

Cambridge University Press

0521612101 - An African Savanna: Synthesis of the Nylsvley Study

R. J. Scholes and B. H. Walker

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Savannas cover approximately half of the African land surface and one fifth of that of the world. They are one of the most important, but least studied terrestrial ecosystems. They are the basis of the African livestock industry and the wildlife they support is of key importance in bringing in tourists.

The Nylsvley site in South Africa is one of the most intensively studied savannas in the world, and as such, it is a key source of data and theory relating to this important tropical biome.

The South African Savanna Biome project was set up to develop the understanding necessary to predict changes in the ecosystem's stability, induced by both natural and man-made stresses. This book provides a synthesis of the programme's sixteen years of research at Nylsvley and aims to develop a unified vision of the ecology of the dry savanna.

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### **Cambridge Studies in Applied Ecology and Resource Management**

The rationale underlying much recent ecological research has been the necessity to understand the dynamics of species and ecosystems in order to predict and minimise the possible consequences of human activities. As the social and economic pressures for development rise, such studies become increasingly relevant, and ecological considerations have come to play a more important role in the management of natural resources. The objective of this series is to demonstrate how ecological research should be applied in the formation of rational management programmes for natural resources, particularly where social, economic or conservation issues are involved. The subject matter will range from single species where conservation or commercial considerations are important to whole ecosystems where massive perturbations like hydro-electric schemes or changes in land use are proposed. The prime criterion for inclusion will be the relevance of the ecological research to elucidate specific, clearly defined management problems, particularly where development programmes generate problems of incompatibility between conservation and commercial interests.

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# AN AFRICAN SAVANNA

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## SYNTHESIS OF THE NYLSVLEY STUDY

**R. J. Scholes**

*Department of Botany, University of the Witwatersrand, Johannesburg,  
South Africa*

**B. H. Walker**

*Commonwealth Scientific and Industrial Research Organisation,  
Canberra, Australia*



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UNIVERSITY PRESS

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PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE  
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS  
The Edinburgh Building, Cambridge CB2 2RU, UK  
40 West 20th Street, New York NY 10011-4211, USA  
477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
Ruiz de Alarcón 13, 28014 Madrid, Spain  
Dock House, The Waterfront, Cape Town 8001, South Africa

<http://www.cambridge.org>

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First published 1993  
First paperback edition 2004

*A catalogue record for this book is available from the British Library*

ISBN 0 521 41971 9 hardback  
ISBN 0 521 61210 1 paperback

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## PREFACE

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This book presents the major findings of a sixteen-year study of savanna ecology undertaken at Nylsvley, South Africa. Savannas are a tropical vegetation type in which both trees and grass are an important component. They are the basis of the African livestock industry and their wildlife is a key tourist draw-card. The development of the genus *Homo* in Africa has largely taken place in savannas, and they are currently home to tens of millions of people. One half of the land surface of Africa is covered by savanna, making it the most extensive African biome. It is also one of the biomes which has received the least ecological study.

Scientists worked in savannas for many years before these became regarded as a distinct biome, rather than a special case of grassland or forest. It became apparent that certain classes of management problem associated with savannas, such as bush encroachment and multispecies herbivory, could not be addressed with conceptual models based on temperate grasslands or tropical forests. One of the results of this realisation was the establishment of the South African Savanna Biome Programme in 1974. The Nylsvley Nature Reserve, 200 km north of Johannesburg, was its principal study site (Figure 0.1).

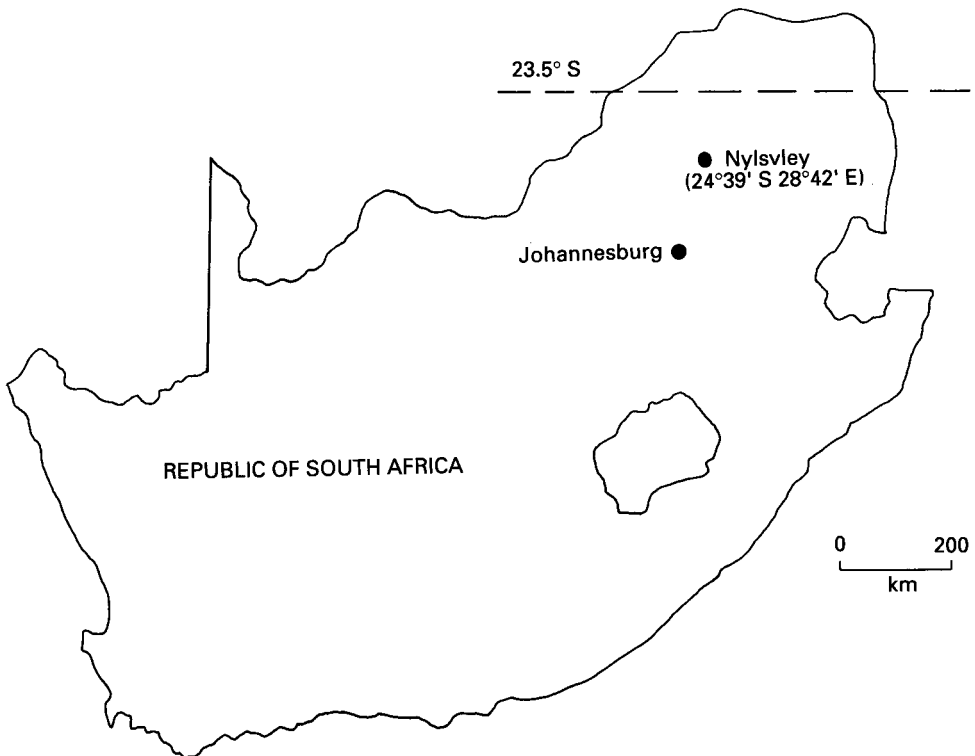
The aim of the Savanna Biome Programme was to 'develop the understanding necessary to predict changes in the ecosystem's stability induced by various natural and man-made stresses' (Anon. 1978). The organisational approach was to encourage scientists in universities, research institutes and government departments to collaborate in a multi-disciplinary study of the ecology of a broad-leafed savanna. When the programme officially ended in 1990, a recommendation of the review committee was that the extensive published and unpublished research which had resulted from the Savanna Biome Programme be brought together in an easily accessible form. This book is the result.

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The book aims to be a synthesis of research rather than a summary. A large amount of work was done in the Savanna Biome Programme, and if each topic was to be justly treated, this book would be unacceptably long, and probably rather boring. Our main purpose has been to draw together the findings of diverse projects into an integrated view of the structure and function of one particular savanna ecosystem. Where possible we relate the findings to savannas in general, and other African savannas in particular. Although our review of the Nylsvley research is not exhaustive, we believe that the major conceptual thrust and findings of the South African Savanna Biome Programme are represented. Most of the studies undertaken at Nylsvley get at least a mention. Readers seeking more methodological detail than is presented here are directed to the original sources, cited in the bibliography.

In writing the book, we have tried to keep the needs and backgrounds of several types of reader in mind. Each chapter begins with a brief background

Figure 0.1. The location of the Savanna Biome research site at Nylsvley, South Africa.





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to the topic and its relevance to savanna ecology. These paragraphs are aimed mainly at undergraduate students, land managers and newcomers to the field. The Nylsvley research results on that subject follow, and will be of most interest to advanced students and specialist research scientists. A short summary of the research highlights concludes each chapter. The overall structure of the book follows a similar strategy: basics in the beginning, detail in the middle, and an overview at the end.

Savanna managers, be they traditional pastoralists, commercial cattle ranchers or nature conservators, are the group which the Savanna Biome Programme was ultimately designed to serve. Although much of the research conducted at Nylsvley was of a fundamental nature, and unlikely to be immediately transferable to the day-to-day operations of a farmer in the field, most of the pressing practical questions which savanna managers have were addressed to some degree. The task of translating the understanding of ecological processes gained at Nylsvley into farming practices in savannas falls mainly to the professional staff of the agricultural and nature conservation authorities. It is hoped that this synthesis of the Nylsvley findings will stimulate them to do so. Some pointers to issues relevant to savanna management are contained in Chapter 17.

The findings reported in this book result from the work of a great many people, including scientists, administrators, students and technical staff. As far as possible the discussion is based on published data (although some of it is not readily accessible), and citation is the main form of acknowledgement of the data source. In most of the topic areas, however, a few individuals played a leading role, and are acknowledged in the introduction to the section.

This book is dedicated to the late Prof. A. J. 'Pine' Pienaar, Director of Agriculture, who was the driving force behind the initiation of the Savanna Biome Programme. He was supported in this effort by Dr S. S. du Plessis of the Transvaal Nature Conservation Division, and Dr van der Merwe Brink of the Council for Scientific and Industrial Research.

Every research programme needs a champion: few are fortunate enough to get one as able as Brian Huntley, the manager of the Ecosystems Programmes at the CSIR. His energetic commitment to the Savanna Programme was crucial to its success. Other key personnel were the CSIR liaison officers Gudran Schirge, Tisha Greyling and Marie Breitenbach; Peter Frost, scientific coordinator of the programme for many years; Ernie Grei, the on-site senior technician; and field assistants Kazamula Baloyi, Fanie Baloyi, Caine Mashishi, Katrina Nkgumane, Ephraim Masunga, John Hlongwane, Samuel

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Hlongwane, Johannes Ngobeni and Simon Molekoa. The writing of this book would not have been possible without the help of Mary Scholes.

Savannas cover one third of South Africa, but this bald statistic cannot begin to express their importance in the national sense-of-place. For South Africans returning from abroad, the sight of a dry, tawny-coloured grass layer, with a broken canopy of trees, is the essence of homecoming.

Present address:  
R. J. Scholes, Division of Forest Science and Technology, CSIR, Pretoria, South Africa.