policy (Republic of South Africa, 2003). This made provision for 'free basic electricity' (FBE) to be supplied to households that qualified as indigent in terms of municipally determined criteria.⁹³ In 2003, the DME decided that qualifying households would be entitled to 50 kilowatt-hours (kWh) per month or 30-day cycle for free, after which they would have to purchase electricity at the standard rate (DME, 2003). According to Santu (2020), "the 50 kWh is equivalent to energy necessary for basic lighting, small black and white TV and small radio, basic ironing and basic water boiling through an electric kettle."

Although the DME deemed this allocation sufficient to meet basic energy needs in poor households (2003:12), many analysts have argued otherwise (Gaunt, 2003; Sugrue, 2005; Dobbins, 2006; Ruiters, 2009; Dugard, 2009; Adam, 2010; Sustainable Energy Africa, 2014). While the FBE subsidy provides relief to poor households, critics point out that it is not enough to meet all their basic cooking and refrigeration requirements. The subsidy is further criticised because the electricity it provides is not actually free – recipients can only access the monthly allocation of 50 kWh after they have made a prior purchase of electricity.

The South African REIPPPP

The introduction of renewable energy into South Africa's energy mix has been a protracted and highly contested process, the details of which are beyond the scope of this chapter (see Malope, Chapter Nine in this volume; also Baker & Wlokas, 2015; Eberhard & Naude, 2016; Davies, Swilling & Wlokas, 2017; Morris, Robbins, Hansen & Nygaard, 2020; Kruger, Nygaard & Kitzing, 2021). In 2010, the then DoE, along with the National Treasury and the Development Bank of Southern Africa, established the Independent Power Producer Office with the mandate to secure electricity from IPPs in the private sector (IPP Office, 2021a:1). The primary objective was to secure the country's energy supply by diversifying from coal-fired electricity generation. However, the programme was also shaped by the need for South Africa to respond to mounting pressure to adhere to international climate change objectives.

93 The state enacted an indigency policy in 2001, which extended to free basic water, free basic sanitation, free basic energy/electricity and free basic refuse removal at local municipal level (Department of Provincial and Local Government, 2001).

As already noted, South Africa's renewable energy programme has not been designed with the energy needs of poor households in mind. However, already in 2003, then Deputy Minister of Minerals and Energy, Susan Shabangu, pointed to the role renewable energy projects could play in addressing social issues in rural areas, through job creation and tackling challenges such as poverty and high reported rates of foetal alcohol spectrum disorder (FASD) (Borchardt, 2023:6). IPPs were therefore also tasked with contributing to national development goals through contributing a percentage of their revenue towards supporting socio-economic and enterprise development projects in formerly marginalised communities in towns that fall within a 50-kilometre radius of the project core site. (For details on the Economic Development Scorecard that was developed, see Malope, Chapter Nine in this volume.) Renewable energy projects are expected to focus on five sectors: healthcare, social welfare, education and skills, general administration, and enterprise development (IPP Office, 2021a:35).

According to the IPP Office (2021a:31), local communities in the vicinity of IPP projects have benefitted substantially from this investment. Measured simply in terms of expenditure, the investment has been significant, with some ZAR12.8 billion committed over the operational life of active IPP projects as of March 2021 (IPP Office, 2021a). However, according to the IPP Office (2021b), in the Northern Cape the high youth unemployment rate, lack of basic services and precarious economic growth all limit the impact that these projects could have on local communities. This caution is consistent with my research findings for De Aar, as well as that of Malope for the town of Loeriesfontein (Malope, 2022).

De Aar as a renewable energy hub

The history of De Aar is rooted in South Africa's mining revolution and subsequent industrialisation. Unlike many Karoo towns, the town was formed not around a church but a railway junction that was established in 1884, at the meeting point of the two railway lines being built to link Cape Town and Port Elizabeth to Kimberley, by then a major diamond mining site (Burman, 1984). This history makes it a particularly interesting case study of renewable energy development, given the historical links between mining and state investment in electricity generation and transport infrastructure in South Africa's economic development through the so-called "minerals-energy complex" (Fine & Rustomjee, 1996).

The formal town was laid out around the railway station in 1902 and declared a municipality in 1904. For much of the twentieth century, De Aar flourished as a consequence of its importance as a railway junction, its population growing by 630% between 1911 and 2011 (Hill & Nel, 2018:205). However, in the 1980s, South Africa's rail transport system came under pressure, due to capital shortages caused

by the international economic sanctions against apartheid and the deregulation of road transport in 1988 (Department of Transport, 2015). As the rail transport sector declined, so did the local economy. De Aar's unemployment rate rose, with negative social consequences for the town (Stassen, 2012).

Today De Aar is an important regional administrative centre as it is the headquarters of not only the ELM (which includes the small towns of Britstown and Hanover), but also the larger Pixley Ka Seme District Municipality. With a population of 23 760 in 2016 (Statistics South Africa (StatsSA), 2016), it is one of the larger towns in the Northern Cape. As in other Karoo towns, agriculture has remained an important contributor to the local economy, with the area around De Aar known for sheep farming and, increasingly, game farming. The local municipality is home to one of the largest abattoirs in the southern hemisphere. However, pressing social issues, including high unemployment rates as well as disturbing levels of FASD and gender-based violence, continue to plague the town. A 2002 study identified De Aar as at that point in time the town with the highest reported FASD rate in the world (Skosana & Koza, 2014; Manoko, 2016).

As in the other Karoo towns discussed in this volume, apartheid spatial planning is still strongly evident in the layout of the town's residential areas and the social composition of its neighbourhoods. White residents, who today comprise under 7% of the town's population, live in the more middle-class area known as De Aar West, while the black majority of the population, over 70% of whom are classified as 'coloured', is concentrated in De Aar East, across the railway junction (see Figure 10.2 below). This part of town is characterised by small, state-built houses, informal settlements, and a general lack of infrastructure.



Figure 10.2 De Aar neighbourhoods, showing Kareeville and survey area

Electricity infrastructure in the municipality

As of 2021, 64% of households in the local municipality were connected to the local electricity grid via prepaid meters (ELM, 2021b). A total of 3 770 households were registered as indigent, 68% of which were receiving the FBE subsidy (ELM, 2021b:38). In 2021, indigent households were defined regardless of household size as those where the total monthly income was less than ZAR4 750 per month (ELM, 2021c:3).

The sale of electricity to the public is the municipality’s major source of revenue (ELM, 2021a:65), but non-payment for electricity services is rife and the municipality is in arrears with Eskom. As of March 2022, its Eskom debt amounted to ZAR105 million, which was 40.6% of the revenue it collected in the 2020/21 financial year (ELM, 2021a:113; Strydom, 2022). Throughout my fieldwork there were warnings and threats by Eskom that it would interrupt the electricity supply to the municipality because of its debt. In 2021, Eskom finally followed through and interrupted the municipality’s electricity supply for two full days. Electricity was only restored once the local municipality had paid ZAR19 million to Eskom (Nzo, 2021:iii).

The municipality is also struggling with a massive backlog in the maintenance of the electricity infrastructure for which it is responsible, which its 2016–2021 Integrated Development Plan (IDP) attributed to a lack of expertise as well as funds. The municipality also blames criminal activity on the part of residents who bypass their prepaid electricity meters (ELM, 2021b:70). Failing to maintain its electricity network puts it at risk of losing its electricity distribution licence from the National Energy Regulator of South Africa (NERSA).

Renewable energy projects

As already noted, by 2021 four solar farms and two wind farms were operational around De Aar as part of the REIPPPP. The four solar farms date to the first bid window of the programme in 2011. As in Loeriesfontein, the investors are subsidiaries of international companies. The smallest solar farm, completed in October 2013 with a capacity of 10 MW, was built by Longyuan SA and Mulilo Energy Holdings, both subsidiaries of a state-owned Chinese company, Longyuan Power (*Sunday Times Live*, 2017). Another solar farm was built by Mainstream Renewable Power, which is headquartered in Ireland. It is being managed by Globeleq South Africa Management Services Ltd, a subsidiary of a company based in the United Kingdom. This farm was completed in April 2014 (De Aar Solar Power, 2015). The other solar farms, with a combined output of 150 MW, were completed in April 2014 and April 2016 respectively. They are both run by Solar Capital, a local subsidiary of Phelan Energy Group Ltd, which is also headquartered in Ireland (Phelan Energy Group Ltd, 2021). The two wind farms date to bid window 3. They have a generating capacity of 138.96 MW and 96.48 MW respectively, and were both completed in November 2017.

Initially the construction of these plants was seen as a very positive development locally, as ordinary people as well as municipal officials anticipated major job creation after 2013. According to a prominent NGO employee, “The people were very excited because it’s work, it’s people’s standard of living that is being raised.” However, these expectations were not met: “You can just say 10% of the people really benefitted and there were very few women [who] were employed” (Fiona, 2018). The IPP Office (2021b:18) claims that the six IPPs in De Aar combined have created 7 159 construction-phase ‘job years’ in the local municipality between 2014 and 2017. However, as discussed by Malope in Chapter Nine, the concept of a job year is misleading. Furthermore, while the investment in renewable energy facilities in the Northern Cape has created employment opportunities, permanent long-term jobs for those who need them most are sparse.

The renewable energy sector’s contribution to socio-economic development is also difficult to evaluate holistically. In 2019 the local municipality was projected to see ZAR2 406 million spent on socio-economic development initiatives from IPPs

over a 20-year period (Borchardt, 2023:18). The majority of IPPs around De Aar have focused their SED commitments on education and aimed their enterprise development initiatives at training young entrepreneurs to start their own businesses. This approach was criticised by local cash-strapped NGOs who felt they could put the money to better use, with one NGO employee complaining to me: “Every second person that comes to De Aar wants to start creating jobs ... by turning us into entrepreneurs. What business do you want to start here, are you telling me the unemployed are going to buy from you?” (Janice, 2018). One IPP representative whom I was able to interview admitted that very few of the trainees would be able to maintain a successful business and the impact was minimal (Patrick, 2021).

With regard to the SED initiatives, a common complaint from the side of the municipality during my fieldwork was that these projects were not aligned to its IDP and failed to make a broader impact in town. One project that looked very promising when I first visited it in 2018 was a community centre funded by Solar Capital, which was established in a rented building near the ‘coloured’ residential areas in De Aar. This offered free Wi-Fi and computer skills classes, as well as business and entrepreneurial training and art classes; it functioned as a social space for young people and also advertised the IPP’s presence in De Aar (Patrick, 2018). However, on a follow-up field trip in 2021, I found that the once-bustling centre was no more: the centre had shut its doors during the COVID-19 pandemic, in part due to the associated lockdown but also because of a leasing disagreement. It serves as a revealing example of a project that appeared to be meeting a range of training and social needs in the community when it first started but was not institutionally embedded in the town and could, therefore, be unilaterally closed by its sponsoring IPP when problems arose.

Socio-economic conditions in Kareeville

Infrastructure

Kareeville was built in 1977, about four to five kilometres from De Aar’s town centre. My survey and follow-up interviews with selected respondents were conducted in Extension 10, a section its residents call Klein Kareeville (Borchardt, 2023). This section is bordered by the Kareeville Primary School, a cemetery, and a dilapidated sportsground. The public infrastructure is rundown. (See Figures 10.3 and 10.4 below.) There are only a few scattered streetlights. Litter is dispersed across the open veld and in the streets. Roads are not tarred, apart from the two fronting the primary school, with the untarred state of their streets a major frustration for many of my survey respondents. The basic housing stock still comprises the original four-room house built in the apartheid era, consisting of two bedrooms, a living room and a small kitchen, with an outside toilet and one outside tap per plot. Some residents

have reduced the size of their house still further by subdividing it and renting out individual rooms, while others have built extensions and backyard structures to gain additional space. Fourteen of the 50 households in my survey had built flush toilets inside their homes while just over half had laid water lines to connect the outside tap to an inside point, generally attached to the kitchen sink. One of the reasons why properties are fenced is to prevent non-household members taking water from the outside tap and thereby increasing the household's municipal utility bill.⁹⁴



Figure 10.3 View of Kareeville, 2017 (Photograph: Stephanie Borchardt)

94 This and the following sections draw on my Kareeberg household survey, follow-up interviews, and observation.



Figure 10.4 A typical house in Kareeville, 2017 (Photograph: Stephanie Borchardt)

Most of my survey respondents described life in Kareeville as bleak. The area suffers from high levels of gang-related violence, which spills over from the neighbouring area and has affected the local primary school. In the words of one key informant, “*Die kids kom maak mekaar gereeld bang by die skool met pangas* [The children often scare one another by bringing pangas to school]” (John, 2017).⁹⁵ The Foundation for Alcohol Related Research (FARR, an NGO that is focused on intervention programmes around FASD and funded by Solar Capital, identified Kareeville and the surrounding neighbourhoods as an area where alcohol abuse is prevalent (Lizette, 2018).

Household composition

The majority of the 50 households in my sample were large and multi-generational. The average size of 6.3 members is larger than the average for the town of De Aar, which is 4.1 (ELM, 2021b:35), and nearly twice the national average of 3.4 (StatsSA, 2011a). The largest household in the survey had 15 members while eight (16%) had more than 10 residents. The smallest household had two people.

⁹⁵ A *panga* is a kind of machete.

Given the size of the houses, overcrowding is severe, with little privacy and children sleeping on the floor. Respondents complained both during the survey and in my follow-up in-depth interviews about the overcrowding.

Kareeville has a particularly youthful population. Thirty-six per cent of my sample population were 14 years and younger, compared to 30% for the Northern Cape as a whole – this figure is also notably higher than in the towns of Loeriesfontein, Sutherland and Vanywksvlei described by Walker and Vorster in Chapter Four. Educational qualifications are generally low, with only 21.5% of residents 20 years and older having completed high school (matric), compared to 28% in the Northern Cape overall. Only a handful of residents (3.8% of the total sample) had a post-school qualification, mostly diplomas, with one woman (a teacher) having a university degree.

Economic activity and poverty

As in other Karoo towns, unemployment is rife, poverty levels are high, and households rely heavily on social grants. Out of the 147 residents older than 15 years of age, who were not in school or an educational facility, only 79 were employed.⁹⁶ The figure of 68 people not working translates into a very high unemployment rate of 46.2%. The majority of those who are employed are in low-skilled or unskilled jobs as general workers, domestic workers, farm workers and assistants to contractors and gardeners. Over a third of those employed work on a part-time or seasonal basis, in most cases irregularly. The handful of people in Kareeville in skilled professions included an attorney's assistant, an army officer, a police officer, two teaching assistants and one teacher (for more detailed information see Borchardt, 2023).

Given this employment profile, wage incomes are, not surprisingly, generally very low. My survey data on wages is incomplete as respondents either did not know the monthly income in the case of 27 household members who were in employment, or refused to divulge this information for a further 18. Table 10.1 below sets out the wage income data recorded for those household members in employment for whom this information was forthcoming – 34 out of a total of 79 reported as employed. Twenty-one of the 34 wage-earners were receiving less than the minimum wage for domestic and farm workers, which in 2017 was ZAR3 001.13 per month or ZAR15.39 per hour for farm workers (Department of Employment and Labour, 2018).

96 Two participants receiving disability grants who were working part time were classified as employed.

Table 10.1 Monthly income of employed household members in Kareeville survey site

Amount	Number	%
R1 - R500	4	11.8
R501 - R1 000	6	17.6
R1 001 - R1 500	1	2.9
R1 501 - R2 000	4	11.8
R2 001 - R2 500	4	11.8
R2 501 - R3 000	2	5.9
R3 001 - R3 500	3	8.8
R4 001 - R4 500	1	2.9
R4 501 - R5 000	1	2.9
R5 001 - R5 500	1	2.9
R5 501 - R6 000	1	2.9
R7 501 - R8 000	2	5.9
R8 001+	4	11.8
Total	34	100

Given the extent of unemployment and low wages, state social grants play an important part in household income, with 116 of the 313 people captured through my survey grant recipients. As can be seen in Table 10.2 below, the most important grant was the child support grant, accounting for just under three-quarters of all grants received. No foster care grants were captured in the survey, even though there was a foster child in one of the households, who would be eligible for the grant.

Table 10.2 Access to social grants in Kareeville survey site

Category	Number	%
Child support grant	85	73.3
Old age pension/ Veteran’s grant	22	19
Disability grant (adult)	8	6.9
Disability grant (child)	1	0.9
Total	116	100

Grants have helped some Kareeville households edge above national poverty lines. Seven of the 26 households that provided full accounts of household income fell below the national food poverty line, which was ZAR531 per person per month in 2017, the year when I conducted my survey (StatsSA, 2019:4). This means that these households do not have sufficient income to meet the basic nutrition needs of household members. Over half – 15 – of the 26 households fell below the upper-bound poverty line of ZAR1 138 per person per month. Households in this income bracket are able to purchase some food items that are not absolutely essential for survival, in addition to the bare basics (StatsSA, 2019).

Energy challenges in Kareeville

Electricity is the primary energy source for over 90% of households. Figure 10.5 below shows the distribution of cooking fuels used in Kareeville households as well as in De Aar overall.

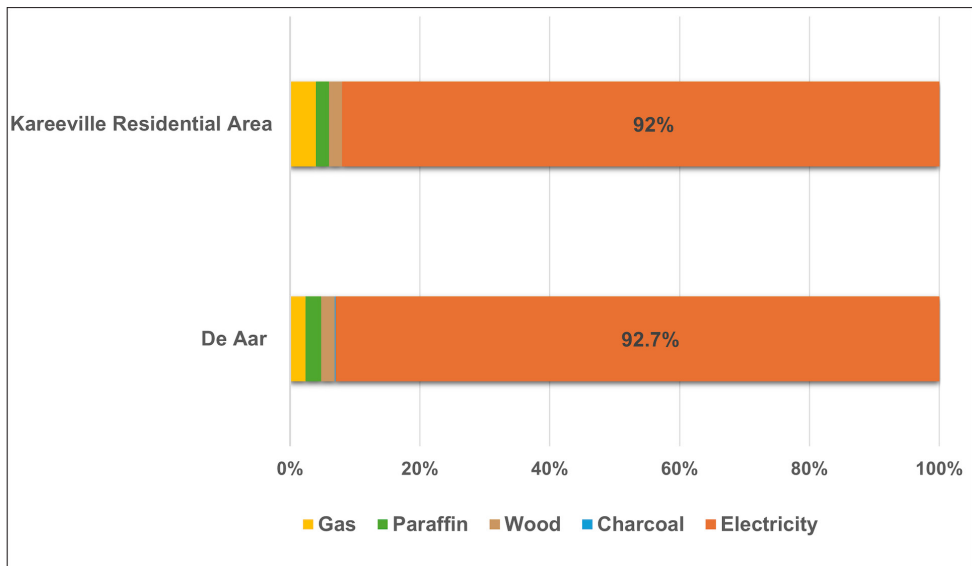


Figure 10.5 Distribution of cooking fuels used in Kareeville (2017) and De Aar (2011) (Kareeville household survey; StatsSA, 2011b)

Two-thirds of the households in my survey (34 out of 50 households) were receiving the FBE subsidy. Almost all the households – 46 of the 50 – accessed their electricity via an installed pre-paid meter. Three households held direct accounts with the municipality, while the one household without any electricity connection had been disconnected by the municipality because of tampering with its pre-paid meter.

The major energy needs are for cooking and the heating of water. The main way water is heated for bathing, as well as for washing dishes and clothes, is with an electric kettle, with a fire in the yard the secondary source. Only two of the households I surveyed had an electric geyser and none had a solar geyser on the roof. According to a municipal official I interviewed, the municipality was expecting to receive 4 000 solar home systems in 2021, as part of a project supported by the Department of Mineral Resources and Energy (DMRE). However, Kareeville was not in line to benefit from this. According to the municipality, the solar water geyser rollout in De Aar was likely to target the township of Nonzwakazi first (ELM, 2021b:123). However, fewer than 2 000 households in the municipality would qualify to have the geysers installed because of the prevalence of old, unsafe asbestos roofs in the town's low-income neighbourhoods (including Kareeville). According to the municipality's 2021/2022 IDP, the municipality regarded eradicating asbestos roofs as a priority, but it did not have the funds to do so (ELM, 2021b).

Heating is a particularly challenging issue for Kareeville residents, with the majority of respondents categorising this as a luxury they could not afford, even though winter temperatures in De Aar can fall below freezing overnight and snow, while rare, can occur. One informant just shook her head when asked how they cope in the cold winters in De Aar:

Dit raak verskriklik koud...koue winde [maar] jy kan nie 'n heater in De Aar in die winter aansit nie, die eenhede loop af, dit gaan vining af. 'n Honderd rand se krag sal twee dae hou as jy 'n heater aansit [It gets terribly cold ... cold winds (but) you can't put on a heater in De Aar in the winter, the (electricity kilowatt) units run down, it's going too quickly. A hundred rands electricity will last two days if you switch on a heater] (Emmie, 2018).

Only 10 of the 50 survey respondents heat their homes with electric heaters. Two have gas heaters and nine respondents referred to building fires for heat. None admitted to making open fires inside their houses, even though anecdotal evidence suggests some do. However, five reported making fires outside and then bringing the coals inside in a container. Emmie (2018) noted that firewood can be free to pick up, but it comes with a cost – because “*Vuur laat jou nie lekker ruik nie, jy stink* [Fire makes you smell bad, you stink],” one has to boil more water for washing one's clothes.

Most surveyed households rely on a range of secondary fuel sources to supplement their use of electricity or substitute for it entirely when they cannot afford to purchase more units; a few simply go without. (See Figure 10.6 below.) Most households have only one light bulb in the kitchen so candles in the living room or bedroom are an important, if potentially dangerous, source of additional lighting for 74% of households. As already indicated, wood fires are important, not only as a source of heat but also for heating water and for cooking. In the survey,

I distinguished between bought and collected wood. Collected wood is sourced from the surrounding *veld* or the municipal waste deposit site in De Aar and, as discussed further below, the need to collect firewood on a regular basis is often a trigger for conflict along gendered and generational lines within households.

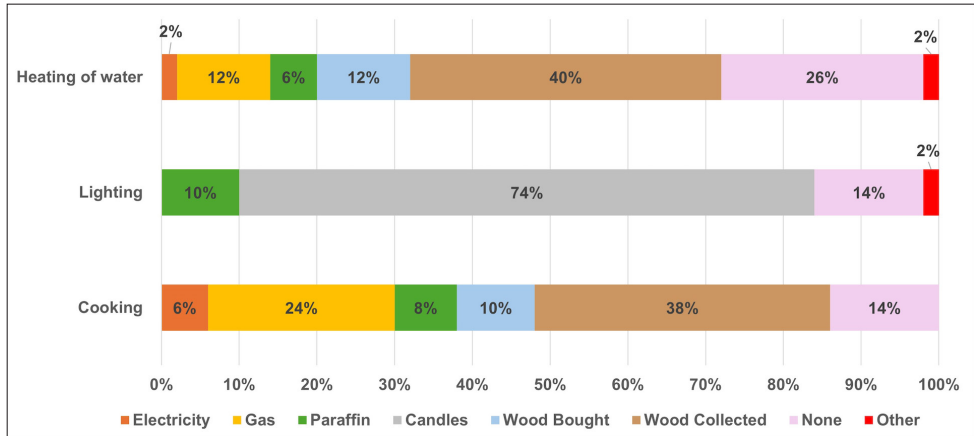


Figure 10.6 Usage of secondary sources of energy in Kareeville (Kareeville household survey)

Other possible energy sources, such as animal dung or agricultural waste, were not reported by any of my respondents. One participant reported that she collected old books and rags from the dustbins of *dorpsmense* [townspeople], which she burnt when her household energy situation was dire and she could not find any firewood. Another used a small, one-burner paraffin stove as a source of both light and heat, by setting the flame on high. These strategies are dangerous and not recommended for indoor use as open flames can lead to fires, cause respiratory problems and, depending on what is being burned, release toxins into the air (Kimenia & Van Niekerk, 2018; Francioli, 2018). Both respondents admitted that they knew their energy use was dangerous, but necessity drove them to do it (Borchardt, 2023:175).

Electricity affordability and reliability

The great majority of respondents in the household survey (41 out of the 50) were concerned with the affordability of electricity. In the words of one: “*Jy kan nie so baie koop nie. Ek koop om te lewe* [You can’t buy that much. I buy to survive]” (Borchardt, 2023:169). All 41 stated that the amount of electricity they were able to procure was insufficient to satisfy their households’ energy needs, which they attributed

primarily to their own lack of funds. Most households, 30 out of the 50 surveyed, reported spending between ZAR100 to ZAR250 per month on electricity, in addition to the amounts spent on other fuel sources, such as firewood. Respondents in four households reported spending nothing on electricity. As already noted, one of them had been disconnected due to tampering with the prepaid meter, while the other three used only their FBE allocation. They then supplemented this allocation of electricity with gas, paraffin, candles, and firewood that they collected.

Trying to keep the lights on: Lisa's story

The following vignette of energy management in one household in Kareeville is selected from the 15 households in which I conducted in-depth follow-up interviews after the household survey.⁹⁷ The household has been chosen not because it is statistically representative, but for descriptive relevance. The discussion illustrates how the general challenges described above play out in actual lives, shaping energy choices and intra-household relationships. The household's energy challenges derive from but also reinforce its poverty and marginalised status.

My primary informant, Lisa (a pseudonym), was a 74-year-old widow in 2018, living with 14 other family members in a standard four-room house with an outside tap and outside flush toilet. She regarded herself as the head of her complex four-generational household (the largest recorded in the survey). She had previously lived and worked on a farm near Philipstown but moved to De Aar in the late 1990s to help look after her son and his children. He was working on a farm outside De Aar and only visited on the weekends; the mother of his three children had left him after the youngest was born. In 2018 Lisa was also looking after the children and grandchildren of her two daughters (neither of whom were resident in De Aar) and three of her sister's grandchildren. The mothers of these children were all working as domestic workers on neighbouring farms and according to Lisa, did not visit the household regularly enough. The household also comprised Lisa's granddaughter, Rachel, and her three children, as well as an eleven-old boy, David, whom Lisa had found living on the streets in De Aar and informally fostered. The genogram in Figure 10.7 below illustrates the household composition in terms of gender, age, and generation.

97 This interview took place on 18 April 2018.

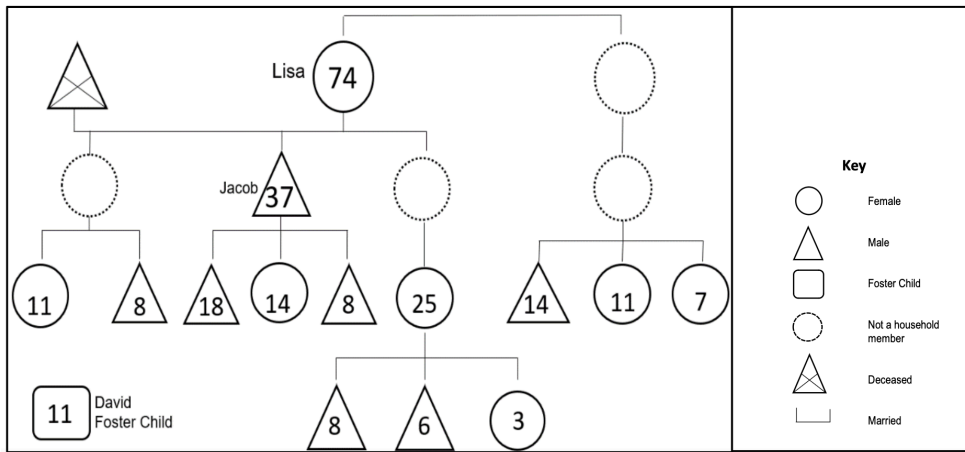


Figure 10.7 Genogram of Lisa’s household, Kareeville, 2018

Lisa never received any formal education and was one of the older members of the community who could not read or write. Two of her grandchildren, aged seven and eight, and two of her great grandchildren, aged six and eight, were not enrolled in school. The other children of school-going age all appeared to be going to school although several were old for their grades – for instance the 18-year-old was in Grade 9 while David, the eleven-year-old foster child, was in Grade 1. Neither Lisa nor her oldest granddaughter (Rachel) knew about the SED programmes being run by the renewable energy companies in De Aar and had no views on the contribution of renewable energy to development. To them the solar and wind farms they could see around the town had nothing do to with them and were not something from which they could potentially benefit.

Jacob was the only resident adult in the household who was employed. He worked for a farmer on a regular basis and earned a steady income. However, Lisa did not know what he was earning and suspected that he contributed less to household income than he could. The only other adult in the household, her granddaughter Rachel, was unemployed and helped Lisa look after the children. The household was heavily dependent on state grants to survive. At the time of my interview, child support grants were in place for six of the children while Lisa received an old age pension. However, five of the children who would be eligible for child support grants were apparently not receiving them. When Lisa was asked about this, she simply shrugged and stated that she was not the parent. It is not known if these parents sent any remittances to the family. As Jacob’s income was unknown, it was not possible to calculate household income accurately, but at the

time of the survey the grants coming into this household totalled ZAR4 670 per month or ZAR311 per person (ZAR340 if Jacob is not counted); this is well below the food poverty line at the time.

Like two-thirds of the other households in my survey, Lisa was receiving the FBE subsidy from the municipality. She estimated that on average she was spending around ZAR400 per month on electricity, which translates to ZAR26.60 per capita per month. However, she noted that it was difficult to calculate this precisely, as usage varied, and she bought small amounts of electricity units when needed. At the time Lisa's household had a refrigerator, an electrical stove, one overhead light in the kitchen and a television. Her son Jacob had a phone, but it was not a smartphone, so he could not connect to the internet, nor make use of the free Wi-Fi provided by one of the IPPs in town. The household did not have a heater to cope with the cold winter but during the survey Lisa reported that they once had one. She told me with some frustration that her children and grandchildren had bought her an electrical heater for Christmas one year, because she was constantly complaining about the cold, but the gift had led to friction, forcing her to give it away:

Ek het dit weggegee omdat die kinders die verwamer te veel sal gebruik en dan sal ons elektrisiteit dit nie aan die einde van die maand maak nie. As een van hulle die verwamer aanstel, dan kan jy vergeet om enige hulp van hulle te kry, hulle sal die hele dag voor daardie verwamer sit [I gave it away because the kids will use the heater too much and then our electricity will not last to the end of the month. If one of them puts the heater on then you can forget about getting any help from them, they will sit in front of that heater the whole day].

The electricity Lisa was able to secure in a month did not cover all her household's needs. She was one of many respondents who admitted to borrowing money specifically to buy electricity. She borrowed from her neighbours even though she considered them "rof en te kwaai [rough and too mean]" and felt they were taking advantage of her by adding an unreasonable interest rate to the loan: "Hulle vra n klomp geld op 'n R100. R100 vra, dan moet jy R150 teruggee... Dis duur [They ask for a lot of money for a R100. Ask for R100, then you will have to pay back R150 ... It's expensive]." She presented borrowing as a calculated matter of convenience, because having electricity meant she could cook food significantly faster than by making a fire and spending time collecting firewood; this in turn allowed her to spend some time on other household activities and gardening.

Lisa's main secondary source of fuel was firewood, which she collected to heat water and also for cooking from time to time. Like many other Kareeville residents, she preferred not to buy wood but to wait until the municipality trimmed trees in De Aar West, when she could buy small branches directly from the municipal workers if

she had the money. Despite her age, she also often scavenged for bits of firewood from the area around her neighbourhood by herself because “*Die kinders, hulle is dan skaam* [The children are ashamed]”. She felt that other family members should help, as the wood being collected was for everybody, but explained to me that as the children of the household grew older, they were becoming increasingly reluctant to be seen doing this by their peers. Collecting firewood was particularly hard in winter, as the fierce competition among local households for firewood close to Kareeville meant she would have to walk further and further from her home to find material to burn. On these occasions she would demand that other household members help her, which could lead to conflict in the household.

As the matriarch of the household, Lisa took responsibility not only for collecting firewood but for undertaking to buy the electricity her household consumed during the month. She felt responsible because she was the one who cooked for everybody and if the receipt was lost, then the meter could not be fed and everyone would go without a meal: “*Partykeer sit ons sonder krag tot die nag ... as die krag so weg word is daar nie weer krag in die nag nie. Dan moet ons bietjie bitter sukkel ... en hulle kry brood* [Sometimes we sit without electricity till the evening ... when they throw away the electricity receipt like that then there is no power during the evenings. Then we struggle ... and they get bread]”. She told me how furious she had been once after Rachel had lost the receipt for electricity units worth ZAR20 before the purchase could be entered on the meter. As a result, she would not allow her granddaughter to buy electricity anymore.

Lisa also complained that the older grandchildren often asked her to cook meat, but this was frequently unaffordable, not only in terms of its actual price but also in terms of its impact on household electricity usage. According to her she would not be able to stay within her budget if she had to cook a meal with meat in it twice a week. If she cooked meat, she preferred to cook small pieces of meat and chicken rather than red meat (which took longer to cook). Lisa, however, often felt pressurised by her family to cook red meat, and this, according to her, was a frequent point of tension in the household.

This brief account of one household's struggles around its daily energy requirements points to both the generational tensions which play out as well as the gendered dimensions of energy management. As the matriarch Lisa is responsible for buying the electricity as well as for preparing the household's meals. Her son Jacob, the only employed member of the household, does not buy electricity yet expects to have a cooked meal after he returns from work, as well as to be given access to the television before other members of the household, because he is the eldest son. When I first interviewed Lisa, during the household survey, her granddaughter Rachel interrupted the interview to say that she chose not to help her grandmother with the cooking, as she felt she (Rachel) did enough in the household by taking care of her own and the other children in the house. Under conditions of

scarcity the energy manager can become the antagonist within the household. At the same time, she is in a position of some power over daily household routines. The person who is responsible for cooking dictates not only what food is prepared but how it is prepared, and which sources of energy are mobilised to prepare it.

Conclusion

This chapter has focused on household energy poverty in Kareeville, De Aar, in the context of the rollout of renewable energy IPPs in the municipality. Energy poverty is endemic in this marginalised neighbourhood. Households employ various strategies to secure not only electricity but other fuel types such as wood, paraffin and gas, including limiting their use of certain electrical appliances and limiting their food options. They also borrow money from neighbours and loan sharks in order to purchase electricity. Some strategies, such as burning coal inside poorly ventilated houses, are dangerous to human health. For those responsible for managing household energy access and consumption, juggling budgets and different needs is a constant source of stress. Tensions around daily energy challenges play out across gender and generational lines, with household members often pitted against each other in terms of their energy needs and preferences and the power they have to assert them. The burden of energy management in financially stressed households falls particularly heavily on older women such as Lisa who, because of their gender and age, are unlikely to be working outside the home and are responsible for cooking, cleaning, and childcare.

This raises important questions about the neglect of household electricity in the REIPPPP as currently conceived. The short answer is that this programme has not been designed with local development needs in mind. It is the product of a fiercely contested national process that has been designed to meet national developmental objectives as well as address international commitments around carbon emissions. As argued by Malope in Chapter Nine, the REIPPPP has the potential to make a more sustainable contribution to local community development, but this requires that the existing Economic Development Scorecard it oversees is reviewed and reconfigured. In De Aar the IPPs' development programmes, while targeting important sectors, are aimed at meeting national bid requirements; they are not well aligned with local development priorities and have tended to benefit a select few.⁹⁸ Beyond these commitments, what has not yet received serious policy attention is the potential for investment in renewable energy to make an important contribution not only to local development, through securing local municipalities' energy supply, but also to making electricity more affordable for energy-poor households such as Lisa's, in poor communities such as Kareeville.

98 For more information on this in De Aar see Borchardt, 2023.

At present local municipalities are not allowed to purchase electricity from the solar or wind farms in their backyard. However, municipalities such as the Emthanjeni Local Municipality are ill-equipped to handle the responsibility of energy provision and distribution. They are in financial difficulties due to a combination of factors, including lack of capacity and poor revenue collection, and are in arrears to Eskom. Almost half the households in the Emthanjeni Local Municipality are beneficiaries of the indigency policy, which imposes an additional financial burden on an already struggling municipality. Boosting the supply of clean and affordable electricity that flows directly to the residents of De Aar through a redesigned renewable energy programme could not only take the strain off the local municipality but also provide a significant service to the larger community. From the perspective of the people of Kareeville, having access to a clean, stable, and affordable supply of electricity would mean one less daily worry for their households and provide some of the preconditions for reducing the burden of poverty and tackling the social and economic challenges they face daily.

Acknowledgements

This work is based on research supported by the South African Research Chairs Initiative of the Department of Science and Innovation (DSI) and National Research Foundation (NRF) of South Africa (Grant No. 98765). The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.

References

- Adam, F. 2010. *Free Basic Electricity: A Better Life for All*. Johannesburg: Earthlife Africa.
- Anneck, W. 1994. *An In-depth Investigation of Fuel Use by Urban Women*. Final report number EO9117. Pretoria: Department of Mineral and Energy Affairs.
- Baker, L., Wlokas, H. L. 2015. *South Africa's Renewable Energy Procurement: A New Frontier?* Energy Research Centre. Cape Town: University of Cape Town.
- Borchardt, S.P. 2023. *Illuminating Energy Poverty: A case study of the energy needs and challenges of low-income households in De Aar, a renewable energy hub in South Africa's Northern Cape Province*. PhD dissertation. Stellenbosch: Stellenbosch University
- Bouzarovski, S. & Petrova, S. 2015. A global perspective on domestic energy deprivation: Overcoming the energy poverty–fuel poverty binary, *Energy Research & Social Science*, (10):31–40. <https://doi.org/10.1016/j.erss.2015.06.007>.
- Burman, J. 1984. *Early Railways at The Cape*. Cape Town: Human & Rousseau.
- CHN Energy investment Group. 2021. Longyuan Mulilo De Aar Wind Power Management Team Titled as a 2021 'Role Model of Central SOEs'. CHN Energy. [Online]. <https://www.ceic.com/gjnyjtwwEn/xwzx/202107/c7d640d7476d48b9956a388388fb6f6d.shtml> [Accessed 12 November 2022].
- Citizens United for Renewable Energy and Sustainability (CURES). 2009. Exploring energy poverty in South Africa: A CURES discussion document. [Online]. https://www.cityenergy.org.za/uploads/resource_176.pdf [Accessed 17 January 2022].
- City of Cape Town Metropolitan Municipality. 2003. State of Energy Report for Cape Town. [Online]. https://www.cityenergy.org.za/uploads/resource_46.pdf [Accessed 17 January 2022].
- Cousins, C.C. 1998. *A Question of Power: The Electrification of Rural Households*, EDRC Report Series. Cape Town: Energy & Development Research Centre, University of Cape Town. <http://hdl.handle.net/11427/22958>.
- Davies, M., Swilling, M. & Wlokas, H.L. 2017. Towards new configurations of urban energy governance in South Africa's renewable energy procurement programmes. *Energy Research & Social Science*, 36:61–69. <http://dx.doi.org/10.1016/j.erss.2017.11.010>.
- De Aar Solar Power. 2015. 'Globeleq awarded Africa Megawatt Leader in renewable energy'. [Online]. <https://dearsolar.co.za/globeleq-awarded-africa-megawatt-leader-renewable-energy/> [Accessed 21 April 2020].
- Department of Employment and Labour. 2018. Labour on minimum wages for farm and forestry workers. [Online]. <https://www.gov.za/speeches/new-minimum-wages-farm-and-forestry-workers-sector-march-2018-23-jan-2018-0000#:~:text=New%20minimum%20wages%20for%20farm,%2F18%3A%20R3001%2C13> [Accessed 14 November 2022].
- Department of Energy (DoE). 2014. Integrated National Electrification Programme (INEP). Pretoria: Department of Energy.
- Department of Environmental Affairs and Tourism (DEAT). 2004. *A National Climate Change Response Strategy for South Africa*. Pretoria: Department of Environmental Affairs and Tourism.

- Department of Minerals and Energy (DME). 1998. *White Paper on Energy Policy*. Pretoria: Department of Minerals and Energy.
- Department of Minerals and Energy (DME). 2001. *National Electrification Programme (NEP) 1994–1999: Summary Evaluation Report*, Volume 1. Pretoria: Department of Minerals and Energy.
- Department of Minerals and Energy (DME). 2003. *Electricity Basic Services Support Tariff (Free Basic Electricity) Policy for the Republic of South Africa*, Government Gazette, Notice 1693 of 2003. Pretoria: Republic of South Africa.
- Department of Minerals and Energy (DME). 2004. *Renewable Energy Policy of South Africa White Paper*. Pretoria: Department of Minerals and Energy.
- Department of Provincial and Local Government. 2001. *National Framework for Municipal Indigent Policies*. Pretoria: Department of Provincial and Local Government.
- Department of Transport. 2015. *National Rail Policy – Green Paper*. Pretoria: Department of Transport.
- Dobbins, A.H. 2006. Implementation and Delivery of Free Basic Electricity in the Face of the Restructuring of the Electricity Distribution Industry. MA thesis. Cape Town: University of Cape Town.
- Dugard, J. 2009. Power to the People? A rights-based analysis of South Africa's electricity services. In: David McDonald (ed.). *Electric Capitalism: Recolonising Africa on the Power Grid*, 264–287. Pretoria: HSRC Press.
- Eberhard, A. & Van Horen, C. 1995. *Poverty and Power: Energy and the South African State*. Cape Town: UCT Press; London: Pluto Press.
- Eberhard, A. & Naude, R. 2016. The South African Renewable Energy Independent Power Producer Procurement Programme: A Review and Lessons Learned. *Journal of Energy in Southern Africa*, 27(4), 1-14. <https://dx.doi.org/10.17159/2413-3051/2016/v27i4a1483>.
- Emmie. 2018. Personal interview, 19 April. De Aar.
- Emthanjeni Local Municipality (ELM). 2021a. Final Budget 2021/22 Financial Year. De Aar: Emthanjeni Local Municipality.
- Emthanjeni Local Municipality (ELM). 2021b. Final Integrated Development Plan 2021/2022. De Aar: Emthanjeni Local Municipality.
- Emthanjeni Local Municipality (ELM). 2021c. Draft Indigent Household Policy. De Aar: Emthanjeni Local Municipality.
- Eskom. 1988. *Annual Report 1988*. Johannesburg: Eskom.
- Eskom. 1994. *Annual and Statistical Report 1994*. Johannesburg: Eskom.
- Eskom. 2002. *Annual Report 2002*. Johannesburg: Eskom.
- Fine, B. & Rustomjee, Z. 1996. *The Political Economy of South Africa: From Minerals-Energy Complex to Industrialisation*. London: C. Hurst & Co.
- Fiona. 2018. Personal interview. 24 April. De Aar.
- Francioli, A.P. 2018. Investigating energy usage among low-income households and implications for fire risk. MA thesis. Stellenbosch: Stellenbosch University.
- Gaunt, C.T. 2003. Researching a basic electricity support tariff (BEST), Domestic Use of Energy Conference. Cape Town: Cape Peninsula University of Technology.

- Hill, T. & Nel, E. 2018. Population change in the Karoo. *African Journal of Range & Forage Science*, 35(3-4):203–208. <http://dx.doi.org/10.2989/10220119.2018.1529705>.
- Independent Power Purchaser Office. 2021a. The Independent Power Producer Procurement Program (IPPP): An Overview As of 30 March 2021. [Online]. <https://www.ipp-projects.co.za/Publications> [Accessed 22 January 2018].
- Independent Power Purchaser Office. 2021b. REIPPPP focus on Northern Cape: Provincial Report, Volume 1. [Online]. <https://www.ipp-projects.co.za/Publications> [Accessed 5 March 2022].
- Ismail, Z. & Khembo, P. 2015. Determinants of energy poverty in South Africa, *Journal of Energy in Southern Africa*, 26(3):66–78. <http://dx.doi.org/10.17159/2413-3051/2015/v26i3a2130>.
- Janice. 2018. Personal interview, 24 April. De Aar.
- John. 2017. Personal interview, 24 October. De Aar.
- Kimania, D. & van Niekerk, A. 2017. Energy poverty, shack fires and childhood burns, *South African Medical Journal*, 107:289. <http://dx.doi.org/10.7196/SAMJ.2017.v107i4.12436>.
- Kimania, D. & Van Niekerk, A, 2018. Why unsafe paraffin stoves are still being widely used in South Africa. *The Conversation*. [Online]. <https://theconversation.com/why-unsafe-paraffin-stoves-are-still-being-widely-used-in-south-africa-100337> [Accessed 19 April 2020].
- Krupa, J. & Burch, S. 2011. A new energy future for South Africa: The political ecology of South African renewable energy, *Energy Policy*, 39:6 254–6 261. <https://doi.org/10.1016/j.enpol.2011.07.024>.
- Kruger, W., Nygaard, I. & Kitzing, L. 2021. Counteracting market concentration in renewable energy auctions: Lessons learned from South Africa, *Energy Policy*, 148(Part B):111995. <http://dx.doi.org/10.1016/j.enpol.2020.111995>.
- Ledger, T. 2021. Broken Promises; Electricity access for low-income households: good policy intentions, bad trade-offs and unintended consequences. Public Affairs Research Institute (PARI). [Online] <https://pari.org.za/broken-promises-good-intentions-bad-trade-offs-and-unintended-consequences/> [Accessed 4 April 2022].
- Lizette. 2018. Personal interview, 20 April. De Aar.
- Manoko, T. 2016. 'De Aar has highest FASD rate in the world'. *The New Age*. [Online]. <http://www.thenewage.co.za/de-aar-has-highest-fasd-rate-in-the-world/> [Accessed 20 April 2017].
- Malope B.J. 2022. Power struggles: An exploration of the contribution of renewable energy to sustainable development, decent work and the “just transition” through a case study of wind farm development outside Loeriesfontein, Northern Cape Province (2011–2020). PhD dissertation. Stellenbosch: Stellenbosch University.
- McDonald, D. 2002. The bell tolls for thee: Cost-recovery, cut-offs and the affordability of municipal services in South Africa. In D. McDonald & J. Pape (eds). *Cost Recovery and the Crisis of Service delivery in South Africa*. Pretoria: HSRC Press.
- Mohlakoana, N. 2014. Implementing the South African Free Basic Alternative Energy Policy: A Dynamic Actor Interaction. PhD thesis. Twente, Netherlands: University of Twente.

- Morris, M., Robbins, G., Hansen, U.E., & Nygaard, I. 2020. Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The political economy dynamics driving a stuttering localization process. PRISM Working Paper 2020-3. Cape Town: Policy Research on International Services and Manufacturing, University of Cape Town.
- Nzo, T. 2021. Whose Power Is It Anyway? - Emthanjeni Local Municipality and Renewable Energy. Public Affairs Research Institute (PARI). [Online] <https://pari.org.za/whose-power-is-it-anyway-emthanjeni-local-municipality-and-renewable-energy/> [Accessed 20 April 2020].
- Patrick. 2018. Personal interview, 23 April. De Aar.
- Patrick. 2021. Personal interview, 6 May. De Aar.
- Phelan Energy Group Limited. 2021. About Us, *Phelan Energy Group*. [Online]. <https://phelanenergygroup.com> [Accessed 19 July 2021].
- Republic of South Africa. 2003. Electricity basic services support tariff (Free Basic Electricity) Policy. Government Gazette, Notice 1693 of 2003.
- Ruiters, G. 2009. Free Basic Electricity in South Africa: A Strategy for Helping or Containing the Poor, in D. McDonald (ed.). *Electric Capitalism: Recolonising Africa on the Power Grid*. Pretoria; HSRC Press. 248–263.
- Santu, J. 2020. FAQs on Free Basic Electricity. *Powertime*. [Online]. <https://powertime.co.za/online/faqs-on-free-basic-electricity/> [Accessed 19 October 2021].
- Simcock, N., Frankowski, J. & Bouzarovski, S. 2021. Rendered invisible: Institutional misrecognition and the reproduction of energy poverty, *Geoforum*, 124(4):1–9. <https://doi.org/10.1016/j.geoforum.2021.05.005>.
- Skosana, I. & Koza, L. 2014. How to wean moms off the bottle. *Bhekisisa: Centre for Health Journalism*. [Online]. <https://bhekisisa.org/article/2014-01-17-00-how-to-wean-moms-off-the-bottle/> [Accessed 16 February 2017].
- South African Government. 2022. President Cyril Ramaphosa: Address to the nation on energy crisis, *The Presidency*. [Online]. <https://www.gov.za/speeches/president-cyril-ramaphosa-address-nation-energy-crisis-25-jul-2022-0000> [Accessed 27 July 2022].
- Stassen, W. 2012. How De Aar is beating curse of alcohol. [Online]. <https://www.iol.co.za/sundayindependent/how-de-aar-is-beating-curse-of-alcohol-1347367> [Accessed 19 October 2020].
- Statistics South Africa (StatsSA). 2011a. The South African National Census of 2011. Pretoria: Statistics South Africa.
- Statistics South Africa (StatsSA). 2011b. My Settlement: De Aar. Pretoria: Statistics South Africa. [Online]. https://www.statssa.gov.za/?page_id=4286&id=6950 [Accessed 16 February 2017].
- Statistics South Africa (StatsSA). 2016. Statistics South Africa Community Survey of 2016. Pretoria: Statistics South Africa.
- Statistics South Africa. (StatsSA) 2017. Poverty Trends in South Africa: An examination of absolute poverty between 2006 and 2015. Pretoria: Statistics South Africa.
- Statistics South Africa (StatsSA). 2019. National Poverty Lines. Statistical release P0310.1. Pretoria: Statistics South Africa.
- Strydom, N. 2022. 18 Northern Cape Municipalities Debt Eskom Billions, *Maroela Media*. [Online]. <https://maroelamedia.co.za/nuus/sa-nuus/18-noord-kaap-munisipaliteite-skuld-eskom-miljarde/> [Accessed 16 June 2022].

- Sugrue, A. 2005. Energy For Sustainable Development, Presentation to The Parliamentary Portfolio Committee on Minerals Resources and Energy. [Online]. <https://pmg.org.za/committee-meeting/4918/> [Accessed 9 November 2023].
- Sunday Times Live*. 2017. De Aar wind-power projects start feeding electricity to Northern Cape. 30 November 2017. [Online]. <https://www.timeslive.co.za/news/south-africa/2017-11-30-de-aar-wind-power-projects-start-feeding-electricity-to-northern-cape/> [Accessed 18 October 2021].
- Sustainable Energy Africa. 2014. Tackling Urban Energy Poverty in South Africa. Cape Town: Sustainable Energy Africa. [Online]. <https://www.sustainable.org.za/uploads/files/file72.pdf> [Accessed 19 November 2022].
- Van der Kroon, B., Brouwer, R., & Van Beukering, P.J.H. 2013. The energy ladder: Theoretical myth or empirical truth? Results from a meta-analysis. *Renewable and Sustainable Energy Reviews*, 20(C): 504–513. <http://dx.doi.org/10.1016/j.rser.2012.11.045>.
- Vermaak, C., Kohler, M., & Rhodes, B. 2009. Developing Energy-based Poverty Indicators for South Africa. *Journal of Interdisciplinary Economics*, 21:163–195. <http://dx.doi.org/10.4102/jef.v7i1.134>.

Chapter 11

Shale gas and sacrifice zones: Local perspectives on the costs and benefits of fracking in the Central Karoo District of the Western Cape

Mzingaye Brilliant Xaba

Shale-gas mining, or fracking (hydraulic fracturing) has been mired in controversy since commercial drilling first took off in the United States of America (USA) in the 1990s. In post-apartheid South Africa, it came to the fore in 2010 when the state granted three companies (Shell, Falcon Oil & Gas and Bundu Gas & Oil Exploration) “technical cooperation permits” to investigate the prospects for shale-gas mining across a broad band of the southern Nama Karoo (see Figure 11.1 below). By then rumours of vast shale-gas resources in the Karoo Basin⁹⁹ had begun to emerge (Academy of Science of South Africa (ASSAf), 2016; Atkinson, 2018; ASSAf, 2019). In 2013, the US Energy Information Administration (2013:15–16) estimated that South Africa had about 390 trillion cubic feet (tcf) of recoverable shale-gas resources – a figure that was revised down from its earlier estimate of 485 tcf but which, if correct, would make South Africa’s reserves the fifth largest globally. However, other estimates were far lower, at between 19 and 23 tcf (ASSAf, 2016:4, 19). One expert claimed at a 2019 ASSAf workshop that the rocks in the Karoo “were over mature and almost up to anthracite grade of metamorphism with only dead carbon remaining. Very little to no desorbed or adsorbed gas was detected” (Nic Beukes, reported in ASSAf, 2019:7). This raised significant doubts about the existence and/or extent of economically recoverable resources.

In the last decade, evidence of the risks posed by shale-gas mining to human health and the environment has also mounted (Fakir, 2015; ASSAf, 2016; ASSAf, 2017). Influential international organisations such as the Intergovernmental Panel on Climate Change (IPCC), the United Nations Environment Programme (UNEP),

99 In geological terms the Karoo Basin refers to a sedimentary basin which extends beneath much of contemporary South Africa; while much of the Nama Karoo biome is situated on Karoo Basin rocks, the Karoo Basin extends beneath the Grassland biome to the east, as shown in Figure 11.1.

the Climate and Clean Air Coalition (CCAC), the International Energy Agency (IEA), and a global coalition of universities have been calling strongly for divesting from fossil fuels because of the unacceptably high carbon and methane emissions associated with their extraction (UNEP & CCAC, 2021; IEA, 2021; IPCC, 2021; Albertyn et al., 2021). Global dynamics are shifting, and shale gas is no longer seen internationally as a 'transition fuel' to clean sources of energy (Swilling, 2021). The International Institute for Sustainable Development has demonstrated that aside from the risks associated with gas power, which have increased, the reduced costs of renewable energy development and battery storage means that "gas supply is not technically necessary until at least 2035, if ever" (Halsey, Bridle & Geddes, 2022:iv).

These developments are making it increasingly difficult for the South African government to rationalise its stated commitment to shale gas as part of the country's energy mix. Already in July 2019, the shale-gas industry in South Africa suffered a major setback when a judgment of the Supreme Court of Appeal (SCA) invalidated the state's regulatory framework for shale-gas mining on procedural grounds, which meant that further exploration was stalled until such time as proper regulations had been put in place (*Minister of Mineral Resources v Stern & others and Treasure the Karoo Action Group & another v Department of Mineral Resources & others*, 2019). Yet despite increasing global pressure to abandon fossil fuels, the evidence suggests that major players in the South African state are still eager for shale-gas mining to proceed, to drive economic development and address the country's serious energy crisis. In 2021, the Minister of Mineral Resources and Energy, Gwede Mantashe, reiterated plans to "continue our commitment of developing the gas industry into our economy" (Mantashe, 2021) and insisted that "the discovery of gas in South Africa must be factored into the transition. Shale gas in the Karoo has been scientifically proven" (quoted in Stoddard, 2021). In July 2022, Gayton McKenzie, the firebrand former Mayor of the Central Karoo District Municipality and leader of the Patriotic Alliance, was quoted as saying, "there will be fracking happening in the Central Karoo. We will mine uranium in the Central Karoo. Johannesburg had nothing, they mined and today they have everything ... Why can't Central Karoo have everything?" (Cruywagen & Payne, 2022).

At the time of finalising this chapter (late 2022), the outcome of the debate on fracking was still uncertain. The government, through the Petroleum Agency of South Africa (PASA), was proceeding with a multi-pronged shale-gas mining research programme and was working towards providing legislative clarity for new permit applications. In November 2022, the Minister of Mineral Resources and Energy expanded the area under investigation for potential shale gas in the Karoo eastwards, across the Eastern Cape to the Indian Ocean (Department of Mineral Resources and Energy (DMRE), 2022) (Figure 11.1). However, the combination

of earlier litigation, the absence of conclusive scientific data on the geology and morphology of the Karoo, and concerns around the environmental risks all meant that the prospects for fracking in South Africa were not assured. The state is on record as stating that all decisions related to fracking will be based on scientific data and proper public consultation (Department of Environmental Affairs (DEA), 2017:163–164). Nevertheless, given the power of the mining lobby in South Africa, concerns that fracking may yet proceed and thus shift the environmental costs onto the local population in the Karoo, in the name of solving South Africa’s interlinked energy and climate change crises, are not unfounded.

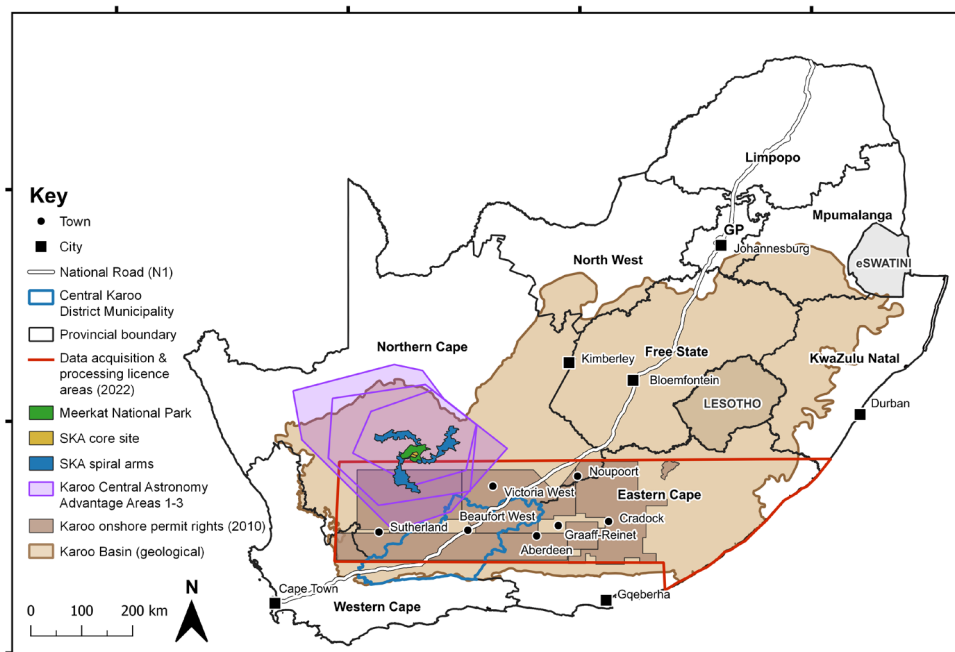


Figure 11.1 The geological Karoo Basin, showing the Central Karoo District Municipality, shale-gas exploration areas in the Karoo (2010 and 2022) and location of the Square Kilometre Array (SKA)

In the Karoo itself, opinion around fracking is divided. In addition to uncertainty among many residents about how to assess the competing arguments about the potential environmental impacts versus the promises of socio-economic benefits, the state is facing what can be considered a legitimacy crisis, in which state-assisted projects are viewed with distrust in many quarters. This is related to the state’s track record, not only of collusion with the mining industry (which has left mining communities in many parts of the country poor, while traditional, political and financial

elites have grown wealthy), but also to disillusionment with poor service delivery and the collapse of infrastructure in many small towns (Mupambwa & Xaba, 2019; Overy, 2020; Sihlobo, 2021). At the same time, while the combination of national litigation by anti-fracking groups and protests by local communities has achieved some victories, thus far these efforts have only served to delay, not ban, fracking outright. In addition, although there are points of convergence among local anti-fracking groups, they are not a united force. Their members come from different backgrounds and the various groups involved (encompassing farmers, religious groups, farm workers, environmental activists, and ordinary citizens) often have different and sometimes even opposing agendas (Rijsdijk, 2016:385). Race and class play a role in the divisions around fracking, although they are not defining factors in shaping local views on fracking.

In this chapter I use a political ecology lens to review the debates on the costs and benefits of fracking from the vantage point of the Central Karoo District Municipality of the Western Cape (centred on the town of Beaufort West and shown in blue in Figure 11.1). My particular concern is to draw attention to local actors and their concerns. Like other regions of the Karoo, the district faces many social and environmental challenges, including high levels of unemployment and poverty, heavy dependence on social grants, and low levels of education. Between 2015 and 2020, it also suffered a severe drought (Milton, Peterson, Nampa, Van der Merwe & Henschel, 2022:7). My research questions the extent to which Karoo residents have been able to participate in the debates on fracking and their concerns have carried weight in policy decisions. At the same time, given the strong differences of opinion locally, how should local views be accommodated and what are their implications for policy? I argue that the environmental concerns need to be taken seriously, in part because of the toxic track record of fracking outside South Africa, but also because even if shale-gas mining brings positive economic spinoffs nationally, the benefits are likely to be limited and unsustainable in the Karoo. Even if the majority of local residents were to favour mining because of the promises of jobs and economic development, the environmental concerns cannot be ignored.

In exploring the competing interests and power relations involved, I work with the concept of 'sacrifice zone'. A sacrifice zone can be understood as an area that has experienced significant environmental disruption from development projects intended to achieve a greater good, which justifies the sacrifice of the area in question; this raises questions about mitigation to offset the damage and the politics involved in the management of the trade-offs. Chinigò and Walker (2020) have applied this concept to the establishment of the core site for the globally and nationally significant Square Kilometre Array (SKA) radio astronomy project in the Upper Karoo, in which, they argue, local development priorities and concerns have been marginalised. (On this, see also Terblanche, Chapter Seven in this volume.)

Given the excessive power of the state when it comes to the regulation of mining, as well as the marginalisation of the Karoo region in the political economy of the country, communities in the Central Karoo District are similarly vulnerable to being 'sacrificed' so that shale-gas mining can proceed in the name of the greater national good, a goal in which the interests of corporate shareholders and the political class take precedence. The Mineral and Petroleum Resources Development Act (MPRDA) 28 of 2002 (RSA, 2002) essentially authorises the state to think paternalistically on behalf of 'our people' when it comes to the extractive industries; local people generally have little power either to be properly informed or to control proceedings, apart from some members of the local political elite, who may profit through empowerment deals and possible kickbacks.

The chapter is based on research undertaken since 2019, involving documentary, case law and media analysis, semi-structured interviews with 35 research participants, critical engagement with the work of other scholars and commentators, and observation in my research site. My primary fieldwork was conducted in the Beaufort West area, but the study encompassed the broader Central Karoo District. My participants can be grouped into four categories.¹⁰⁰ The first group consists of local residents, including farmers, townspeople, representatives of farm-worker organisations and politicians in the district with whom I was able to engage before the COVID-19 pandemic put a stop to in-person fieldwork in 2020. The second group comprises state officials at various levels. The third group is made up of activists in both local and international anti-fracking groups, as well as other non-governmental organisations (NGOs). The fourth category comprises independent journalists and scientists who are actively investigating fracking, not just in South Africa, but in Namibia and elsewhere.

The discussion is structured as follows. Section one reviews the debate on fracking against the background of the mounting energy crisis in South Africa from 2008. The second section looks at local concerns and power dynamics in the fracking struggle in the Central Karoo District, while the third section picks up on the theme of development and sacrifice zones.

100 The author has used pseudonyms to protect the identity of research participants, except in cases where those interviewed agreed to be identified.

The fracking debate in post-apartheid South Africa, 2008–2022

The South African debate on the risks and opportunities associated with fracking can be traced back to 2008 when the country first experienced 'loadshedding'¹⁰¹ because of the growing crisis in the energy sector. The energy crisis coincided with the global expansion of shale-gas mining, led by the shale-gas boom in the USA in the early 2000s (Esterhuysen & Redelinghuys, 2014). At the time, the South African government was also beginning to talk about scaling back the country's reliance on coal for generating energy, with shale gas being presented as a potential bridge fuel that could facilitate the transition to renewable energy (Glazewski, 2016). The state's pro-fracking stance also fit with its aspirations to be a more technocratic developmental state (Atkinson, 2019; Seekings & Nattrass, 2020).

The first round of applications for exploration permits for shale gas and coalbed methane took place between 2008 and 2010 in terms of the Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA). Applications involved two transnational companies, Shell South Africa, and Falcon Oil & Gas, as well as a third company, Bundu Gas & Oil Exploration, which is a subsidiary of an Australian company called Challenger Energy Limited (ASSAf, 2016; DEA, 2017). Their applications covered a wide band across the southern Karoo, straddling both the Northern and Western Cape Provinces and impacting directly on several towns, including (from west to east) Sutherland, Beaufort West, Noupoot, Aberdeen, Graaff-Reinet and Cradock (Department of Mineral Resources (DMR), 2012:52).

These applications were met with considerable resistance from environmental activist groups such as the then newly formed Treasure the Karoo Action Group, as well as local townspeople and farmers (Atkinson, 2018). Opponents of fracking were adamant that it posed unacceptable risks for the environment and for people, given the aridity, fragile biodiversity, and unique landscapes of the Karoo, as well as the lack of proper understanding of the geomorphology and geology of the region (Avenant, Watson, Esterhuysen & Seaman, 2016; Todd et al., 2016). In a context of significant water scarcity, there were major concerns around the source and amount of water to be used in fracking, the treatment of its wastewater, the threat of groundwater contamination and the implications for other land users (Van Wyk, 2014; ASSAf, 2016). According to Todd et al. (2016), other ecological concerns included the threat posed by direct and indirect habitat loss to the survival of animal and plant species and the difficulty of restoring damaged ecosystems in a semi-arid region like the Karoo. Here critics pointed to the poor track record of the mining

101 Eskom, South Africa's power utility, defines loadshedding as "a controlled process that responds to unplanned events in order to protect the electricity power system from a total blackout" (<https://loadshedding.eskom.co.za/LoadShedding/Description>).

industry with regard to the environment in South Africa – Overy (2020) has gone so far as to argue that “if the mining industry was forced to account for and reverse the environmental damage it causes, it would not be financially viable.” These concerns mirror those in other parts of the world, with environmentalists pointing to the international evidence that fracking is a high-risk endeavour (ASSAf, 2016; Avenant, Watson, Esterhuysen & Seaman, 2016; Kijko, Kahle, Smit, Esterhuysen & Glazewski, 2016).

Opponents of fracking argued then (and now) that the environmental damage can be expected to outweigh any economic gains and that the state should rather invest in renewable sources of energy and promote other forms of economic activity in the Karoo, such as tourism and agriculture (Janse van Vuuren, 2019). More recently, some critics of fracking have argued that although the COVID-19 pandemic has worsened the financial pressure on households, it has also created an opportunity to re-imagine a more sustainable future for the Karoo in the post-COVID era. For instance, hydrologist Stephen Cramer (2020) has argued that the Karoo’s special geography lends itself to marketing the region as a low-viral destination, which could see a boom in post-COVID eco-tourism and promote sustainable development opportunities. Social distancing and isolation, he has noted, have always been part of the way of life for Karoo residents.

The proponents of fracking have based their claims on both the economic prospects of shale-gas mining and its potential contribution to reducing South Africa’s significant contribution to global carbon emissions, through its reliance on coal-fired electricity. In 2012, an influential report by Econometrix, a prominent economic consultancy firm commissioned by Shell, presented strong arguments in favour of fracking in terms of job creation, increased tax revenues, and additional indirect spinoffs for the economy. The study estimated that extracting 20 tcf could add ZAR2 trillion to the economy, create 355 817 jobs and generate ZAR887 billion in additional tax revenues; if 50 tcf were extracted, then the economic gains would multiply accordingly (Econometrix, 2012:66–70). In response to environmental concerns, proponents argued that shale gas is 50% cleaner than coal, if ‘fugitive’ emissions such as methane are managed. They thus maintain that the exploitation of shale gas will offer South Africa a source of alternative energy that will contribute to lower greenhouse gas emissions and thus reduce South Africa’s carbon footprint significantly (Glazewski, 2016:438). In this way, fracking will promote the public good both nationally and locally, by stimulating development, diversifying and decarbonising the energy mix, and improving energy security and independence. In making these arguments they have pointed to the USA where the shale-gas boom was leading to energy security and the creation of jobs (Vegter, 2012; ASSAf, 2016).

The Econometrix report was criticised by scholars such as Wait and Rossouw (2014) who argued that its findings were biased, as they exaggerated the economic benefits while failing to account for the environmental costs. For the proponents of fracking, the converse was true: the claims by environmentalists and other anti-fracking groups were either exaggerated, reflecting misplaced fears, or entirely false; if allowed to prevail they would inhibit economic growth and the development of cheaper sources of energy (Vegter, 2012:6–8).

In March 2010, the vigorous debate on the risks posed by shale-gas mining generated sufficient controversy that the Minister of Mineral Resources, Susan Shabangu, felt obliged to place a moratorium on exploration, pending an investigation of the environmental risks of fracking by an interdepartmental task team (Atkinson, 2018). The task team, established in April 2011, came out in support of a phased approach to the mining. It recommended that normal exploration should be allowed to continue but actual hydraulic fracturing should not be permitted, pending the establishment of a monitoring committee and the strengthening of the regulatory framework (DMR, 2012:69–70). Once these mechanisms were in place, however, hydraulic fracturing (fracking) should be authorised under the strict supervision of the monitoring committee. Further recommendations concerned the need for ongoing research, to improve the scientific knowledge base around shale gas, and for departments to work together to support whatever actions were required. Mindful of the significant investment in the SKA radio telescope in the Upper Karoo, the task team also recommended that the co-existence of shale-gas mining and astronomical research should be investigated further (DMR, 2012:69–70).

These recommendations were approved by the National Cabinet, under-then President Zuma, on 7 September 2012. In that month, the Cabinet lifted the moratorium to allow exploration to proceed, on condition that the exploration would not involve actual fracking. The Cabinet also formed an interdepartmental monitoring committee to produce a regulatory framework that would cover both exploration and potential production (ASSAf, 2017, 2019; Atkinson, 2018). Meanwhile, in a second round of applications in 2013, a number of South African companies (Sungu Sungu, Rhino Oil & Gas, Bundu and Motuoane Energy) applied for prospecting permits for shale-gas mining in the wider Karoo Basin, in KwaZulu-Natal, Eastern Cape, North West Province and Free State (Finkeldey, 2018:463). Critics have suggested that these applications should be seen as a ploy by local entrepreneurs to speculate with applications that they would later be able to sell to established, globally networked oil companies.¹⁰² These suspicions were given weight by the fact that none of the South African companies that were applying for permits had experience in oil or gas extraction (*Ibid.*:463).

102 This point is based on interviews with key informants in December 2020 and February 2021.

By this time the fracking issue was a hot topic of public debate, and the government was eager to decide the issue. In February 2015, the DEA commissioned the Council for Scientific and Industrial Research (CSIR) to conduct a ‘Strategic Environmental Assessment for Shale Gas Development’ in terms of the National Environmental Management (NEMA) Act 107 of 1998 (DEA, 2017). The purpose of the Strategic Environmental Assessment (SEA) was to provide the state with an evidence-based assessment on which an informed decision about the impact of the proposed developments could be reached.

SEAs are expected to be transparent and allow for public consultations, during which local communities can be thoroughly briefed about the proposed project and make their voices heard. The CSIR’s three-phased process started in February 2015 and ended in October 2016. Its final report, published in early 2017, was cautiously in favour of proceeding along the path already set. It recommended the establishment of exclusionary zones for sensitive areas, as well as a risk-averse approach to be followed, with a mitigation strategy if drilling for exploration and production purposes were to go ahead (DEA, 2017:111). The exclusionary zones identified in the report included the Astronomy Advantage Areas declared around the SKA in terms of the Astronomy Geographic Advantage Act of 2007, thereby displacing the possibility of actual fracking from the Northern Cape (where the Act applies) to the Western and Eastern Cape. As argued by Walker (2022), this recommendation, which was subsequently accepted, reflects the national importance the state has attached to the SKA radio astronomy project, which was allowed to trump fracking as a land use in the Northern Cape but not in other parts of the Karoo. Exclusionary zones as per the CSIR report included “important groundwater and surface water resources, areas of high biodiversity sensitivity, scenic areas important to the cultural landscapes, vulnerable people living in populated communities, and the footprint of the SKA development phases” (DEA, 2017:111–112).

In March 2015, the fracking debate took an unexpected turn, with an announcement by Shell that it was pausing its fracking plans in South Africa, pending the finalisation of legislation. Shell also cited low petroleum prices globally and uncertainties about the regulatory framework as factors in its decision (Reuters, 2015). Then, in June 2015, while the SEA was still in its early phase, a new Minister of Mineral Resources (Advocate Ngoako Ramatlodi) attempted to pre-empt the SEA process by publishing Petroleum Exploration and Development Regulations for the exploration and production of shale gas. This produced an outcry from environmentalists and other concerned parties (Atkinson, 2018), with Afriforum and agricultural unions challenging the regulations in the Eastern Cape High Court in 2015 (*Minister of Mineral Resources v Stern & others* and *Treasure the Karoo Action*

Group & another v Department of Mineral Resources & others, 2019). This meant that fracking could not proceed as the matter was sub judice (Atkinson, 2018:450).

Further litigation involving Afriforum, the agricultural unions and Treasure the Karoo Action Group followed. Finally, in July 2019, the SCA ruled that the Minister of Mineral Resources was not empowered to make shale-gas regulations, because the greater part of these regulations concerned environmental management, which fell under the Minister of Environmental Affairs in terms of NEMA (*Minister of Mineral Resources v Stern & others* and *Treasure the Karoo Action Group & another v Department of Mineral Resources & others*, 2019). The regulations were thus set aside in their entirety on procedural grounds. The SCA judgment meant that until new, properly authorised regulations were in place, all permit applications “are for non-invasive exploration only”, which meant they were restricted to desktop research and aerial surveys (Chen, 2019).

Despite this setback, in late 2021 the government, through PASA, was still undertaking research on shale gas in the Karoo Basin, indicating that the state's commitment to fracking had not diminished. In May 2021, the Department of Water and Sanitation published its draft shale-gas regulations for comment (Department of Water and Sanitation, 2021), with many activists concerned about the short notice period they were given to prepare their comments. In the same month, the Minister of Mineral Resources and Energy, by then Gwede Mantashe, announced that the research of the Council for Geoscience had found shale gas in the Karoo (Mantashe, 2021:4–5). As indicated earlier, Mantashe, a powerful figure in the ANC government and former trade unionist in the mining industry, is strongly in favour of shale gas as part of South Africa's energy mix and has been at pains to explain that people should not understand the 2019 SCA judgment as a ban on fracking (Chen, 2019). As already noted, in November 2022, he authorised an expansion of the area under investigation for potential shale gas in the Karoo eastwards, to reach the Eastern Cape coastline.

Local voices in the fracking struggle

As the previous discussion makes clear, there is a marked divide in the national debate between proponents and opponents of shale-gas mining on its contribution to social and economic development. In this section, I show that local views on the merits of fracking in the Central Karoo largely track the national debate, but do so with an intensity borne out of people's experience of living in the places likely to be most directly impacted. However, local lobby groups, whether they comprise commercial farmers, farm-worker organisations, anti-fracking advocacy groups, or townspeople desperate for jobs, have limited power to influence the outcome of the

fracking debate one way or the other. Local debates also reflect the complexity of contemporary race and class divisions within the Karoo. Privileged white community members have generally been seen as leading the anti-fracking discourse, with black residents tending to support fracking. However, these dynamics are not fixed and have shifted over time as residents across race and class divides have grown suspicious of the proposals for fracking.

Intense divisions and heated exchanges between supporters and opponents of fracking emerged publicly in the Central Karoo during the public consultation meetings that were organised around the 2016 SEA in Graaff-Reinet in the Eastern Cape, Beaufort West in the Western Cape and Victoria West in the Northern Cape. (On this see Borchardt, 2016). These three Karoo towns were seen by those conducting the SEA as sufficiently large to attract both local townspeople and members of surrounding farming communities to its consultation meetings. In this time all the shale-gas mining companies also held their own consultation meetings with local communities, both in publicly accessible and more exclusive venues in different towns (Du Toit, 2015a, 2015b).

What the SEA process made clear was that shale-gas mining was a highly divisive issue in the Karoo. Communities found themselves presented with a stark choice between the promises of economic growth and jobs being made by the fracking industry, and the state on the one hand or the dire warnings about the potential threat to the environment made by environmental activists and a tiny group of experts on the other (Borchardt, 2016:23–24; Scholes et al., 2016). Borchardt (2016) has described the ways in which unequal power relationships between local residents and national players manifested themselves at SEA public meetings: presenters used technical language and favoured English; there was limited time for questions, and people needed internet connectivity to access documents in advance. To the local opponents of fracking I interviewed in 2020/21, it seemed clear that the state was committed to proceeding and the SEA consultations were essentially a tick-box opportunity to secure local support for what was already planned. Many complained that the experts running the SEA meetings (who were seen as representing “the government”) were evasive and not transparent in the way they approached the consultation process. Meetings were poorly attended and the local people who were able to attend were not adequately informed about what fracking involved. This reduced these occasions to essentially empty debates between those who already supported or opposed fracking, rather than opportunities for public education or the articulation of alternative resolutions (Borchardt, 2016; Booij, 2019; Meintjies, 2019; Van Der Walt, 2019; Smith, 2020). In any case, an SEA process does not give local communities real power to shape decisions around the issues at stake, with both legislative and executive power lying with the state.

As already noted, consultation processes were also spaces in which community divisions were laid bare. The differences between those who believed the claims that fracking would change their lives for the better and those who thought that fracking was environmentally too destructive to be considered mapped onto divisions of race and class. According to Du Toit (2015c), a journalist residing in the Karoo, in 2015 local proponents of fracking included the Karoo Shale Gas Community Forum, which was formed by former provincial leader of the ANC in the Western Cape, Chris Nissen, local representatives of fracking companies, and individual residents. Opponents were mostly farmers, both commercial and small-scale, some individuals who claimed to be traditional Khoisan leaders, and a group of land and environmental activists, the latter with links to national NGOs.

These divisions were still apparent during my fieldwork in 2019. However, while the issues around fracking had not changed since the 2016 SEA, several local informants were adamant that the degree of support for fracking had declined. According to them, this was because local people had become increasingly concerned about the environmental consequences, especially the threat to the region's water resources, given the ongoing drought. Anti-fracking groups have been effective in conscientising local people about the dangers of fracking and also raising questions about the promises made by the government and shale gas companies. According to one resident:

Initially when this shale thing was introduced to us, everything looked promising and fine. And then people started researching and googling. And then people said, Wow! In America this thing happened, and the water was full of gas in the end, and there was gas coming out of the soil. The whole thing escalated, and people were not happy with the shale gas thing (Campbell, 2021).

Despite the SCA ruling that had invalidated the shale-gas regulations in 2019, many Karoo residents I interviewed remained anxious about the possible return of fracking. Their major concerns were similar to those raised in 2016. These included the risks of water contamination, the negative impact of fracking on tourism, the disruption of jobs in the agricultural sector, and the false hope presented to marginalised communities by the fracking industry and the state. Concerns about the threat that fracking posed to the region's water resources were especially acute in the Beaufort West region in the context of the severe drought that ravaged the region from 2015 to 2020. The opponents of fracking also emphasised that if an environmental disaster were to happen as a result of shale-gas mining, the primary beneficiaries (the company shareholders and political class) would be insulated from its immediate consequences, whereas local people would be the direct victims. A strong thread binding many in the anti-fracking groups together was a conservative attitude towards change – a strong desire to keep the Karoo as it is, with its clean air and quiet, wide spaces.

As in 2016, in 2019 the pro-fracking stance was spearheaded by those arguing that it would bring jobs and alleviate economic hardships. For example, one staunch proponent of fracking interviewed in Beaufort West, a middle-aged white man, accused environmentalists of brainwashing people. He saw those he described as “greenists” as enemies of progress who wanted to derail investments and development in the Karoo:

...mining would have created a lot of work and stimulated our struggling economy to alleviate poverty. We need something that can drive and sustain our economy, man. People need work, but all these greenists came here and brainwashed people to stop mining ... It's easy to criticise mining, but what's the alternative? All these greenists are not coming up with solutions, man (Havenga, 2019).

In a similar vein, another resident, a ‘coloured’ man, noted:

...environmental protection is important, but people here are screaming for job opportunities, and the municipality alone cannot be able to produce all the jobs, so there is no way we can just chase away mining like that, but we have to be careful (Hendricks, 2019).

According to Van Der Walt (2019), environmentalists are frustrating investors while not offering serious alternatives around job creation, other than referring very broadly to the potential of renewable energy projects, tourism, and farming.

In this context, race and privilege map readily onto each other. Those who are opposed to fracking are often dismissed on the grounds that they are resisting progress, not because of environmental concerns but because it threatens their already privileged status as whites and landowners. My interviews revealed a strong thread of anti-white, anti-farmer sentiment among the black residents of Beaufort West who support fracking. The fact that commercial farmers are generally opposed to fracking magnifies the racial differences: white farmers are seen as unconcerned about the socio-economic challenges facing local black African and ‘coloured’ communities and opposed to fracking to protect their farms (Booi, 2019).

Local farmers are certainly sceptical about fracking, which they see as a serious threat to their livelihoods. One (white) farmer I interviewed in the Beaufort West area decried the promises made by the government as a ploy to lure local people into accepting fracking. According to him, the persistent talk about fracking by the government and fracking companies was a deliberate strategy to agitate local communities to support fracking, while causing anxiety and confusion among farmers (Pence, 2019). Similarly, an elderly white woman I interviewed in town commented:

...the jobless people are waiting for mining, and nobody is telling them the truth. Mining companies come here and give them false hope. Some people are excited about jobs, but nobody wants to tell us the number of jobs that fracking will create. We have nice fresh air here in Beaufort West. We don't want shale gas here (Kruger, Interview 2019).

However, while racial divisions are certainly an issue in the struggle over fracking, the debate is not split neatly along racial lines. Emphasising the vulnerability of local communities, one male 'coloured' activist commented that "mining will solve a crisis (poverty) but will leave us in a worse crisis (environmental) ... so we must be careful" (Booi, 2019). Importantly, anti-fracking lobbyists and local farmers do not disagree about the need for job creation in the Karoo. Their major concern is that fracking poses major risks to the environment and hence to the local economy. Furthermore, the jobs that will be created will primarily require skilled workers who, given the skills and education profile of Karoo towns, will in most cases be outsiders. The local jobs associated with shale-gas mining include well construction and the building of roads, pipelines and other basic infrastructure. Thus, to the extent that local communities will benefit, this will only be short-term (Kruger, 2019). This mirrors the situation described by Malope (Chapter Nine) with regard to the investment in renewable energy near Loeriesfontein.

A number of people I interviewed felt caught in the middle between the opposing sides:

This thing is between farmers, fracking firms and the government. Communities are caught in between and misled. Others will come and say, this thing will bring jobs, others will say, no, this thing will destroy the environment (Booi, 2019).

"I am confused, man," added another resident, also male and 'coloured':

I would say I am in the middle. I cannot say whether fracking will contaminate water or not. Most local people here do not know what this whole fracking is all about, just in terms of scientific processes and all that. It's all about choosing between jobs and protecting the environment (Makaphela, 2019).

Political affiliation and the patronage networks associated with that are also significant. According to one senior academic who preferred to remain anonymous, as in the broader mining industry, fracking provides opportunities for politically connected elites at all levels to profit from the process, even if little gas is found in the end (Smith, 2020). In Beaufort West, one activist claimed that local politicians from the then ruling ANC were strongly in support of fracking during the consultation meetings because they believed it would bring not only economic opportunities for the many but also personal benefits for themselves (Van Der Walt, 2019). Other

anti-fracking activists also told me during the course of my interviews in 2020/2021 that the state and fracking companies rely on groups of local activists to push the agenda of fracking on their behalf.

Interestingly, according to Atkinson (2018:449), many officials in Karoo municipalities are alive to both the threats and the possible positive spinoffs of fracking. In its 2020/21 Integrated Development Plan (IDP), the Central Karoo District Municipality (2021:62, 63) notes that “the potential economic and energy impact of medium to large scale shale gas extraction could be substantial” but cautions that “potential environmental trade-offs ... must be fully understood in order to be prevented or mitigated.” It also notes that “the extent and viability of these gas reserves” are still uncertain. However, local municipalities do not have a clear or influential role in determining the outcome of decisions of national importance. Their participation in the fracking debate has been purely because the proposed developments are targeting their areas. In this regard they are in a similar position as the local residents they are meant to represent. In the words of one resident with intimate knowledge of mining projects in the Karoo:

If somebody wants to do shale gas, or uranium mining, it's not done by the municipality ... In this case, the municipality just does preparation for the national project, monitoring and waste collection. Companies apply for permission to the government, then we just hear that certain pieces of land are for that company and so on. The municipality only becomes part of these processes when the national government brings up a project (Campbell, 2021).

Political ecology theorists emphasise both the significance of unequal power relations among social groups in determining who and how the environment and its resources are accessed and the way in which these power relations reproduce the marginalisation and vulnerability of the poor. Thus Bryant (1998:86) argues that “power is reflected in the ability of one actor to control the environment of another”. Furthermore, “political and economic elites have invariably sought to justify specific, usually highly unequal, patterns of human use of the environment in term of ‘the greater national good’” (ibid.:87). These dynamics are clearly visible in how local communities are placed in the debate on fracking in the Central Karoo. The main mandate of the companies promoting fracking in this area is to produce profits for their shareholders. The state’s mandate is more complex as it includes ensuring economic development, energy security and environmental protection, while raising revenue through taxation and maintaining political relevance at different scales. However, armed with legislative power, political capital and globally networked financial power, the state and mining companies are able to push their agendas at the local level. In this regard the struggles around shale-gas mining

in the Karoo are not unlike those documented for other mineral-rich communities in South Africa, where the state has allowed mining companies and their allies to dominate decision-making while also creating divisions between proponents and opponents of mining at the local level (Mupambwa & Xaba, 2019; Mnwana, 2021).

Whose Karoo: local development or sacrifice zone?

In this section I argue that fracking is unlikely to bring sustainable development to the Karoo and those who are promoting fracking are treating the region as essentially a sacrifice zone. Meaningful development involves a process that results in a better life for everyone, which Peet and Hartwick (2009:1–2) have defined in terms of the ability of people to live a healthy life, in a healthy place, with their basic needs met, and, importantly, to be treated with dignity and respect. Development is often equated with economic growth, but if that growth damages the environment and increases inequality, then it cannot meet the criteria of a better life for all (Ibid.).

According to Klein (2015:310–311), sacrifice zones are spaces of poverty and disempowerment, often suffering from toxic pollution because of the impact of extractive industries. They are generally neglected, out-of-the-way places “where residents lack[ed] political power, usually having to do with some combination of race, language, and class.” This understanding of sacrifice zones is related to the concept of environmental justice, which calls for an equitable and just use of environmental resources, in which the concerns and priorities of local communities are respected, and the state is able to implement environmental laws and policies that protect the environment and punish polluters (UNDP, 2014:5–7).

Klein's definition of sacrifice zones perfectly describes the dominant conception of the Karoo in the state and among the supporters of fracking, who see this sparsely populated, semi-arid area as a national asset that can be utilised for the national good, understood primarily in terms of driving economic growth. As noted in other chapters in this volume, the Karoo is being redefined by externally driven investments aimed at exploiting its natural resources. In a context in which the Karoo is economically and politically marginalised, the state presents such externally initiated non-agricultural development projects as an answer to the developmental challenges facing the Karoo, even though local populations are divided over the costs and benefits of such projects (see also Walker et al., 2018:167–168; Walker & Chinigò, 2018:1981). As with the SKA, shale-gas mining is being supported in terms of global and national development goals; local concerns are not the primary consideration. This approach builds on and reinforces perceptions of the Karoo as a largely empty space that can be sacrificed to achieve the national good. It downplays the significance of competing interests, unequal power relations and the need to scrutinise the trade-offs carefully (Walker et al, 2018).

Although the state has committed itself to sound scientific processes in assessing the impact of fracking on the environment, the debates around shale-gas mining at the national level remain elitist and exclusive, fuelling local people's mistrust of scientists as well as external investors (Borchardt, 2016:33; ASSAf, 2019:21). Non-disclosure statements give fracking companies the right to withhold information on trade secrets (such as the chemicals used in fracking), which constrains the public's right to know and shields the companies from accountability and fair academic inquiry (Lewis, McMichael & Glazewski, 2016; Green, 2016:372).

This situation is worsened by the fact that in South Africa the track record of extractive industries with regard to local development and respect for the environment is problematic, with extensive evidence of damages faced by local communities through loss of access to their land, the contamination of water sources, the destruction of the social fabric, the spread of new diseases and other forced changes (Mupambwa & Xaba, 2019; Overy, 2020; Hoffman & Gillson, Chapter Eight in this volume). Even some avid proponents of fracking have admitted that although there are laws in place to monitor the behaviour of fracking companies, the record of these companies is problematic. Using Shell's record in Nigeria as an example, Vegter (2012:20), acknowledges that the track record of some of the extractive companies is hard to defend. Given this track record, and the weak capacity of the South African state to hold mining companies to account regarding corporate social responsibility and adherence to environmental laws (Overy, 2020), it is reasonable to expect that a similar pattern is likely to unfold in the Karoo if fracking does, finally, proceed.

Conclusion

As of the time of writing, no actual exploration rights had been awarded to companies in the Karoo and it is difficult to predict whether shale-gas mining will indeed proceed. Although key actors are convinced by the arguments in favour of fracking, the state is also keen to position itself as striking a middle ground by insisting that whatever decision is finally taken is based on scientific evidence and participatory processes (DEA, 2017:163–164; ASSAf, 2019). Yet despite stated commitments to participatory processes, it seems clear that, whatever the outcome, affected communities in the Karoo will not be the ones making the final decision.

The main concern of this chapter has been to expose the marginalisation of Karoo voices and priorities in the fracking debate and the unequal power relations at play in the attempts by the state and mining industry to advance shale-gas mining in the region. I have used the concept of sacrifice zone to argue that external proponents of fracking perpetuate the image of the Karoo as a predominantly empty space that can be exploited to achieve the greater national good. The companies that have an

interest in shale-gas mining are globally networked, with headquarters in the Global North, but they rely on local partnerships, in which local political elites are set to benefit – not ordinary residents whose priorities are of lesser concern. Further tilting power dynamics against local communities is the paternalistic attitude of the state in its quest to provide solutions to the energy crisis, drive economic growth, and provide empowerment opportunities for political elites.

Fracking is promoted as improving the energy mix in South Africa, by reducing the country's heavy reliance on coal as well as imported oil and gas and thereby also reducing greenhouse emissions and the catastrophic consequences linked to climate change, including extreme weather shocks, loss of biodiversity and massive food insecurity. There is no doubt that South Africa needs to change the way energy is generated and consumed but the grounds for arguing that fracking is part of the solution are weak. By now the evidence that fracking involves unacceptable environmental risks and will bring limited gains for local people appears incontrovertible. International and national evidence shows that fracking could cause major environmental damage without bringing sustainable development to the Karoo (Fakir, 2015; Glazewski, 2016).

Yet it is also very clear that economic deprivation makes talk of jobs and development attractive to many local actors. There is a clear need for the state to look at alternative development plans that recognise the interests of different constituencies – not only farmers, but also the unemployed in local towns – and at the same time strengthen local state institutions to improve prevailing socio-economic conditions. Much more attention must be paid to giving voice to the full range of concerns in local communities and to empowering residents to participate actively in the search for sustainable, long-term solutions as key role players, not bystanders in relation to how the national state and its allies want to proceed.

Acknowledgements

I am grateful for the input on earlier drafts from the editors, Cheryl Walker and Timm Hoffman. This chapter draws on research that was supported by the South African Research Chairs Initiative of the Department of Science and Innovation (DSI) and National Research Foundation (NRF) of South Africa (Grant No. 98765). The financial assistance of the NRF towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at are those of the author and are not necessarily to be attributed to the NRF.

References

- Academy of Science of South Africa (ASSAf). 2016. South Africa's technical readiness to support the shale gas industry. Pretoria: Academy of Science of South Africa. [Online]. <https://research.assaf.org.za/handle/20.500.11911/14> [Accessed 10 June 2020].
- Academy of Science of South Africa (ASSAf). 2017. The shale gas industry in South Africa: Toward a science action plan, 31 August–1 September 2017. Proceedings Report. Pretoria: Academy of Science of South Africa. [Online]. <https://www.dmr.gov.za/Portals/0/adam/Content/mR6c2sNChk-u72XE1zK0XQ/Text/2017%20ASSAF%20Shale%20Gas%20Proceedings%201.pdf> [Accessed 10 June 2020].
- Academy of Science of South Africa (ASSAf). 2019. Academy of Science of South Africa: Consultative workshop on the shale gas science action plan for South Africa. Pretoria: Academy of Science of South Africa. [Online]. <https://research.assaf.org.za/handle/20.500.11911/118> [Accessed 10 November 2020].
- Albertyn, C., Allais, L, Archibald, S, Chersich, M, Everatt, D, Manderson, L, Mbembe, A. & Satgar, V. 2021. 'Climate crisis: Decarbonizing window will close for universities like Wits if they don't lead the way'. *Daily Maverick*, 18 August 2021. [Online]. <https://www.dailymaverick.co.za/article/2021-08-18-climate-crisis-decarbonising-window-will-close-for-universities-like-wits-if-they-dont-lead-the-way/> [Accessed 17 September 2021].
- Atkinson, D. 2018. Fracking in a fractured environment: shale gas mining and institutional dynamics in South Africa's young democracy. *The Extractive Industries and Society*, 5(2018):441–452. <https://doi.org/10.1016/j.exis.2018.09.013>.
- Atkinson, D. 2019. When Stars Collide: Competing Development Paradigms in the Central Karoo. *Journal of Southern African Studies*, 45(4): 689–709. <https://doi.org/10.1080/03057070.2019.1645481>.
- Avenant, M., Watson, M, Esterhuysen, S & Seaman, M. 2016. Potential impact of unconventional gas mining on surface water systems of the Karoo. In: J. Glazewski & S. Esterhuysen (eds), *Hydraulic fracturing in the Karoo: critical legal and environmental perspectives*. Claremont: Juta. [Online]. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].
- Booi, C. 2019. Personal interview, 2 December, Beaufort West.
- Borchardt, S. 2016. What are we SEA-ing? An exploration of the communication strategies and extent of public participation at the Strategic Environmental Assessment (SEA) public briefings for Shale Gas Development in the Karoo. Honours Research Report. Stellenbosch: Department of Sociology and Social Anthropology, Stellenbosch University.
- Bryant, R. L. 1998. Power, knowledge and political ecology in the third world: a review. *Progress in Physical Geography*, 22(1):79–94. <https://doi.org/10.1177/030913339802200104>.
- Campbell, L. 2021. Telephonic interview, 18 February.
- Central Karoo District Municipality. 2021. *Integrated Development Plan 2020/21*. Beaufort West: Central Karoo District Municipality. https://www.skdm.co.za/download_document/933 [Accessed 12 September 2021].

- Chen, Y. 2019. Status of plans to frack SA's 'water tower'. *Oxpeckers*, 21 August 2019. <https://oxpeckers.org/2019/08/fracking-sas-water-tower/> [Accessed 12 September 2020].
- Chinigò, D. & Walker, C. 2020. Science, astronomy, and sacrifice zones: development tradeoffs, and the Square Kilometre Array (SKA) radio telescope project in South Africa. *Social Dynamics*, 46 (3): 391–413. <https://doi.org/10.1080/02533952.2020.1850626>.
- Cramer, S. 2020. Looking for opportunities: the Karoo in corona times. *Graaff-Reinet Advertiser*, 11 May 2020. [Online]. <https://www.graaffreinetadvertiser.com/News/Article/General/looking-for-opportunities-the-karoo-in-corona-times-202005120827> [Accessed 12 September 2020].
- Cruywagen, V. & Payne, S. 2022. 'I will run for President in 2024', Central Karoo Mayor Gayton McKenzie says after 100 days in office. *Daily Maverick*, 24 July 2022. [Online]. <https://www.dailymaverick.co.za/article/2022-07-24-i-will-run-for-president-in-2024-central-karoo-mayor-gayton-mckenzie-says-after-100-days-in-office/> [Accessed 27 July 2020].
- Department of Environmental Affairs (DEA). 2017. *Strategic Environmental Assessment for Shale Gas Development in the Central Karoo; Phase 3: Decision Support Tools Report*. [Online]. https://seasgd.csir.co.za/wp-content/uploads/2017/07/Decision-Support-Tools_Final_09June17.pdf [Accessed 27 June 2020].
- Department of Mineral Resources (DMR). 2012. Report on investigation of hydraulic fracturing in the Karoo Basin of South Africa. Pretoria: Department of Mineral Resources. [Online]. https://cisp.cachefly.net/assets/articles/attachments/41596_the_full_report_on_investigation_of_hydraulic_fracturing_in_the_karoo_basin_of_south_africa.pdf [Accessed 12 October 2021].
- Department of Mineral Resources and Energy (DMRE). 2022. Invitation for proposals to conduct seismic acquisition, seismic processing and/or acquisition and processing of any other geophysical, geological or geochemical data onshore South Africa. Government Gazette No. 47530. [Online]. <https://www.gov.za/documents/mineral-and-petroleum-resources-development-act-mprda-invitation-proposals-conduct-0> [Accessed 11 December 2020].
- Department of Water and Sanitation. 2021. Regulations for the Use of Water for Exploration and Production of Onshore Naturally Occurring Hydrocarbons that Require Stimulation Including Hydraulic Fracturing and Underground Coal Gasification to Extract and any Activity Incidental Thereto that may Impact Detrimentally on the Water Resource. Government Gazette, 7 May 2021. Pretoria: Department of Water and Sanitation. [Online]. https://www.gov.za/sites/default/files/gcis_document/202105/44545gon406.pdf [Accessed 2 February 2020].
- Du Toit, J. 2015a. Karoo fracking: Falcon and the Angora farmers. *Karoo Space*, 12 February 2015. [Online]. <https://karoospace.co.za/karoo-fracking-falcon-angora-farmers/> [Accessed 23 November 2021].
- Du Toit, J. 2015b. Shell spinning its wheels. *Karoo Space*, 10 June 2015. [Online]. <https://karoospace.co.za/shell-spinning-its-wheels/> [Accessed 23 November 2021].
- Du Toit, J. 2015c. When frack meetings go pear-shaped. *Karoo Space*, 17 November 2015. [Online]. <https://karoospace.co.za/when-frack-meetings-go-pear-shaped/> [Accessed 7 September 2022].

- Econometrix. 2012. *Shale gas report: special report on economic considerations surrounding potential shale gas resources in the southern Karoo of South Africa*. [Online]. <https://cer.org.za/wp-content/uploads/2012/06/Econometrix-KSG-Report-February-2012.pdf> [Accessed 14 August 2020].
- Esterhuysen, S. & Redelinghuys, N. 2014. Knowledge of unconventional gas mining among decision makers in South Africa: Exploring the requirements for fact-based water policy development. *Water Policy*, 16 (2014): 1 155-1 171. <https://doi.org/10.2166/wp.2014.034>.
- Fakir, S. 2015. *Framework to Assess the Economic Reality of Shale Gas in South Africa*. WWF-SA-World Wide Fund for Nature (formerly World Wildlife Fund), South Africa. http://awsassets.wwf.org.za/downloads/framing_the_economics_of_shale_gas_in_south_africa_report_web.pdf [Accessed 11 February 2020].
- Finkeldey, J. 2018. Unconventionally contentious: Frack Free South Africa's challenge to the oil and gas industry. *The Extractive Industries and Society*, 5(2018):461–468. <https://doi.org/10.1016/j.exis.2018.08.006>.
- Glazewski, J. 2016. Conclusion: Looking forward. In: J. Glazewski. & S. Esterhuysen (eds). *Hydraulic Fracturing in the Karoo: Critical Legal and Environmental Perspectives*. Claremont: Juta and Company Ltd. [Online]. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].
- Green, L. 2016. What does it mean to require 'evidence-based research' in decision-making on hydraulic fracturing? In: J. Glazewski. & S. Esterhuysen (eds). *Hydraulic Fracturing in the Karoo: Critical Legal and Environmental Perspectives*. [Online]. Claremont: Juta and Company Ltd. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].
- Halsey, R., Bridle, R. & Geddes, A. 2022. *Gas pressure: exploring the case for gas-fired power in South Africa*. International Institute for Sustainable development (IISD) Report, March 2022. [Online]. <https://www.iisd.org/system/files/2022-03/south-africa-no-need-for-gas.pdf> [Accessed 27 July 2022].
- Havenga, K. 2019. Personal interview, 9 September. Beaufort West.
- Hendricks, E. 2019. Personal interview, 10 September. Beaufort West.
- Intergovernmental Panel on Climate Change (IPCC). 2021. Summary for Policymakers, in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds)]. Cambridge, United Kingdom: Cambridge University Press. [Online]. https://report.ipcc.ch/ar6/wg1/IPCC_AR6_WGI_FullReport.pdf [Accessed 1 June 2022].
- International Energy Agency (IEA). 2021. *NetZero by 2050: A Roadmap for the Global Energy Sector*. NetZero by 2050 Interactive, IEA. [Online]. https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf [Accessed 10 October 2022].
- Janse van Vuuren, C. 2019. Imminent fracking in the Karoo is pitted against climate change. *IOL News*, 18 November 2019. [Online]. <https://www.iol.co.za/capetimes/opinion/imminent-fracking-in-the-karoo-is-pitted-against-climate-change-37413692> [2021, May 9].

- Kijko, A., Kahle, B, Smit, A, Esterhuysen, S. & Glazewski, J. 2016. Hydraulic fracturing, waste-water pumping and seismicity. In: J. Glazewski & S. Esterhuysen (eds). *Hydraulic Fracturing in the Karoo: Critical Legal and Environmental Perspectives*. Claremont: Juta and Company Ltd. [Online]. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].
- Klein, N. 2015. *This Changes Everything: Capitalism vs the Climate*. New York: Simon and Schuster. [Online]. <https://www.simonandschuster.com/books/This-Changes-Everything/Naomi-Klein/9781451697391> [Accessed 10 March 2020].
- Kruger, M. 2019. Personal interview, 9 September. Beaufort West.
- Lewis, A., McMichael, L. & Glazewski, J. 2016. Water quality, fracking fluids and legal disclosure, in J. Glazewski & S. Esterhuysen (eds). *Hydraulic fracturing in the Karoo: critical legal and environmental perspectives*. [Online]. Claremont: Juta and Company Ltd. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].
- Makaphela, R. 2019 Personal interview. 10 September, Beaufort West.
- Mantashe, S. G. 2021. Address by the Honourable Minister of Mineral Resources and Energy Mr Samson Gwede Mantashe, MP on the Budget vote 34, 18 May 2021. Department of Mineral Resources and Energy (DMRE). [Online]. <https://www.gov.za/speeches/minister-gwede-mantashe-mineral-resources-and-energy-dept-budget-vote-202122-18-may-2021> [Accessed 11 August 2021].
- Meintjies, R. 2019. Personal interview, 10 September. Beaufort West.
- Minister of Mineral Resources v Stern & others and Treasure the Karoo Action Group & another v Department of Mineral Resources & others* (790/2018) [2019] ZASCA 99; [2019] (4 July 2019). [Online]. <http://www.saflii.org/za/cases/ZASCA/2019/99.html> [Accessed 11 February 2020].
- Milton, S, J., Peterson, H, Nampa, G, Van der Mwere, H. & Henschel, J, R. 2022. Drought as a driver of vegetation change in Succulent Karoo rangelands, South Africa. *African Journal of Range & Forage Science*, 2022:1–15. <https://www.tandfonline.com/doi/abs/10.2989/10220119.2021.1992501>.
- Mwana, S. 2021. When custom divides 'community': legal battles over platinum in North West Province. In: W. Beinart, R. Kingwill & G. Capps (eds). *Land, law and chiefs in rural South Africa: Contested histories and current struggles*. Johannesburg: Wits University Press. [Online]. <https://rebrand.ly/9e8n7p5> [Accessed 10 March 2022]. <https://doi.org/10.18772/22021056796.9>.
- Mupambwa, G. & Xaba, M, B. 2019. Investors or looters? A critical examination of mining and development in Africa, in T.V. Warikandwa, A. Nhemachena, N. Mpofo & H. Chitimira (eds). *Grid-locked African economic sovereignty: Decolonising the neo-imperial socio-economic and legal force-fields in the 21st century*. Cameroon: Langaa RPCIG. [Online]. <https://www.africanbookscollective.com/books/grid-locked-african-economic-sovereignty> [Accessed 19 June 2020]. <https://doi.org/10.2307/j.ctvh9vx7n.13>.
- Overy, N. 2020. Mining communities bear the burden of disease. *New Frame*, 9 July 2020. [Online]. <https://rebrand.ly/jdaq8u9> [Accessed 13 July 2020].

- Peet, R. & Hartwick, E. 2009. *Theories of development: Contentions, Arguments and Alternatives*. 2nd Edition. New York: The Guilford Press. [Online]. https://books.google.co.za/books/about/Theories_of_Development_Second_Edition.html?id=w0MqHZOooa8C&redir_esc=y [Accessed 10 August 2020].
- Pence, E. 2019. Personal interview, 3 December. Beaufort West.
- Republic of South Africa (RSA). 2002. Mineral and Petroleum Resources Development Act, Act 28 of 2002. Cape Town. South Africa. [Online]. <https://www.gov.za/documents/mineral-and-petroleum-resources-development-act#:~:text=The%20Mineral%20and%20Petroleum%20Resources,provide%20for%20matters%20connected%20therewith> [Accessed 23 December 2021].
- Rijsdijk, I. 2016. The scripto-visual rhetorical of 'fracking' in South Africa, in J. Glazewski & S. Esterhuysen (eds). *Hydraulic fracturing in the Karoo: critical legal and environmental perspectives*. Claremont: Juta and Company Ltd. [Online]. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].
- Reuters. 2015. 'Shell pulls back from shale in South Africa'. *Reuters*, 16 May 2015. [Online]. <https://www.reuters.com/article/uk-shell-shale-idUKKBN0MC0G920150316> [Accessed 18 May 2021].
- Scholes, R., Lochner, P, Schreiner, G, Snyman-Van der Walt, L. & De Jager, M. (eds) 2016. *Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks*. Pretoria: Council for Scientific and Industrial Research (CSIR). [Online]. https://seasgd.csiir.co.za/wp-content/uploads/2016/12/SGD-Scientific-Assessment-Binder1_LOW-RES_INCL-ADDENDA_21Nov2016.pdf [Accessed 20 June 2020].
- Seekings, J. & Nattrass, N. 2020. COVID vs Democracy: South Africa's lockdown misfire. *Journal of Democracy*, Vol 31 (4):106–121. <http://dx.doi.org/10.1353/jod.2020.0059>.
- Sihlobo, W. 2021. 'Small towns are collapsing across South Africa. How it's starting to affect farming'. *The Conversation*, 18 June 2021. [Online]. <https://theconversation.com/small-towns-are-collapsing-across-south-africa-how-its-starting-to-affect-farming-162697> [Accessed 17 September 2021].
- Smith, R. 2020. Online interview, 17 November.
- Stoddard, E. 2021. Gwede Mantashe punts nuclear and Karoo shale gas in address to NUM, *Daily Maverick*, 26 October 2021. [Online]. <https://www.dailymaverick.co.za/article/2021-10-26-gwede-mantashe-punts-nuclear-and-karoo-shale-gas-in-address-to-num/> [Accessed 26 October 2021].
- Swilling, M. 2021. 'It's the green train now-and you're on the wrong platform, Gwede Mantashe'. *Daily Maverick*, 23 May 2021. <https://www.dailymaverick.co.za/article/2021-05-23-its-the-green-train-now-and-youre-on-the-wrong-platform-gwede-mantashe/> [Accessed 21 June 2021].
- Todd, S. W., Hoffman, M. T., Henschel, J. R., Cardoso, A. W., Brooks, M. & Underhill, L. G. 2016. The potential impacts of fracking on biodiversity of the Karoo Basin, South Africa. In: J. Glazewski. & S. Esterhuysen (eds). *Hydraulic Fracturing in the Karoo: Critical Legal and Environmental Perspectives*. Claremont: Juta and Company Ltd. [Online]. https://juta.co.za/catalogue/hydraulic-fracturing-in-the-karoo-critical-legal-and-environmental-perspectives_24470 [Accessed 12 December 2020].

- United Nations Development Programme (UNDP). 2014. *Environmental Justice – Comparative Experiences in Legal Empowerment*. United Nations Development Programme. [Online]. https://www.undp.org/content/undp/en/home/librarypage/democratic-governance/access_to_justiceandruleoflaw/environmental-justice---comparative-experiences.html [Accessed 4 September 2020].
- United Nations Environment Programme (UNEP) and Climate and Clean Air Coalition (CCAC). 2021. *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions*. Nairobi: United Nations Environment Programme. [Online]. <https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions> [Accessed 23 January 2022].
- United States (US) Energy Information Administration. 2013. *Shale Oil and Shale Gas Resources are Globally Abundant*. US Energy Information Administration, 10 June 2013. [Online]. <https://www.eia.gov/todayinenergy/detail.php?id=11611> [Accessed 10 May 2020].
- Van Der Walt, L. 2019. Personal interview, 9 September. Beaufort West.
- Van Wyk, J. 2014. Fracking in the Karoo: approvals required? *Stellenbosch Law Review*, 25(1):3454. <https://hdl.handle.net/10520/EJC154364>.
- Vegter, I. 2012. *Extreme environment: how environmental exaggeration harms emerging economies*. Cape Town: Zebra Press. [Online]. <https://rebrand.ly/d75d1c> [Accessed 19 May 2020].
- Wait, R. & Rossouw, R. 2014. A comparative assessment of the economic benefits from shale gas extraction in the Karoo, South Africa. *Southern African Business Review*, (18)2:1–34. <http://dx.doi.org/10.25159/1998-8125/5651>.
- Walker, C., Milton, S. J., O'Connor, T. G., Maguire, J. M. & Dean, W. R. J. 2018. Drivers and trajectories of social and ecological change in the Karoo, South Africa. *African Journal of Range & Forage Sciences*, 35 (3&4):157–177. <http://dx.doi.org/10.2989/10220119.2018.1518263>.
- Walker, C. & Chinigò, D. 2018. Disassembling the Square Kilometre Array: astronomy and development in South Africa. *Third World Quarterly*, 39(10):1979–1997. DOI: 10.1080/01436597.2018.1447374.
- Walker, C. 2022. Out of bounds: Environmental Justice and the Square Kilometre Array Radio Telescope in South Africa's Northern Cape Karoo. In: G. Wynn, J. Carruthers & N. Jacobs (eds). *Environment, Power, Justice: Southern African Histories*. Athens, OH: Ohio University Press.

Chapter 12

Change and continuity in the Karoo: Concluding reflections

Cherryl Walker and M. Timm Hoffman

In this closing chapter we reflect on the five cross-cutting themes identified in the Introduction as emerging from the research presented in the preceding chapters. These themes are: 1) the Karoo as a reconfigured resource frontier, evidenced by the significant land-use changes underway across the region; 2) linked to this, the changing nature of farming in the Karoo; 3) the Karoo's isolated and struggling small towns (its *dorps*) as significant but neglected sites of social reproduction; 4) the imperative of conserving the region's vulnerable natural resource base, including its unique biodiversity, and 5) the power relations embedded in this confluence of issues, shaping not only relationships among humans but also human relationships with other species and the environment. We conclude with brief reflections on what this set of issues means for social and ecological sustainability in the Karoo and the value of inter-disciplinary research in identifying pathways towards this goal.

The Karoo as a reconfigured resource frontier

Nigel Penn (2005) has memorably described the Karoo as a “forgotten frontier” in the history of colonisation in South Africa. What the preceding chapters make clear is the extent to which these drylands are a frontier zone once again – this time not forgotten, but increasingly prominent as a reconfigured resource frontier within an already constituted nation-state (one that is facing a daunting range of social and environmental challenges). Today, powerful state and corporate interests are showing unprecedented interest in extracting as much value as possible from the Karoo's natural resource base, encompassing not only its mineral riches as before, but now also its renewable and non-renewable energy resources, its clear skies, its sparsely populated rangelands and unique bio-diversity (especially in the Succulent Karoo biome, where increasing levels of biopiracy are threatening to reverse the conservation gains made in recent decades).

Throughout the twentieth century by far the most extensive land use in the Karoo was that of commercial sheep and wool production on private, white-owned farms, with pockets of small-scale livestock farming persisting in the former 'coloured' reserves of Namaqualand. While livestock farming still prevails over much of the region, the nature of production and long-established tenure relations are shifting. Today the pre-eminence of commercial farming is being challenged by the new land uses proliferating across the region. (For a graphic representation of this, see Figure 1.1 on page 2.) Increasingly, wind and solar farms, which were entirely absent only a few decades ago, dominate selected Karoo landscapes, with solar farms especially prevalent in the north, and wind farms concentrated along the escarpment and in the south. The globally networked Square Kilometre Array (SKA) radio telescope, first mooted in South Africa little more than two decades ago, now has a very large terrestrial footprint in the Northern Cape Karoo, with the Astronomy Advantage Areas proclaimed around its core site in 2014 covering some 12 million hectares (fully 10% of South Africa) (Walker, 2022). The conservation sector, which was absent from the Succulent Karoo in the 1980s, currently covers nearly 8% of this biome (Hoffman & Gillson, Chapter Eight). In the Nama Karoo biome, the more limited protected area network has recently grown by some 135 000 hectares, thanks to the proclamation of the Meerkat National Park around the SKA core site.

Mining, a land use with a long history of extreme social and environmental damage in the Karoo (Marcatelli, Chapter Three; Hoffman & Gillson, Chapter Eight; Xaba, Chapter Eleven), is also set to expand as the significant mineral wealth of the region continues to be exploited in the name of economic growth, job creation and, in the case of the Karoo's rare earth deposits, technological advances. A mining developer interviewed in 2021 described the Northern Cape as "being rich in the new-era metals such as rare earths and lithium, with the entire geology of the area opening up dramatic new understanding in the last three years" and "technology ... creating major new opportunities" (Creamer, 2021). As shown in Figure 12.1 below, the impact of mining on the landscape has been particularly severe in Namaqualand and the Upper Karoo, especially along the Namaqualand coast and Gariiep River where the diamond-rich, alluvial sediments have been mined for more than a century.

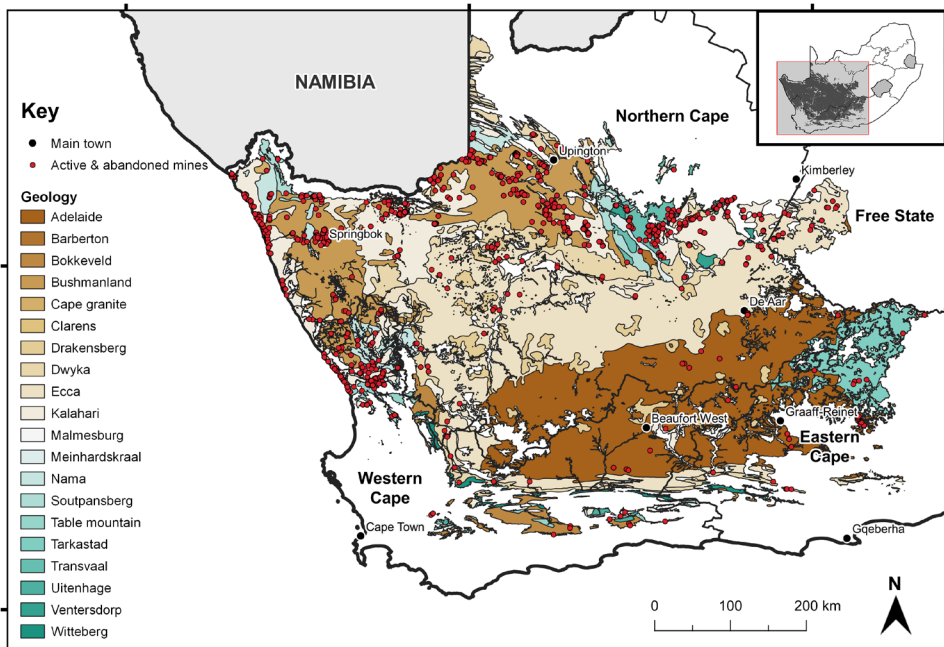


Figure 12.1 Active and abandoned mines in the Karoo, as of 2012

While non-renewable energy in the form of shale-gas mining ('fracking') has not, at the time of writing, been given the necessary regulatory go-ahead to proceed, the state has awarded prospecting rights over large swathes of farmland in the central and eastern Karoo, while signalling strong support for shale gas as part of the country's future energy mix (Xaba, Chapter Eleven). Despite strong opposition from farmers and ecologists, fracking appears poised to become a major extractive industry in the Karoo, with significant threats to its water resources, general environmental health (Todd et al., 2016) and land-based livelihoods.

Chinigò and Walker (2018:1984) have argued that the history, geography, and current economic and political marginalisation of the Karoo have combined to "reinforce external views of it as an empty space, ripe for development in the global and national interest." Here it is important to recall that despite lay perceptions of the region as uniformly dry and botanically homogeneous, the Karoo encompasses a range of climatic sub-zones, substrates, habitats, and vegetation types. The specific distribution of resources across the region, whether certain kinds of minerals (diamonds, copper, iron ore, asbestos, manganese, etc.), shale-gas deposits, wind and solar power, rainfall or highly sought-after plant and animal species, is significant in determining where within the region major land-use changes are likely to be

located. However, the actual siting and implementation of the new developments, as well as the nature and extent of their impacts, both social and environmental, are shaped by history, politics, and economic considerations that operate across different spatial and temporal scales. Here the examples of asbestos mining (Marcatelli, Chapter Three), the establishment of the SKA (Terblanche, Chapter Seven), renewable energy (Malope, Chapter Nine; Borchardt, Chapter Ten) and shale-gas mining (Xaba, Chapter Eleven) are all instructive.

The renewed interest in exploiting the region's natural resource base is fuelling contestations over land and authority. It is also fuelling debates around what sustainability means in this context, the scale at which impacts should be measured, and where the power to determine the answers to these questions lie. What the preceding chapters make clear is that in this mix the interests of most people for whom the Karoo is home are being subsumed within economic and political agendas that are being set outside the region. These findings give weight to our depiction of the contemporary Karoo as a resource frontier.

The concept of the frontier has an important, if disputed place, in historical and development studies. In the history of colonisation, it has been used to describe the geographical, political, and social dimensions of change, as territories and the people and resources within them are exposed to external social forces intent on bringing the land under new regimes of production, authority, and ownership. The precise dynamics that are involved are complex and vary over space and time (Kroger & Nygren, 2020; Swanson, 2019; on the Northern Cape see, *inter alia*, Penn, 2005; Legassick, 2016). Building on this general account of frontiers, a resource frontier can be understood as a territory in which selected resources are 'up for grabs' as new social forces move in to exploit them and in the process disrupt and displace prior arrangements. The extensive literature on resource frontiers in development studies shows how the resulting struggles are likely to lead to a fundamental reordering of authority over the resources in question, along with the enforcement of new rules about property regimes, governance and resource management, and the imposition of often uncompromising restrictions on how and by whom the land or resources can be used (Thaler et al., 2019). As development interventions expand across the resource frontier, territorial boundaries may be redrawn, long-standing social and property arrangements dissolved or significantly undermined, and new ones imposed in their place (Rasmussen & Lund, 2018). While resource extraction can promote aggregated economic growth and potentially reduce local poverty if its benefits are widely distributed, it regularly leads to environmental degradation and higher levels of poverty (Barbier, 2012; Melstrom et al., 2016). Unless the developments are consciously integrated with the regional economy, their destabilising social impacts addressed and natural resources carefully managed, local people are vulnerable to further marginalisation in what Barbier (2016) has described as geographical poverty traps.

While the concept of resource frontier has been applied to struggles over mineral resources in other parts of South Africa (Mnwana & Bowman, 2021; Huizenga, 2022), outside of the research presented in this collection little attention has been paid to the Karoo in this regard.¹⁰³ However, the concept provides a useful lens through which to analyse the land-use changes underway in this region and the social dynamics they have unleashed. It foregrounds the extent to which these developments are favouring external interests, while destabilising local institutions and relationships to place, and directs attention to the unequal power relations in the ways in which claims to natural resources are unfolding. The concept also encourages more critical reflections on how the changes underway in the Karoo compare with broader processes of resource extractivism in other parts of South Africa and globally. In this regard, what complicates the analysis of extractivism in the Karoo is that here not all the new land uses are directly about the accumulation of capital and externalisation of profits. In the case of astronomy, the investments in both the SKA and the optical observatory outside Sutherland have been supported by the state in the interests of advancing a national science agenda. The rollout of renewable energy projects, while driven by international corporations, is also seen as essential for South Africa's energy transition away from coal-fired electricity and hence in the public interest, nationally as well as globally. Yet the power imbalances in the ways in which these seemingly non-exploitative developments are unfolding are very similar to those more commonly attributed to conventionally extractivist industries, such as mining.

As with the frontier zones of the colonial expansions of the past, resource frontiers are frequently sites of localised conflict and resistance (Barney, 2009), as the chapters by Marcatelli (Chapter Three), Terblanche (Chapter Seven), Malope (Chapter Nine) and Xaba (Chapter Eleven) attest. At the same time, frontiers can also function as spaces of exchange and assimilation, in which hybridised forms of economic and social relations may materialise, new cultural forms take root, local power brokers emerge, and new livelihood opportunities become available. These processes were at work in the Karoo historically, as touched upon by Walker and Vorster (Chapter Four) and Cupido et al. (Chapter Five). In the present conjuncture, it is clear that some local actors are indeed benefitting from their association with the external investors and political players driving the land-use changes, as noted in particular by Malope (Chapter Nine) with regard to renewable energy, and Xaba (Chapter Eleven) in the case of shale-gas mining. Some of the community development initiatives associated with especially the renewable energy and conservation sectors also show potential for contributing positively to improving

103 The more general concept of frontier has been deployed in relation to developments in the energy and conservation sectors in South Africa (Sovacool et al., 2017). In addition, Chinigò and Walker (forthcoming) have applied ideas around frontiers as contested spaces in working with the concept of knowledge frontiers to explore the positioning of the SKA as pushing the frontiers of knowledge in South Africa and Africa more generally.

livelihood opportunities and social wellbeing, but achieving this will require a more empowered local citizenry, an issue we return to briefly in our discussion of power and more sustainable futures below.

Overall, however, a common concern across the chapters addressing land-use change is that contemporary investments in the Karoo are failing to address local development needs in a systematically inclusive and sustainable manner, despite the significant injection of capital (mainly in selected infrastructure) that accompanies the land-use changes in and around project sites. This is consistent with global concerns around extractivism and the further marginalisation of vulnerable groups in resource frontiers. Unless these concerns are addressed, the land-use developments currently underway in the Karoo can be expected to perpetuate the history of surplus populations that Marcatelli lays out with specific regard to the Prieska region in Chapter Three – a sobering example of how change and continuity are entwined with each other in the region.

The changing nature of farming in the Karoo

Notwithstanding the significant land-use changes described above, livestock farming can be expected to continue to be the major land use in the Karoo into the foreseeable future, certainly when measured in terms of its spatial extent (Walker et al., 2018). However, as the preceding discussion makes clear, farming in the Karoo is undergoing significant changes as a result of a combination of forces, some internal to the sector but many external. Understanding the dynamics at work is thus important for identifying interventions that could help restructure this sector in the interests of not only a more equitable but also a more sustainable utilisation of the rangeland. The calculus around these issues is complex, as the following brief review reflects, with more cross-disciplinary research needed to integrate the issues.

Appreciating the semi-arid nature of the Karoo is fundamental to understanding the history of farming in the region. While technology in the form of dams, windmills and pumps has made irrigated crop production possible in selected sites (notably along the Gariiep River), the water resources of the region have always been severely limited, dictating livelihood and settlement patterns. Extensive livestock farming on natural rangeland has thus been the predominant form of farming in these drylands over aeons. Before the colonial period hunter-gatherer and pastoralist societies utilised the Karoo in very low numbers, their highly mobile grazing and hunting practices leaving little discernible impacts on the landscape into the present. In contrast, the far more intensive grazing introduced on market-oriented farms from the late nineteenth century impacted significantly, not only on the environmental health of the rangeland, but also on social relationships as land

was privatised along racial lines. Since the mid-nineteenth century, commercial farms have been almost exclusively white-owned although Marcatelli (Chapter Three) and Walker and Vorster (Chapter Four) point to the under-acknowledged presence of black pastoralists (Baster and Xhosa) with colonial land rights in the Upper Karoo. Yet it is important to recognise that white landowners' hegemony over the land has undergone changes. The number of commercial farmers in the Karoo reached a peak in the mid-twentieth century and has contracted significantly over the last 30 years. Average farm sizes have responded accordingly, first becoming smaller to accommodate the growth in the number of farmers and their progeny but more recently increasing in size as fewer, better-resourced producers have consolidated their farming operations into larger and larger farming units.

In this context the communal areas that have survived in the Namaqualand region of the Succulent Karoo can be considered outliers with some valuable lessons to impart. As described by Cupido et al. (Chapter Five), some communal farmers possess relatively large herds of sheep and goats and are commercially oriented, but most have small herds of 50 animals or less. These farmers practise livestock farming as part of a mixed livelihoods strategy that relies on several income streams, including government grants, remittances, and part-time employment. Their farming practices also reflect an amalgam of knowledge systems that Cupido et al. characterise as agrisyncretic, in which elements of indigenous and scientific knowledge systems mingle with "idiosyncratic" practices. Cupido et al. argue that herding offers more environmentally friendly and climate-adaptive ways of managing livestock than the fenced camp systems currently prevailing on commercial farms, a position that a small number of commercial farmers and some ecologists endorse (Gildenhuis, 2020). Other generally neglected categories of black part-time farmers in the Karoo are townspeople who keep small numbers of livestock on the side – backyard farmers (Manyani, Chapter Six) – as well as the small-scale farmers who, since 1994, have gained formal or informal rights to the large commonages historically attached to most Karoo towns (discussed further below).

Agricultural census records for the Karoo reflect a significant decline in the number of sheep, goats, cattle, and equines (horses, mules, donkeys) from 1911 to 2007 (Hoffman et al., 2018). Data suggests that animal numbers peaked in the 1930s, when over 11 million sheep were recorded across both biomes. By 2007 this number had declined by more than 60%, to just over four million animals. The data from agricultural censuses also show a marked decline in the area under wheat and lucerne cultivation in both the Nama and Succulent Karoo biomes, from a peak in the mid-1970s when state subsidies supported the ploughing of marginal lands. Karoo farmers have not been subsidised by the state to grow wheat and lucerne for decades and the area under crop production has declined significantly,

except where permanent water has enabled the expansion of centre pivot irrigation schemes (noted by Marcatelli along the Gariep River (Chapter Three)). The marked absence of state support for large-scale agriculture in the post-apartheid era has forced commercial farmers to rely increasingly on their own associations and commodity-based organisations.

More difficult to gauge from official records is the number of Karoo farmers who have switched from livestock to wildlife or game farming, the latter encompassing a range of activities including meat production, ecotourism, and hunting. In the Karoo, game farming appears to be more commonly practised in the Nama Karoo biome, but spatially explicit statistics are difficult to access. Manyani (Chapter Six) found that just under a fifth of the farmers that she sampled in the Ubuntu Local Municipality were game farmers but notes that they should more accurately be described as mixed farmers, inasmuch as they were generally farming with both wildlife and sheep. While game farming was widely seen by her informants as more profitable, if one had the necessary capital to invest, many farmers remained committed to sheep farming for a mix of reasons that included habit and sentiment. Manyani also found that although concerns around the 'greenwashing' associated with wildlife farming have merit,¹⁰⁴ many game farmers are concerned with the environmental health of their land. Furthermore, there are potential synergies between game farming and the tourism and hospitality sectors in small towns that could give the latter a boost. While the shift to game farming has led to farm workers losing not only their jobs but also their homes, Manyani notes it has created some new on-farm job opportunities in the service sector, which have disproportionately benefitted women who were previously less likely to find paid work.

Much less evident in the commercial farming sector is a concern with the social justice dimensions of sustainable agriculture. Both Manyani (Chapter Six) and Terblanche (Chapter Seven) describe the persistence of deeply racialised social hierarchies on farms in the districts they have studied. In this regard the post-apartheid state's land reform programme is a harbinger of change, the full dimensions of which need ongoing research at different scales. Nationally, the reduction in the number of commercial farmers and the dismantling of apartheid since 1994 has seen a decline in the political power of private white landowners as a class. The debate on expropriation without compensation, which dominated the political-policy debate on land reform between 2017 and 2022 (Zenker & Walker, 2024) has unsettled commercial farmers, including in the Karoo where many farming families regard themselves as having deep roots in the land (Manyani, Chapter Six; Terblanche, Chapter Seven). However, while tensions around land reform

104 Greenwashing has been defined as "the intersection of ... poor environmental performance and positive communication about environmental performance" in corporate behaviour (Delmas & Burbano, 2011, in De Freitas Netto et. al, 2020); the debates on this phenomenon in game farming in South Africa are reviewed by Manyani, Chapter Six.

policies are evident, the impact of this programme of government on actual farming practice appears more muted. The relative economic power of local landowners has not been substantially diminished and there are also signs of adaptation among some commercial farmers, which may boost their resilience in the face of change (Manyani, Chapter Six). At the same time, the number of white farming families on the land continues to decline. As the racial composition of commercial agriculture slowly shifts to being more representative of the wider population, this can be expected to introduce new dynamics into the debate on land reform and the contribution of commercial farming to the regional economy.

Official land reform figures for the Karoo are hard to come by and not necessarily reliable, but it is estimated that as of 2018 approximately 2.2 million hectares had been redistributed from white landowners to black beneficiaries in the Northern Cape, a third of this through the state's municipal commonage programme (Walker, 2024). The latter was a particularly significant focus of redistributive land reform in the Northern Cape in the early 2000s (Atkinson & Ingle, 2018). Commonage lands around small towns in the Karoo have been made available to both small-scale and emerging farmers, although the take-up has generally been low and the livelihood benefits uneven, as the chapters by Walker and Vorster (Chapter Four), Manyani (Chapter Six) and Malope (Chapter Nine) have shown. The purchase of white-owned farms adjacent to some of Namaqualand's communal areas has also transferred thousands of hectares into state ownership, for use by small-scale farmers in the region's former 'coloured' reserves (May & Lahiff, 2007). While this has benefitted the farmers concerned, as well as offered some redress for past injustices, its redistributive reach has been more limited. The Karoo Regional Spatial Development Framework has expressed concern that the redistribution of semi-arid rangeland, far from markets and urban service centres, to black farmers who lack capital and strong extension support, is unlikely to benefit the recipients or enhance the regional economy (DALRRD, 2022:140). There are also environmental limits to the number of farmers who can make a sustainable living off farming in the Karoo (Walker, 2024).

The Extension of Security of Tenure Act (Act 62 of 1997), which forms part of the government's land reform initiatives, was meant to protect the rights of all farm dwellers and prevent unlawful evictions from farms. However, tenure insecurity has persisted, with farm workers and their families continuing to be displaced from farms, a trend that the amalgamation of farms into larger farming units is exacerbating (Phuhlisani NPC, 2017; Manyani, Chapter Six; Terblanche, Chapter Seven). This has led to the growth of informal settlements around especially some larger towns in the Karoo, as displaced farm-worker households, with few skills to facilitate their entry into alternative livelihoods, have been legally or illegally evicted or have moved by themselves to town.

The changing nature of farming has had important consequences for social-ecological dynamics in the Karoo. The decline in livestock numbers and greater conservation awareness among many farmers means that, overall, the Karoo has greater cover and better quality of vegetation today than it had in the first half of the twentieth century (Hoffman et al., 2019). The spread of alien vegetation, especially the expansion of *Prosopis spp.*, and the recent severe drought offer counter evidence to this general conclusion (Conradie et al., 2022; Archer et al., 2022), but the overall trend has been towards an improvement in the ecological health of the Karoo (Hoffman & Gillson, Chapter Eight). This achievement needs to be defended against the threats from the poorly regulated extractivist land uses described in the previous section, and taken into account in evaluating the challenges to biodiversity conservation discussed below. However, the decline in family farms and rise in 'weekend' farmers has greatly weakened the synergistic relationship between commercial agriculture and the economic and social wellbeing of the region's small towns. Increasingly, lifestyle farmers and large commercial enterprises by-pass these towns in favour of larger regional centres when making significant purchases, while the investment of the farming community in local schools and other social institutions has declined dramatically as well. This has had serious consequences for the small towns where most Karoo residents live. Finding ways to reinvigorate farm-small town linkages in the Karoo is thus an important challenge for researchers and policymakers alike.

Small towns as significant sites of social reproduction

This leads to our third major theme: the Karoo's small towns as important but under-resourced sites of social reproduction that, as already noted, are failing to benefit in significant ways from the land-use changes taking place around them. Here we use the term 'social reproduction' broadly, to encompass not only the reproduction of the labour force and relations of production but also the reproduction of social relationships and daily life across the institutions that contribute to the social fabric of these towns. Important here are households, families and neighbourhood networks, as well as local schools and religious, political and other civic organisations and associations.

As noted by Walker and Vorster (Chapter Four), despite the strong rural connotations attached to the Karoo in the public imagination, its residents have been predominantly urban in terms of location and outlook since the 1970s. The social and economic importance of Karoo small towns features prominently in Chapters Four (Walker & Vorster), Nine (Malope) and Ten (Borchardt). The dorpscaapes they describe are distinctive urban spaces within the South African landscape: small, isolated, typically formally planned, with a rich tradition of vernacular architecture and surrounded by extensive commonages that could support a variety of economic

activities, from small-scale farming to the generation of renewable energy. However, today this asset base is generally rundown and poorly maintained, reflecting both weak local economies and weak local government (Borchardt, Chapter Ten; Xaba, Chapter Eleven). The great distances between towns also mean that local municipalities in the Karoo are spatially very large, which adds to their governance problems. Decision-making by influential politicians and bureaucrats is generally far removed from ordinary people who have very limited opportunities for feeding their views and aspirations directly into the public domain, as was starkly demonstrated during the state's Strategic Environmental Assessment around shale-gas mining in 2016 (Xaba, Chapter Eleven).

The household surveys reported on by Walker and Vorster (Chapter Four) reveal the extent of the poverty and unemployment that is blighting daily life in the Karoo's small towns. In this context, social grants and state-subsidised services, including the rollout of RDP housing, are making a critically important contribution to the basic survival of many households – a contribution that, arguably, binds these households more tightly to these isolated settlements. While circular migration to larger centres in search of jobs and better prospects has been a feature of Karoo towns for decades, there are complex push-pull factors in the current conjuncture that need further investigation. The household surveys have found some evidence that established patterns of migration may be shifting, with fewer young adults in their 20s migrating in search of work in larger centres than in the past. In part this fall-off in out-migration could signal increased pessimism in this cohort about their job prospects elsewhere. However, in the case of Loeriesfontein, shifts in the population profile since 2011 can also be linked to former migrants returning home in the hope of finding work through the wind farm developments near the town (Walker & Vorster, Chapter Four; Malope, Chapter Nine). Given the extent of the land-use changes in the Karoo, as well as the evidence presented in this volume that current investments in astronomy, renewable energy and mining are not leading to a surge in work opportunities in their host towns, this is an important issue to probe further.

The pervasive disjuncture between local hopes, if not expectations, of jobs and 'development' on the one hand, and the corporate, national and global priorities driving the new land uses on the other, is consistent with the earlier discussion of resource frontiers. So is the evidence that some benefits are flowing to local elites through both established and new patronage networks linking them to these developments. In part, the disjuncture is a function of the economic marginalisation of the area, for which the new investors cannot be held directly responsible. Malope's discussion (Chapter Nine) of renewable energy and 'decent work' in Loeriesfontein brings out the significant mismatch between the education levels and skill profiles of the local labour force and the personnel requirements of the

renewable energy projects in the area, once the short-lived construction phase has passed. However, the disjuncture is exacerbated by the lack of commitment to meaningful consultation and long-term investment in community development that the research is revealing in the new land users' local development commitments and corporate social responsibility plans. In addition to shortcomings with regard to public participation in the identification of projects, Borchardt's discussion of energy poverty in De Aar (Chapter Ten) draws attention to the lack of alignment between the community development projects initiated by Independent Power Providers in terms of national policy requirements and the Integrated Development Plan of the local municipality, which is meant to guide investment planning and project prioritisation.

The Karoo Regional Spatial Development Framework proposes an approach to regional planning that builds on the region's larger towns as "regional development anchors" and key "regional service centres", while identifying specific niches that the "other [very] small towns" can occupy, for instance as tourism destinations (DALRRD, 2022). These are sound proposals on paper, but, given the weak and fractious nature of local government, as well as the political marginalisation of the region nationally, implementation of this Framework can be expected to be a significant challenge. Critically important here will be to find mechanisms that can strengthen local participation in the decision-making needed to take this agenda forward.

As described inter alia by Marcatelli (Chapter Three), Walker and Vorster (Chapter Four) and Borchardt (Chapter Ten), contemporary Karoo towns are scarred by the divisions of the past, notably the enforced segregation and racialised hierarchies of the apartheid era, which still shape the ways in which physical and social spaces are organised. This helps account for the social challenges undermining wellbeing and weighing down social services in these towns, perhaps most perniciously the disturbingly high levels of alcohol and substance abuse noted in Chapter Four. Yet despite their many social problems, these "small enclaves" have valuable attributes that residents appreciate, on which locally grounded development initiatives could build. Karoo *dorps* are important in terms of the social networks and informal support structures they provide family and community members and the social identities and cultural institutions they sustain. Many residents value the unique sense of place the Karoo environment bestows on their hometowns. They also value their intimate scale and hospitality, along with their relative safety compared to big cities such as Cape Town. The fractured but nevertheless rich cultural heritage of these settlements, discussed most directly by Cupido et al. in Chapter Five but touched upon in other chapters, is another resource that not only deserves wider recognition but could be reinvigorated and repurposed by its heirs.

The critical importance of conserving biodiversity

The reconfiguration of the Karoo as a resource frontier makes the conservation of its natural resource base an issue of regional and national concern. Understanding the role of climate change, land degradation and the impact of inappropriate land-use practices on biodiversity is widely recognised as crucial for the development of sustainable land-use options. Increasingly, biodiversity is also being recognised for its intrinsic value, its conservation seen as a moral and not only instrumentalist good (Batavia & Nelson, 2017). Yet while the loss of biodiversity is recognised as an issue of global importance (United Nations Environment Programme, 2022), translating this recognition into effective measures in marginalised and isolated regions like the Karoo is a major challenge. As the previous discussion makes clear, this is not simply a technical or regulatory task.

One of the main ways the conservation of biodiversity has been addressed has been through the development of a protected area network incorporating national parks and nature reserves. Much of the ecological damage to Karoo environments was done in the late nineteenth and early twentieth centuries. The search for diamonds along Namaqualand's west coast, the extraction of asbestos around Prieska, the extensive cultivation of marginal lands, and the overgrazing of Karoo rangelands all contributed to high levels of degradation that are still evident in some parts of the region today (Milton & Dean, 2021). In response to these early impacts South Africa developed a raft of excellent legislation aimed at protecting the environment from the worst excesses of unsustainable development. The introduction of systematic conservation planning tools and new environmental legislation in South Africa since 1994 (Paterson, 2009) has resulted in a significant increase in the area under formal and informal conservation protection (Statistics South Africa (StatsSA), 2021). Appreciation of the Karoo's unique environmental and cultural heritage and the importance of preserving it for future generations is growing. Tensions remain, however, between those who wish to exploit the natural resources of the region through extractivist practices, with minimal attention to its environmental costs, and those who promote less intrusive approaches to economic development, such as conservation, tourism and sustainable livestock production. In recent years, the ruthless plundering of unique botanical specimens in the Succulent Karoo has opened a new frontline in the battle to protect biodiversity.

Hoffman and Gillson (Chapter Eight) provide an overview of the history of biodiversity conservation in the Karoo. Significant financial input from the international community, the state and private trusts such as the Leslie Hill Succulent Karoo Trust has resulted in an exponential increase in the area under formal protection in the Succulent Karoo biome since the 1980s. In the far-less speciose Nama Karoo biome, several important large mammal species such as mountain zebra and black rhinoceros have formed the focus for protection efforts,

while the expansion of ecotourism and wildlife farming has added significantly to the conservation estate. Although the initial emphasis in growing the protected area network was on national parks and nature reserves, additional approaches have been promoted in the last 20 years, including the establishment of several 'mega reserves', which take the form of World Heritage Sites, Biosphere Reserves and Protected Environments. In the Richtersveld contractual park, local farmers are now allowed to graze their herds in this protected area (Hempson et al., 2015). In the Gouritz Cluster Biosphere Reserve, the model that is being promoted incorporates different levels of conservation, with core protected zones bordered by areas where sustainable farming can take place (Pool-Stanvliet & Coetzer, 2020). Private landowners are becoming increasingly aware of the importance of looking after the natural resources on their farms (Manyani, Chapter Six) and a series of stewardship arrangements has contributed significantly to the expansion of the protected area network in the Karoo.

These gains constitute a major success story for the conservation of the biodiversity of the Karoo, which deserves recognition. However, there are limits to the protected area strategy. Not all analysts agree that exclusive conservation areas are an appropriate land-use option (Kepe et al., 2005; Kopnina, 2016; Büscher & Fletcher, 2019; Büscher et al., 2022), particularly in a region where poverty and deep-seated inequities around landownership are so entrenched. Issues around environmental justice have been highlighted by Benjaminsen et al. (2008) for the Namaqualand region with regard to the exclusion of people from their historic lands and the sealing off of protected areas against other forms of land use. Livestock losses from the depredations of jackals and caracal (Natrass & Conradie, 2015) are also a source of conflict between conservationists and neighbouring landowners, as described by Terblanche (Chapter Seven) with regard to the commercial farmers bordering the Meerkat National Park around the SKA core site. Across Africa critics have condemned protected areas as catering primarily to global or national elites at the expense of local people and their needs (Brockington et al., 2008). There are calls from some quarters to abandon this model of conservation altogether, in favour of strategies which involve the co-utilisation and/or co-management of natural resources by surrounding communities (Büscher & Fletcher, 2019; Rudd et al., 2021).

In response, conservationists argue (from an ecocentric rather than an anthropocentric perspective (Kopnina et al., 2018)), that without formally protected areas in the Karoo, large-scale losses in biodiversity will follow as a result of habitat loss from expanded agriculture, mining and hunting, and the illegal trade in plants and animals (Cowling et al., 2001). The consequences of this loss go far beyond the disappearance of individual, iconic species, and the absence of recreational

spaces for middle-class publics: they undermine the foundations of the ecosystems on which human life depends. Conservationists and the state's environmental agencies therefore still view the protected area model of biodiversity conservation as having an essential place in the spectrum of options for the long-term protection of habitats and species (DEA, 2016). However, finding models of conservation that both sustain biodiversity and benefit local people in meaningful ways remains an ongoing challenge for the conservation sector (Adams et al., 2004).

This is another important area for more inter-disciplinary research. New policy considerations around the sustainable use of biodiversity that give greater access to the natural resources of protected areas by surrounding communities could influence how conservation land is used in the future (DFFE, 2022). Both Cupido et al. (Chapter Five) and Terblanche (Chapter Seven) also confirm the importance of working with local knowledge in protecting natural resources, whether inside or outside protected areas. At the same time, the conservation of natural resources has to be recognised as a basic principle of land use, not a sectoral concern of environmentalists in selected sites. This must also mean that all land users need to be held accountable for how they utilise the land over which they exercise stewardship responsibilities. This requires far more effective enforcement of South Africa's environmental management and water legislation. It also requires meaningful mitigation of the historical and future impacts of mining on the environment (Hoffman & Gillson, Chapter Eight), an undertaking that remains woefully inadequate throughout the Karoo.

Power relations

Clearly threaded through all four themes discussed above is the issue of power – most immediately, the unequal power relations embedded in the forces implicated in both change and continuity in the Karoo. The observation that human relations are power-laden is such a commonplace as to be almost banal, but if social and ecological sustainability is the goal, then the specificity of how power functions in different contexts needs unpacking – its nature, scale and history. This could be a chapter in itself; in what follows, three key points are reprised.

The first is that central to the history of the Karoo since colonial times has been the assertion of power over not only local people but also the environment, by external forces with technology on their side. Initially this involved armed European pastoralists, with the might of imperial Britain backing (but also regulating) their incursions. Today it involves a more diverse set of national and global actors who are investing in both extractivist and 'green' land uses. In this reconfigured resource frontier, the legacy of dispossession and racial inequality that the colonial period

has bequeathed continues to reverberate through day-to-day encounters and policy debates. However, there are important changes underway in the social identity of who exercises power nationally and locally and how, and these changes need to be unpacked further as well. In this regard more research is needed on emerging class dynamics In the Karoo, as the social and economic power of white landowners is constrained, and a small cohort of black professionals and politicians claim the levers of power in local government.

What this means for ordinary people has featured prominently in preceding chapters and is an issue crying out for further research and debate. Marcatelli (Chapter Three) traces the narrative of change and continuity in the Prieska region where the subjugated black majority was economically useful but politically excluded before 1994, but has since found themselves politically useful as voters but economically superfluous. However, the transition to democracy in 1994 has meant that ordinary residents have some leverage, particularly with regard to the national state, as seen in the significant rollout of social grants (Walker & Vorster, Chapter Four) and free basic services such as electricity (Borchardt, Chapter Ten), as well as in the Economic Development Scorecard against which the state assesses the bids of independent power producers in the renewable energy sector (Malope, Chapter Nine). While the available evidence points to the continued marginalisation of most Karoo residents, the advent of formal democracy raises an important question, one which we can only pose here: how can people's political citizenship be better leveraged to advance further claims on what Ferguson (2015) has described as people's "rightful share", i.e., their just share of the wealth that has been socially produced, including as a result of the history of dispossession and accumulation described in Chapters Three to Five (by Marcatelli, Walker & Vorster and Cupido et al. respectively).

This leads to the second important point that emerges from our thematic review above – the weakness of local institutions as vehicles through which Karoo residents have been able to give voice to their aspirations and influence the developments taking place in their backyards. In local government the local state is plagued by a general lack of capacity to execute its mandate and manage the powerful corporate interests driving local land-use change. Sporadic protests, such as those described by Malope in Loeriesfontein (Chapter Nine), show that currents of popular dissatisfaction with how projects are being implemented have the potential to burst into the open and disrupt and even redirect local outcomes from time to time. However, harnessing this energy to impact more decisively on decision-making powers in boardrooms and policy-political forums far from project sites is a much more difficult undertaking. Local non-governmental organisations are poorly resourced and social movements weak. The challenges of organising in a region as large and poorly served in terms of transport, communications and national media

coverage as the Karoo are immense. Here the linkages between local and national organisations opposed to shale-gas mining described by Xaba (Chapter Eleven) are of interest, as they show the value of building alliances beyond the region. This example also points to the potential of concern for safeguarding the Karoo environment (in particular, its threatened water resources) as a galvanising force.

These points draw attention to the social dimensions of power, which is what social scientists are most comfortable analysing, including the ways in which social and economic inequities are reproduced in the exploitation of natural resources. While these power relations are starkly visible in the Karoo, there is another significant axis of power running through the discussion of change and continuity that this volume is bringing to the fore, particularly in the chapters that focus explicitly on threats to the ecology of the Karoo (Hoffman & Gillson, Chapter Eight; Xaba, Chapter Eleven). This concerns the power of the biophysical environment in setting limits to human agency and rebounding on human endeavours, at times catastrophically, when certain environmental thresholds are breached. What researching land-use changes in a semi-arid region like the Karoo makes clear is the importance of understanding the power of the biophysical environment when one is analysing continuity and change – the ways in which water, weather, topography and plant and animal life have interacted to create certain conditions that influence (in non-linear ways) how social and economic relationships have unfolded over time. The biophysical environment continues to interact in extraordinarily complex ways with ‘the social’ in the present (as a vast literature on the subject of social-ecological systems aims to address). Climate change, the outcome of anthropogenic forces, is driving this point home. This is why the conservation of biodiversity and sustainable use of natural resources are more than sectoral concerns.

Towards social and ecological sustainability in the Karoo

The research presented in this volume confirms that the Karoo region is making an important contribution to national and global commitments around mitigating climate change, protecting biodiversity and advancing scientific knowledge. However, what this research also makes clear is that in these endeavours there are major shortcomings with regard to social and environmental justice for Karoo communities. Although the stated intention on the part of both state and corporate actors is that current development interventions should address the dual challenges of poverty eradication and environmental protection, it is clear that practice is falling far short of advancing these goals. This calls for both an analysis of why this should be the case – what are the different interests and power relations involved? – and the re-imagining of what more diverse, inclusive, and sustainable local economies

might look like, and how a revitalised set of policies and practical interventions can be taken forward. Working towards this requires, in turn, a deep understanding of the history, sociology and ecology of the Karoo, which is the terrain this volume has set out to traverse.

As noted in Chapter One, the introduction, this collection has not itself been designed to offer a coherent blueprint for regional development, nor a detailed set of policy recommendations for specific sectors and concerns. Rather, it explores the broad contours of change and continuity in the region and, through the individual chapters, identifies key issues of concern in selected sites, on selected topics. Through their critical analysis of developments over different scales of time and space, individual authors have identified a range of issues that need attention in negotiating social-ecological change and working towards long-term sustainability in the region. These include the need for closer integration between farming (at different scales) and small-town economies; much stronger investment in protecting the Karoo's biodiversity and water resources against poorly regulated extractivism; unlocking the as yet unrealised potential of renewable energy in revitalising small towns and addressing household energy poverty, as well as the importance of local people being active agents in shaping their development agendas, including through more effective local government, stronger civic institutions and respect for local knowledge. The five crosscutting themes reviewed in this concluding chapter derive from this research and lay out important dimensions of what needs to be addressed in working towards social and environmental sustainability in the Karoo.

Collectively this set of chapters opens up a research agenda in which expanded inter-disciplinary collaboration should continue to play an important part. The growing recognition of the importance of inter-disciplinarity that Hoffman and Petersen document in Chapter Two is leading to a re-evaluation of the disciplinary contributions of both the natural and the social and human sciences, as well as greater appreciation of the benefits of exchange, critique, and collaboration among these broad domains. The bibliometric analysis in Chapter Two shows where the strengths and weaknesses in the emerging field of Karoo Studies lie. Major gaps with regard to climate change, migration, extractivism, energy and alternative livelihood strategies need more concerted work. Hoffman and Petersen also point to the importance of supporting a new generation of scholars who can not only bring together the critical research skills and commitment to the region that this work requires, but will also be open to formulating new sets of questions in confronting the challenges of sustainability in coming decades. Our hope in putting this volume together as a contribution to these endeavours is that it will encourage more research and stimulate further inter-disciplinary collaboration in this compelling region called the Karoo.

References

- Adams, W.M., Aveling, R., Brockington, D., Dickson, B., Elliott, J., Hutton, J., Roe, D., Vira, B. & Wolmer, W. 2004. Biodiversity conservation and the eradication of poverty. *Science*, 306:1 146–1 149. <http://dx.doi.org/10.1126/science.1097920>.
- Archer, E., Du Toit, J., Engelbrecht C., Hoffman, M.T. 2022. The 2015–19 multi year drought in the Eastern Cape, South Africa: Its evolution and impacts on agriculture. *Journal of Arid Environments*, 196:104 630. <https://doi.org/10.1016/j.jaridenv.2021.104630>.
- Atkinson, D. & Ingle, M. 2018. By their own bootstraps: municipal commonage farmers as an emerging agrarian class in the Karoo. *African Journal of Range & Forage Science*, 35(3&4):233–244. <http://dx.doi.org/10.2989/10220119.2018.1514653>.
- Barbier, E.B. 2012. Scarcity, frontiers and development. *Geographical Journal*, 178:110–122. <http://dx.doi.org/10.1111/j.1475-4959.2012.00462.x>.
- Barbier, E.B. 2016. Is green growth relevant for poor economies? *Resource and Energy Economics*, 45:178–191. <https://doi.org/10.1016/j.reseneeco.2016.05.001>.
- Barney, K. 2009. Laos and the making of a 'relational' resource frontier. *Geographical Journal*, 175: 146–159. <http://dx.doi.org/10.1111/j.1475-4959.2009.00323.x>.
- Batavia, C. & Nelson, M.P. 2017. For goodness sake! What is intrinsic value and why should we care? *Biological Conservation*, 209:366–376. <https://doi.org/10.1016/j.biocon.2017.03.003>.
- Benjaminsen, T.A., Kepe, T. & Bråthen, S. 2008. Between global interests and local needs: conservation and land reform in Namaqualand, South Africa. *Africa*, 78:221–244. <https://doi.org/10.3366/E0001972008000144>.
- Brockington, D., Duffy, R. & Igoe, J. 2008. *Nature Unbound: Conservation, Capitalism, and the Future of Protected Areas*. London: Earthscan.
- Büscher, B. & Fletcher, R. 2019. Towards convivial conservation. *Conservation & Society*, 17(3):283–296. <https://www.jstor.org/stable/26677964>.
- Büscher, B., Koot, S. & Thakholi, L. 2022. Fossilized conservation, or the unsustainability of saving nature in South Africa. *Environment and Planning E: Nature and Space*, OnlineFirst. <https://journals.sagepub.com/doi/full/10.1177/25148486211062002>.
- Chinigò, D. & Walker, C. 2018. Disassembling the Square Kilometre Array: astronomy and development in South Africa. *Third World Quarterly*, 39(11):1979–1997. <https://doi.org/10.1080/03057070.2019.1642028>.
- Chinigò, D. & Walker, C. (forthcoming). Knowledge frontiers: Shaping African futures through the Square Kilometre Array. In: I. Praet & P. Pitrou (eds). *Social Sciences off Earth: An Introduction to Outer Space Studies*. Oxford: Oxford University Press.
- Conradie, W.S., Wolski, P. & Hewitson, B.C. 2022. Spatial heterogeneity of 2015–2017 drought intensity in South Africa's winter rainfall zone. *Advances in Statistical Climatology, Meteorology and Oceanography*, 8:63–81. <https://doi.org/10.5194/ascmo-8-63-2022>.
- Cowling, R.M., Pressey, R.L., Lombard, A.T., Desmet, P.G. & Ellis, A.G. 2001. From representation to persistence: requirements for a sustainable system of conservation areas in the species-rich Mediterranean-climate desert of southern Africa. *Diversity and Distributions*, 5(1–2):51–71. <https://doi.org/10.1046/j.1472-4642.1999.00038.x>.

- Creamer, M. 2021. 'Northern Cape 'elephant country' needs exploration boost, says explorer'. *Creamer Media's Engineering News*, 17 March 2021. [Online]. <https://www.engineeringnews.co.za/article/northern-cape-elephant-country-needs-exploration-boost-says-geologist-2021-03-17> [Accessed 11 January 2022].
- De Freitas Netto, S.V., Sobral, M.F.F., Ribeiro, A.R.B. *et al.* 2020. Concepts and forms of greenwashing: a systematic review. *Environmental Sciences Europe*, 32(1). <https://doi.org/10.1186/s12302-020-0300-3>.
- Department of Agriculture, Land Reform and Rural Development (DALRRD). 2022. *Karoo Regional Spatial Development Framework*. Department of Agriculture, Land Reform and Rural Development: Pretoria.
- Department of Environmental Affairs (DEA). 2016. National protected area expansion strategy for South Africa 2016. Pretoria: Department of Environmental Affairs. [Online]. <https://rebrand.ly/xdjmytr> [Accessed 1 February 2023].
- Department of Forestry, Fisheries and Environment (DFFE). 2022. Consultation on the draft White Paper on conservation and sustainable use of South Africa's biodiversity 2022. *Government Gazette*, 685(46687), Notice 2252 of 8 July 2022.
- Ferguson, J. 2015. *Give a Man a Fish*. Durham: Duke University Press. <https://doi.org/10.2307/j.ctv1198xwr>.
- Gildenhuis, A. 2020. Herding as a contribution to sustainable agriculture in the Karoo: an exploration of key debates. Sociology Honours research project. Stellenbosch: Department of Sociology and Social Anthropology, Stellenbosch University.
- Hempson, G.P., Illius, A.W., Hendricks, H.H., Bond, W.J. & Vetter, S. 2015. Herbivore population regulation and resource heterogeneity in a stochastic environment. *Ecology*, 96(8):2 170–2 180. <http://dx.doi.org/10.1890/14-1501.1>.
- Hoffman, M.T., Skown, A., Bell, W., & Mashele, S. 2018. Long-term changes in land use, land cover and vegetation in the Karoo drylands of South Africa: Implications for degradation monitoring. *African Journal of Range & Forage Science*, 35(3&4):209–222. <http://dx.doi.org/10.2989/10220119.2018.1516237>.
- Hoffman, M.T., Rohde, R.F. & Gillson, L. 2019. Rethinking catastrophe? Historical trajectories and modelled future vegetation change in southern Africa. *Anthropocene* 25:100 189. <http://doi.org/10/1016/j.ancene/2018.12.003>.
- Huizenga, D. 2022. Rival jurisdictions on a resource frontier: Law, territorialization, and inscription in the Eastern Cape, South Africa. *Geoforum*, 133:1–10. <https://doi.org/10.1016/j.geoforum.2022.04.010>.
- Kepe, T., Wynberg, R. & Ellis, W. 2005. Land reform and biodiversity conservation in South Africa: complementary or in conflict? *International Journal of Biodiversity Science and Management*, 1(1):3–16. <http://dx.doi.org/10.1080/17451590509618075>.
- Kopnina, H. 2016. Nobody likes dichotomies (but sometimes you need them). *Anthropological Forum*, 26(4):415–429. <http://dx.doi.org/10.1080/00664677.2016.1243515>.
- Kopnina, H., Washington, H., Gray, J. & Taylor, B. 2018. The 'Future of Conservation' debate: Defending ecocentrism and the Nature Needs Half movement. *Biological Conservation*, 217:140–148. <http://dx.doi.org/10.1016/j.biocon.2017.10.016>.

- Kroger, M. & Nygren, A. 2020. Shifting frontier dynamics in Latin America. *Journal of Agrarian Change*, 20(3):364–386. <https://doi.org/10.1111/joac.12354>.
- Legassick, M. 2016. *Hidden Histories of Gordonia: Land Dispossession and Resistance in the Northern Cape, 1800–1990*. Johannesburg: Wits University Press. <https://doi.org/10.18772/12016049544>.
- May, H. & Lahiff, E. 2007. Land reform in Namaqualand, 1994–2005: A review. *Journal of Arid Environments*, 70(4):782–798. <https://doi.org/10.1016/j.jaridenv.2006.08.015>
- Melstrom, R.E., Jones, L.R. & Caviglia-Harris, J. 2016. Patterns of frontier development: a dynamic model of resource extraction in the Brazilian Amazon. *Environment and Development Economics*, 21(3): 350–370. <http://dx.doi.org/10.1017/S1355770X15000303>.
- Milton, S.J. & Dean, W.R.J. 2021. Anthropogenic impacts and implications for ecological restoration in the Karoo, South Africa. *Anthropocene* 36: 100–307. <https://doi.org/10.1016/j.ancene.2021.100307>.
- Mnwana, S. & Bowman, A. 2022. Land, conflict and radical distributive claims in South Africa's rural mining frontier. *The Extractive Industries and Society*, 11(2):100–972. <https://doi.org/10.1016/j.exis.2021.100972>.
- Nattrass, N. & Conradie, B. 2015. Jackal narratives: Predator control and contested ecologies in the Karoo, South Africa. *Journal of Southern African Studies*, 41(4):753–771. <http://dx.doi.org/10.1080/03057070.2015.1049484>.
- Paterson, A.R. 2009. Legal framework for protected areas: South Africa. *IUCN-EPLP*, 81:1–47.
- Penn, N. 2005. *The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century*. Athens, Ohio: Ohio University Press.
- Phuhlisani NPC. 2017. Tenure security of farm workers and dwellers, 1994–2016. Commissioned report for High Level Panel on the assessment of key legislation and the acceleration of fundamental change, an initiative of the Parliament of South Africa. Cape Town: Parliament of South Africa.
- Pool-Stanvliet, R. & Coetzer, K. 2020. The scientific value of UNESCO biosphere reserves. *South African Journal of Science*, 116(1/2). <https://doi.org/10.17159/sajs.2020/7432>.
- Rasmussen, M.B. & Lund, C. 2018. Reconfiguring frontier spaces: The territorialization of resource control. *World Development*, 101:388–399. <https://doi.org/10.1016/j.worlddev.2017.01.018>.
- Rudd, L. F., Alfred, S., Ross, J. B. G., Hare, D., Nkomo, M.N., Shanker, K., Allen, T., Biggs, D., Dickman, A., Dunaway, M., Ghosh, R., Gonzalez, N.T., Kepe, T., Mbizah, M.M., Middleton, S.L., Oommen, M.A., Paudel, K., Sillero-Zubiri, C. & Davalos, A. 2021. Overcoming racism in the twin spheres of conservation science and practice. *Proceedings of the Royal Society B-Biological Sciences*, 288(1962):20211871.
- Sovacool, B. K., Burke, M., Baker, L., Kotikalapudi, C. K., & Wlokas, H. 2017. New frontiers and conceptual frameworks for energy justice. *Energy Policy*. <https://doi.org/10.1016/j.enpol.2017.03.005>.
- Statistics South Africa (StatsSA). 2021. Natural Capital Series 2: Accounts for Protected Areas, 1900 to 2020. Discussion document D0401.2. Produced in collaboration with the South African National Biodiversity Institute and the Department of Forestry, Fisheries and the Environment. Pretoria: Statistics South Africa.

- Swanson, H.A. 2019. Patterns of Nature cultures: Political Economy and the Spatial Distribution of Salmon Populations in Hokkaido, Japan. In: J. Cons & M. Eilenberg (eds). *Frontier Assemblages: The Emergent Politics of Resource Frontiers in Asia*. Hoboken NJ: Wiley. 117–130. <https://doi.org/10.1002/9781119412090.ch6>.
- Thaler, G.M., Viana, C. & Toni, F. 2019. From frontier governance to governance frontier: The political geography of Brazil's Amazon transition. *World Development*, 114: 59–72. <http://dx.doi.org/10.1016/j.worlddev.2018.09.022>.
- Todd, S.W., Hoffman, M.T., Henschel, J.R., Cardoso, A.W., Brooks, M. & Underhill, L.G. 2016. The potential impacts of fracking on biodiversity of the Karoo Basin, South Africa. In: J. Glazewski & S. Esterhuysen (eds). *Hydraulic fracturing in the Karoo: Critical legal and environmental perspectives*. Cape Town: Juta.
- United Nations Environment Programme (UNEP). 2022. UN Biodiversity Conference, COP 15. <https://www.unep.org/un-biodiversity-conference-cop-15> [Accessed 12 January 2023].
- Walker, C. 2022. Out of bounds: Environmental justice and the Square Kilometre Array radio telescope in South Africa's Northern Cape Karoo. In: G. Wynn, J. Carruthers & N.J. Jacobs (eds). *Environment, Power, and Justice; Southern African Histories*. Athens: Ohio University Press. 94–129.
- Walker, C. 2024. Land reform and beyond in times of social-ecological change: Perspectives from the Karoo. In: O. Zenker, C. Walker & Z. Boggempoel (eds). *Beyond Expropriation without Compensation; Law, Land Reform and Redistributive Justice in South Africa*. Cambridge: Cambridge University Press. 214–238.
- Walker, C., Milton, S. J., O'Connor, T.G., Maguire, J.M. & Dean, W.R. 2018. Drivers and trajectories of social and ecological change in the Karoo, South Africa. *African Journal of Range & Forage Science*, 35(3&4):157–178. <http://dx.doi.org/10.2989/10220119.2018.1518263>.
- Zenker, O. & Walker, C. 2024. Introduction; Beyond Expropriation Without Compensation: Law, Land Reform and the Future of Redistributive Justice in South Africa. In: O. Zenker, C. Walker, Z-Z. Boggempoel (eds). *Beyond Expropriation Without Compensation: Law, Land Reform and Redistributive Justice in South Africa*. Cambridge: Cambridge University Press. 1–32.

Index

A

- Acocks, John 28
 - desertification hypothesis 28
- African National Congress (ANC) 69, 243, 247
- Afriforum 295, 296
- Afrikaans 11, 34, 91, 93, 97, 108, 109, 129, 144, 163, 179, 181, 183
- AfrikaBurn 42
- Agricultural Research Council (ARC) 130, 135
- agriculture, see also farmers, farming 13, 14, 16, 34, 37, 72, 75, 79, 82, 100, 101, 126, 129, 156, 172, 181, 216, 218, 221, 250, 251, 318, 319, 320
 - census records of, in Karoo 95, 100, 109, 136, 152, 163, 284, 317
 - irrigation 13, 72, 75, 79, 99, 318
 - sustainable 152, 153, 154, 157-159, 165-173, 318
- alcohol abuse, see also foetal alcohol spectrum disorder 43, 247, 269
- Alheit, CW, Rev. 72
- Alston, Garwood 99
- Amandelboom 71, 72, 97
- apartheid 65, 66, 68, 77-79, 84, 85, 95, 101, 104, 115, 155, 172, 202, 242, 260, 264, 267, 322
- asbestos belt 65, 74, 75, 81
- Asbestos Relief Trust 81
- Astronomy Geographic Advantage Act 115, 295
- astronomy, see also SALT, SKA 1, 3, 13, 14, 21, 92, 173, 181, 223, 315, 321
- astronomy advantage area(s) 295, 312
- Augrabies 20, 212

B

- bantustan(s) 65, 68, 69, 77, 78, 100, 101
- Baster(s) 8, 70-73, 95, 97, 98, 99, 242, 248, 317
- Beaufort West 15, 40, 101, 217, 290-292, 297-300
- biodiversity, biodiversity conservation 1, 3, 14, 16, 29, 44, 133, 151, 157, 166, 168, 169, 172, 183, 201-205, 209-211, 214-216, 219-221, 223, 224, 238, 292, 295, 304, 311, 320, 323-325, 327, 328
- Biodiversity Act 204, 205
- biomes, see also Nama Karoo, Succulent Karoo 3, 6, 65, 134, 222
- bioregion(s) 6, 10, 11
- Bleek, Dorothea 76
- Bleek Lloyd collection 36
- Blydefontein Rock Shelter 40
- Bophuthatswana 77
- Brandvlei 14, 180, 234
- Breede River Valley 11
- Britstown 264
- Bundu Gas & Oil Explorations 287, 292
- Bushmanland 20, 69, 71, 98, 211, 212, 216

C

- Calvinia 106, 234, 243
- Cape Asbestos 77-81
- Cape Colony, history, see also colonisation 9, 13, 41, 42, 65, 69-74, 96-99, 100, 123-125
- Cape Franchise 101
- Carnarvon 14, 39, 71, 76, 95, 97, 99, 106, 110, 112, 180, 186, 187, 189, 193, 207
- Central Karoo District Municipality 15, 288-290, 301
- CHN Energy Investment Group 257
- Christianity 97

- class 47, 80, 112, 155, 237, 243, 258, 264, 290, 291, 297, 298, 302, 318, 325, 326
- Climate and Clean Air Coalition (CCAC) 288
- climate change 1, 5, 16, 21, 28, 132, 135, 169, 172, 173, 219, 220, 221, 223, 224, 233, 236, 238, 252, 262, 287, 289, 304, 323, 328
- colonisation 2, 84, 96, 100, 311, 314
- Coloured Labour Preference Policy 78
- 'coloured' reserves 100, 121, 122, 125, 143, 312, 319
- communal areas: see also 'coloured' reserves 13, 34, 37, 39, 122, 124, 125, 128, 132, 141, 143, 218, 317, 319
- Community Work Programme (CWP) 113
- conservation 1, 13-16, 21, 29-31, 33, 38, 40, 42, 45, 133, 138, 151, 152, 154, 155, 157, 166-169, 172, 183, 187, 192-194, 201-224, 311, 312, 315, 320, 323-325, 327
- types of areas 204, 205
- Copperton 79, 83, 84
- Council for Scientific and Industrial Research (CSIR) 187, 295
- COVID-19 66, 113, 151, 218, 259, 267, 291, 293
- Critical Ecosystem Partnership Fund (CEPF) 202, 215
- D**
- Danielskuil 74, 77, 81
- De Aar 15, 75, 107, 236, 257, 258, 260, 261, 263-267, 269, 272-277, 279, 322
- decent work 236, 238, 239, 247, 249, 250, 259, 321
- Democratic Alliance (DA) 243, 247
- Department of Agriculture, Forestry and Fisheries (DAFF) 156, 163, 174
- Department of Agriculture, Land Reform and Rural Development (DALRRD) 10, 11, 82, 319, 322, 330
- Department of Energy (DoE) 239, 240, 261, 262
- Department of Environmental Affairs (DEA) 204, 209, 215, 216, 233, 236, 289, 292, 295, 303
- Department of Environment and Nature Conservation (DENC) 169
- Department of Forestry, Fisheries and the Environment (DFFE) 203-206, 210-212, 216, 217, 219, 325
- Department of Mineral Resources and Energy (DMRE) 81, 82, 238, 239, 273, 288
- Department of Minerals and Energy (DME) 238, 261, 262, 282
- De Tuin 73
- development, see also renewable energy, SKA 10, 11, 21, 38, 39, 116, 154, 171, 203, 205, 217, 219, 276, 288, 290, 291, 296, 299, 301, 302, 304, 313, 321, 323
- community, local 15, 83, 84, 162, 217, 302, 316
- regional 92, 322, 328
- rural 154, 155, 159, 173
- sustainable development 1, 21, 83, 114, 151, 153, 158, 214, 219-222, 237, 250, 293, 302, 304
- dispossession 1, 37, 65, 85, 93, 96, 97, 100, 104, 115, 124, 143, 155, 156, 242, 325, 326
- drought, drought relief 21, 27, 28, 36, 46, 101, 114, 135, 136, 138, 144, 151, 153, 162, 166, 169, 171, 173, 188, 201, 222, 245, 251, 290, 298, 320
- Drought Investigation Commission, 1923 124
- drugs 13, 108, 110, 115
- Dutch East India Company (DEIC) 9, 123, 141
- Dutch Reformed Church (DRC) 97, 98
- E**
- ecology 74, 123, 126, 132, 133, 136, 138, 168, 327, 328
- animal ecology 32, 33, 134, 182
- plant ecology 30, 43
- political ecology 68, 290, 301
- Ecosystem-based Adaptation (EbA) 219, 222, 223

- education 21, 37, 83, 144, 160, 163, 164, 240, 242, 243, 248, 250, 251, 263, 267, 276, 290, 297, 300, 321
- Elawan 83, 84
- electricity, see also poverty, renewable energy 3, 15, 107, 233, 238, 239, 241, 252, 257, 258-262, 263, 265, 266, 272-280, 292, 293, 315, 326
Free Basic Electricity (FBE) 262, 265, 272, 275, 277
- Emthanjeni Local Municipality 257, 258, 280
- Enel 83, 84
- environment 1, 4, 6, 10, 19, 32, 34, 44, 65, 93, 96, 108, 121, 173, 183, 201, 311, 313, 314, 316, 319, 323, 325, 327
degradation (land) 28, 124, 152, 170, 201, 202, 217, 220, 237, 314, 323
mining, impact on 1, 3, 14, 26, 202, 289, 292, 295, 298, 302, 303, 312, 325
- environmental change 27-29, 42, 43, 147, 220
- environmental impact assessment (EIA) 97, 188, 244, 257
- Eskom 15, 233, 237, 238, 241, 252, 258, 261, 262, 265, 280, 292
- ethnobotany 21, 29, 31, 53, 61, 145
- Expanded Public Works Programme (EWP) 106, 217
- Extension of Security of Tenure Act (Act 62 of 1997) 319
- extractivism 1, 2, 83, 315, 316, 328
green 83
- F**
- Falcon Oil & Gas 287, 292
- farmers, see also agriculture, farming 39, 41, 75, 76, 108, 185, 222, 223, 251, 291, 317, 320
backyard 14, 158, 162, 163, 171, 173, 317
commercial, large-scale 14, 19, 42, 75, 76, 77, 82, 98, 101, 144, 155, 156, 159-162, 163, 169, 170, 179-182, 188-196, 222, 233, 296, 298, 299, 300, 317, 318, 324
game, wildlife 14, 34, 151-155, 157, 165-173, 202, 264, 318
herders 14, 41, 121-144
lifestyle, 'weekend' 45, 320
small-scale 100, 114, 153, 155, 162-164, 218, 319, 324
- farming, see also agriculture, farmers 1, 6, 14, 16, 34, 35, 71, 75, 93, 114, 124, 183, 202, 218, 223, 224, 299, 311, 316-320, 328
commercial 39, 72, 99, 115, 151, 155, 156, 161, 170, 172, 189, 195, 312, 318, 319
fencing and 8, 37, 42, 57, 71, 91, 101, 124, 140, 166, 182, 193, 194, 317
livestock 6, 72, 93, 100, 124, 128, 159, 162, 163, 164, 165, 171, 172, 180, 181, 187, 196, 202, 264, 316, 317
game, wildlife 1, 14, 34, 151, 152, 153-157, 165-173, 202, 264, 318, 324
pastoralism 121, 122, 123, 127, 141, 201, 220
small-scale 156, 171, 321
- farm worker(s) 68, 79, 85, 113, 153, 155, 158, 166, 167, 170, 172, 181, 183, 188, 270, 290, 318, 319
- evictions 68, 319
- foetal alcohol spectrum disorder (FASD) 43, 263, 264, 269
- Foundation for Alcohol Related Research (FARR) 269
- fracking, see mining, shale-gas
- frontier 2, 13, 41, 65, 66, 71, 73, 97, 311, 314, 315
Northern Cape as "forgotten frontier" 311
resource frontier 2, 13, 16, 311-316, 321, 323, 325

G

- Gariep [Orange] River 2, 69, 71, 72, 73, 74, 76, 96, 97
- Gencor 81
- gender, gender relations 15, 37, 68, 155, 167, 219, 243, 259, 264, 274, 275, 278, 279
- Geographic Information System (GIS) 130, 203, 205
- Globeleq South Africa Management Services Ltd 266
- Goegab Nature Reserve 33
- Gouritz Cluster Biosphere Reserve (GCBR) 207
- Graaff-Reinet 71, 101, 211, 292, 297
- Grassy Karoo 10
- Great Karoo 10
- Griqualand Exploration and Finance Company 81
- Griqualand West 73
- Griqua(s) 70, 76, 78, 97, 98
- Griquatown 74
- Group Areas Act 102-104, 242

H

- Hanover 264
- Hantam Local Municipality 106, 234, 240, 259
 - local politics in 243, 245-247
- Harmsfontein 71, 72, 97, 99
- Hoogland Local Municipality 106
- Hopetown 73
- household
 - gender and generational conflicts in 15, 161, 162, 259, 269, 274, 275, 278, 279
 - household size 109, 260, 265
- housing 102, 103, 106, 107, 110, 267
- human-wildlife conflict 179-196
- hunting 153, 157, 165, 168, 216, 316, 318, 324
 - canned 157, 168
 - predators and 182, 183, 185, 192, 193

I

- illegal trade 3, 217, 311, 324
- Independent Power Producer(s) (IPP) 233, 235, 236, 238-241, 246, 247, 250, 252, 258, 262
- interdisciplinary research, collaboration 4, 16, 19, 24, 33, 38, 43, 45, 328
- Intergovernmental Panel on Climate Change (IPCC) 287
- International Energy Agency (IEA) 288
- International Labour Organization (ILO) 236, 238, 239, 249
- International Union for Conservation of Nature (IUCN) 33, 215

J

- jackal, see also human-wildlife conflict, predators 14, 33, 37, 42, 140, 142, 143, 179, 180, 184-195
 - as *ongedierte* 179, 193
- justice 45, 237, 319
 - environmental 1, 36, 233, 302, 324, 327
 - social 1, 3, 16, 151, 152, 155, 158, 165, 169-171, 218, 233, 318, 327
- just transition, see renewable energy

K

- Kamiesberg 25, 96, 132, 134, 138, 140, 141, 221, 226
- Kareeberg 69, 71, 72, 94, 95, 106, 180-182, 185, 187, 188, 192, 195, 268
- Kareeberg Farmers' Forum 188
- Kareeberg Local Municipality 95, 106, 185
- Kareeville (De Aar) 258-260, 265, 267-280
- Karoo Basin 7, 25, 231, 287, 289, 294, 296
- Karoo Biome Project 30, 44
- Karoo National Park 34, 40, 54, 59, 217, 230
- Karoo Regional Spatial Development Framework 10, 11, 319, 322
- Karoo, see also Nama Karoo, Succulent Karoo
 - Agricultural Sciences and 12, 20, 23, 24, 35, 43

- Archaeology and 21, 40, 48, 51, 58, 59, 89
 Biological Sciences and 4, 12, 20, 23, 24, 26, 33, 43, 44
 defining, extent 2, 5-11, 106, 302
 demography 11, 37, 91, 93, 101, 102, 319
 Earth Sciences and 12, 20, 21, 23, 24, 26, 47, 53
 Environmental Sciences and 20, 21, 23, 24, 27
 geology of 7, 21, 24, 26, 289, 292, 312
 Health Sciences and 20, 21, 23, 24, 42
 history of 1, 2, 10, 19, 40, 41, 42, 44, 69-74, 93, 96-99, 100-105, 123-125, 201-203, 208-210, 263, 264, 311, 314, 316, 325
 Humanities and 20, 21, 23, 24, 40, 41, 43, 44
 irradiation in 7
 Karoo Studies 12, 19, 93, 328
 literature and 21, 42, 103, 126, 179
 local government and 37-39, 105, 106, 162, 171, 213, 243, 245, 246, 321, 322, 326, 328
 migration and 16, 37, 46, 70, 80, 109, 321, 328
 Palaeo Sciences and 20, 23-25
 rainfall in 6, 7, 25, 27, 28, 32, 33, 34, 123, 132, 134, 135, 136, 138, 139, 161, 201, 215, 313
 Social Sciences and 5, 12, 20, 21, 23, 24, 26, 35, 36, 39, 40, 43, 44, 121, 125, 152, 183
 tourism and 21, 37, 38, 40, 94, 101, 112, 115, 151, 154, 157, 159, 165, 167, 205, 216-218, 220, 224, 293, 298, 299, 318, 322, 323
 water resources 3, 15, 26, 30, 33, 37, 65, 99, 108, 123, 168, 221, 222, 223, 292, 295, 298, 303, 313, 316, 318, 325, 327, 328
 Karoo Shale Gas Community Forum 298
Karretjiemense 42
 Kenhardt 74
 Khoekhoe, Khoekhoen 36, 41, 70, 95, 97, 123, 124, 179
 Khoisan 13, 31, 41, 42, 73, 298
 Kimberley 65, 73, 75, 106, 263
 Klein Karoo National Arts Festival 42
 Knersvlakte 20, 29, 213, 216
 knowledge, knowledge production, system(s) 1, 13, 19, 40, 44, 121, 126, 144, 182, 222, 223, 315, 317
 agrisyncretic 121, 122, 125-144
 idiosyncratic 13, 121, 126, 133, 135, 137, 138, 141, 317
 indigenous 13, 121, 124-126, 132, 133, 134, 136, 137, 138, 139, 142, 143, 223, 317
 local 14, 97, 121, 123, 129, 132, 133, 134, 135, 161, 168, 182, 192, 193, 195, 223, 325, 328
 scientific 13, 16, 121, 126, 129, 132, 134, 135, 136, 137, 138, 139, 143, 182, 192, 193, 195, 222, 289, 294, 300, 303, 317, 327
 Koegas 74, 78-80, 82
 Korana 73, 74, 98
 Korana Wars 73
 Kuruman 74, 77, 79, 81
- L**
- landownership 37, 38, 158, 161, 188, 324
 land reform 16, 21, 34, 35, 39, 38, 40, 82, 114, 151, 152, 153, 155, 156, 162, 163, 164, 169, 170, 171, 172, 219, 318, 319
 restitution 37, 104, 114, 116, 211
 tenure security 37, 155, 158, 166, 319
 Lekela Power 244, 254
 Leliefontein 13, 122, 124, 127, 128, 132, 134, 135, 137, 138
 Leslie Hill Succulent Karoo Trust 210, 213, 216-217, 323
 Little Karoo 10, 31
- Karoo Regional Spatial Development Framework 10, 11, 319, 322

livelihoods 2, 6, 16, 40, 46, 69, 71, 97, 103, 111, 112, 155, 165, 173, 179, 185, 188, 194, 195, 196, 220, 222-224, 236, 253, 260, 299, 313, 317, 319

local government 16, 105, 162, 171, 213, 243, 245, 246, 262, 321, 322, 326, 328

Loeriesfontein 13, 15, 84, 91, 93-96, 98, 101-114, 233-236, 238, 240-249, 251, 259, 263, 266, 270, 300, 321, 326

Long-Term Ecological Research Project, Tierberg 44

Longyuan Power 266

M

Mainstream Renewable Power 206, 234, 244, 245, 246, 252, 252, 266

Mardeck 153, 156, 162, 164, 170

Marx, Karl 67, 87

Marydale 78, 79, 84

MeerKAT 181

Meerkat National Park 14, 94, 180, 181, 183, 192, 193, 207, 211, 214, 312, 324

mesothelioma 42, 77, 79

Middelpos 234

Mineral and Petroleum Resources Development Act (MPRDA) 291, 292, 309

Minerals and Petroleum Resources Development Act 292

mining 7, 14, 26, 45, 75, 84, 91, 172, 201, 217, 223, 226, 236, 239, 263, 289, 291, 293, 296, 302, 312, 315, 324

asbestos 7, 13, 42, 65, 66, 74-82, 85, 314, 323

coal 15, 77, 233, 237, 238, 239, 252, 261, 262, 292, 293, 304, 315

copper 7, 13, 26, 66, 75, 79, 80, 83, 84, 313

diamond 7, 26, 65, 73, 74, 75, 77, 203, 263, 312, 313, 323

gold 65, 165

manganese 313

rare earth 7, 312

shale-gas [fracking] 1, 3, 7, 15, 21, 26, 29, 33, 39, 40, 45, 50, 57, 61, 62, 172, 203, 223, 231, 287-304, 313

tributary mining 77, 78

Mintek 81

missionaries 71, 135

Rhenish Mission Society 71

Mission Stations and Communal Reserves Act, 1909 123

Motuoane Energy 294

Mulilo Energy Holdings 266

municipal commonage 98, 102, 104, 153, 156, 162, 170, 319

Murray & Roberts 244-246, 248

N

Nama Karoo 6-9, 14, 19, 29, 34, 40, 65, 93, 140, 152, 169, 172, 187, 192, 201, 203, 205-208, 210-215, 217, 287, 312, 318, 323

Namaqualand 7, 10, 13, 20, 26, 27, 29, 31, 32, 34, 39-41, 96, 121-129, 132-136, 138-142, 144, 192, 218, 221, 312, 317, 319, 323, 324

Namaqua National Park 212, 214, 216, 217

National Energy Regulator of South Africa (NERSA) 244, 266

National Environmental Management Act (NEMA) 204

National Forests Act 205

National Key Points Act 194

National Protected Area Expansion Strategy for South Africa (NPAES) 209, 210, 215

National Research Foundation (NRF) 45, 180

National Union of Metalworkers of South Africa (NUMSA) 212, 239

Niekerkshoop 74, 82, 84

Nieuwoudtville 234, 243

Northern Cape Mining Community 66, 88

O

Orion Minerals Ltd 83

P

patronage networks 253, 300, 321

Paulshoek 128, 139, 141

Pella 73

Phelan Energy Group 266, 284

Pixley Ka Seme District Municipality 82, 264

plants 21, 25, 29-31, 33, 51, 54, 58, 129, 133-139, 143, 147, 149, 201, 203, 205, 217, 220, 223, 229, 261, 266, 324

invasive aliens, including *Prosopis* 21, 29, 30, 31, 51, 57, 133, 202, 320

physiology 58

systematics 21, 29, 31

poaching, see illegal trade

Population Registration Act 102

post-apartheid state 69, 106, 318

poverty 3, 13, 15, 16, 42, 43, 69, 93, 95, 106, 107, 111-115, 236-238, 241, 243, 244, 253, 257, 259-261, 263, 270, 272, 275, 277, 279, 290, 299, 300, 302, 314, 321, 322, 324, 327

energy poverty 15, 107, 236, 258, 259, 260, 262, 272-280, 322, 328

poverty line(s) 69, 112, 113, 272, 277

power relations 5, 16, 290, 301-303, 325

Pramberg 71, 72, 96

predators, see also hunting, jackal 21, 31, 33, 37, 42, 129, 131, 138, 140, 141, 142, 143, 179, 182, 219, 223

caracal 33, 37, 140, 142, 182, 185, 192, 219, 324

Prieska 13, 42, 65-67, 69-85, 316, 323, 326

Prieska Copper Mine 79

Protected Areas Act 204

Provision of Land and Assistance Act 124

R

race 15, 95, 102, 103, 107, 109, 119, 155, 170, 251, 290, 297, 298, 299, 302, 317
classification 68, 78, 79, 101, 102, 242

terminology 8

rangeland, see also *veld* 43, 91, 121-126, 128-130, 133, 139, 209, 316, 319

Reconstruction and Development Programme (RDP) 106, 110, 261, 321

renewable energy 13, 15, 38, 45, 66, 83, 85, 93, 233, 252, 259, 262, 263, 279, 280, 288, 292

community trust(s) 84, 114, 172, 173, 202, 235, 242, 253

De Aar and 257, 258, 260, 266, 267, 276

development and 236, 239-242, 253, 276, 279, 299, 311, 314, 315, 321, 326, 328

employment and 237, 240, 241, 321, 322

just transition and 15, 233, 235-237, 239, 252, 253

Loeriesfontein and 94, 234, 242-253, 300

Renewable Energy Independent Power Producer Procurement Programme (REIPPP) 84, 114, 233, 234, 235, 236, 237, 238-242, 251, 253, 258, 262, 263, 266, 279

Restitution of Land Rights Act 104

Rhenosterpoort 71

Rhino Oil & Gas 294

Richtersveld 20, 34, 127, 140, 207, 212, 214, 224, 324

Roggeveld 97

S

sacrifice zone 290, 302, 303

sanitation 99, 262, 296, 306

SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development 45, 95

Save the Karoo 191

- Schalk Willem Burger Lubbe et al (Appellants) and Cape Plc (Respondent)* 80, 87
- Schietfontein 71-73
- Seacow River Valley 40
- service delivery 105, 106, 108, 283, 290
- Shell South Africa 292
- Siyathemba Local Municipality 65-67, 80, 82
- small towns [*dorps*], see also individual towns 12, 13, 14, 37, 40, 45, 69, 91-115, 187, 234, 240, 264, 290, 311
- dorpscape(s) 13, 93, 114, 320
- social reproduction and 16, 68, 320-322
- Smith, Harry, Governor 69, 72, 75, 96
- social change 37, 91
- social-ecological change 2, 16, 92, 95, 115, 173, 328
- social-ecological dynamics 92, 320
- social-ecological system 5, 31, 327
- social grants 69, 85, 106, 116, 112, 113, 116, 222, 243, 271, 272, 276, 277, 317, 326
- Solar Capital 266, 267, 269
- South African National Parks (SANParks) 141, 192, 193, 204, 215, 224
- South African Radio Astronomy Observatory (SARAO), see also SKA 181
- South African War 76
- Southern African Large Telescope (SALT) 38, 94
- Sperrgebiet 20, 215
- Springbok 75, 106
- Square Kilometre Array (SKA) 1, 3, 14, 15, 38, 45, 94, 115, 180-183, 211, 236, 289, 290, 294, 295, 302, 312, 314, 315
- community development and 94, 114, 187, 236, 290, 315
- farmers and 180, 181, 187-196, 324
- Land acquisition programme 14, 181, 182, 183, 188, 192, 194
- Steinkopf 13, 122, 124, 130, 131, 134, 137, 138
- Succulent Karoo 3, 6-9, 19, 25, 28, 29, 31, 34, 40, 41, 44, 45, 93, 94, 184, 201-203, 205-217, 220, 311, 312, 317, 323
- biodiversity hotspot 3, 44, 202, 211
- Succulent Karoo Ecosystem Programme (SKEP) 29, 202, 215
- Sungu Sungu 294
- Surplus People Project 68, 89
- surplus population(s) 13, 65, 66, 67-69, 79, 83, 84, 85, 316
- sustainability 3, 16, 37, 42, 108, 155, 158, 218, 219, 222, 229, 253, 281, 311, 314, 325, 327, 328
- Sustainable Development Goals (SDGs) 219
- Sutherland 13, 38, 91, 93-95, 97, 101, 102, 106-115, 270, 292, 315
- T**
- Tankwa Karoo National Park 34, 140, 212, 214
- teenage pregnancy 111
- transhumance 123, 124
- Treasure the Karoo Action Group 288, 292, 295, 296
- trekboer(s)* 9, 41, 70, 71, 72, 97, 124
- Tswana 70, 74, 77, 96
- U**
- Ubuntu Local Municipality 14, 151, 152, 156, 158-161, 163-166, 168, 171-173, 318
- unemployment 69, 80, 112, 220, 241, 243, 253, 263, 264, 270, 271, 290, 321
- United Nations (UN) 204, 236, 287, 323
- United Nations Environment Programme (UNEP) 287
- Uppington 76, 241
- Upper Karoo 10, 13, 14, 65, 69, 71, 72, 85, 93, 96, 99, 108, 180, 182, 195, 290, 294, 312, 317
- urbanisation 37, 72, 76, 91, 101, 102, 223, 320

V

Vanwyksvlei 13, 14, 79, 93, 94, 95, 98-100, 101, 102, 103, 104, 105-115, 180
veld, see also rangeland 76, 127-129, 132-137, 154, 168-170, 172, 202, 222, 223, 267, 274
 Victoria West 14, 71, 72, 96, 152, 153, 156, 162, 164, 165, 167, 170-172, 297

W

Williston, see also Amandelboom 39, 180, 187, 188, 190, 193, 198
 World Heritage Convention Act 204

X

|Xam 8, 36, 70, 71, 73, 96, 98, 99, 179
 genocide and 41, 61, 73, 86
 |Xam ka lau 96
 Xhosa 13, 70, 71, 72, 73, 76, 96, 99, 163, 317

Z

Zak River 71, 96

Contributing authors

Stephanie Borchardt is a Postdoctoral Fellow and former doctoral student in the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University.

Clement Cupido is a Rangeland Ecologist with the Agricultural Research Council, based in the Biodiversity and Conservation Biology Department at the University of the Western Cape (UWC).

William Ellis is a Professor in the Department of Anthropology at the University of the Western Cape (UWC).

Lindsey Gillson is Director of the Leverhulme Centre for Anthropocene Diversity and Professor of Anthropocene Biodiversity at the University of York, UK and formerly Deputy Director of the Plant Conservation Unit and Professor in the Department of Biological Sciences at the University of Cape Town (UCT).

M Timm Hoffman is an Emeritus Professor at the University of Cape Town and former Director of the Plant Conservation Unit in the Department of Biological Sciences at the University of Cape Town (UCT).

Boitumelo Malope is a Postdoctoral Fellow and former doctoral student in the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University.

Charmaine Manyani is a Gender and Development Consultant and former doctoral student in the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University

Michela Marcatelli is a Research Manager at the University of Bologna and former Postdoctoral Fellow in the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University.

Hana Petersen is a PhD student in the Department of Biological Sciences at the University of Cape Town and former Research Assistant with the Plant Conservation Unit at the University of Cape Town (UCT).


Igshaan Samuels is a specialist researcher with the Agricultural Research Council in South Africa and global co-chair of the International Support Group for the United Nations declared International Year of Rangelands and Pastoralists in 2026.

Renelle Terblanche is a Hybrid Learning Coordinator at Stellenbosch University and former doctoral student in the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University.

Jan Vorster is a Research Fellow in the Department of Sociology and Social Anthropology at Stellenbosch University.

Cherryl Walker is an Emeritus Professor in the Department of Sociology and Social Anthropology at Stellenbosch University and held the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University from 2016–2023.

Mzingaye Brilliant Xaba is a Postdoctoral Research Fellow at the Institute for Pan-African Thought and Conversation at the University of Johannesburg (UJ) and former Postdoctoral Fellow in the SARChI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University.



This inter-disciplinary collection explores significant land-use changes in South Africa's semi-arid Karoo region and their implications for social justice and the environment, across different scales. It brings together recent scholarship by established and younger researchers, in both the social and the natural sciences, to examine the ways in which the Karoo is being reconfigured as a new 'resource frontier' and the tensions and contestations that result.

Along with ongoing mining, major investments in astronomy (notably the Square Kilometre Array radio telescope), in renewable and non-renewable sources of energy (solar, wind, potential shale-gas mining), in biodiversity conservation and commercial game farming are reshaping land use and authority in this vast and long-marginalised area. While promising significant benefits to society at large, these developments are built on older histories of dispossession and extractivism – histories that many Karoo residents fear are being reproduced in new forms today. Collectively these dynamics place this unique region at the centre of national and global concerns around climate change, the politics of knowledge production, the conservation of threatened biodiversity, and the meaning and possibility of sustainable development.

These issues are explored through a series of case studies of selected developments, complemented by chapters providing more historical context and general overviews. While challenging perceptions of this region as a peripheral wasteland, this collection raises conceptual and policy questions that resonate far beyond the Karoo itself. It also highlights the importance of interdisciplinary collaboration in research aimed not only at understanding but also at responding appropriately to the mounting challenges of our time.

ABOUT THE EDITORS:

Cheryl Walker is an Emeritus Professor in Sociology and former NRF/DSI SARCHI Research Chair in the Sociology of Land, Environment and Sustainable Development at Stellenbosch University. She has worked extensively on issues related to land dispossession and land reform in South Africa; on land policy in sub-Saharan Africa; on women's political and social history in South Africa, and, most recently, on social-ecological change in the Karoo.

M Timm Hoffman is an Emeritus Professor in the Department of Biological Sciences and former Leslie Hill Chair of Plant Conservation at the University of Cape Town. His main research interests lie in an analysis of long-term environmental change in southern Africa in response to land use and climate especially in the light of future climate change projections. He has an additional focus on the changing social and ecological environments within the communal areas of Namaqualand.



ISBN 978-1-991450-00-5



9 781991 450005