Long-term burning experiments: Revisiting the Brotherton Burning Trial

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In 1980, large portions of the Drakensberg were under the control of the Department of Forestry, who had a fairly regimented policy of burning the grasslands every second spring. Although this was a sound policy from the point of view of clean water production, there was very little information on the effect of this burning programme on plant species diversity. To answer this question, Colin and Terry Everson, researchers at the Cathedral Peak Forestry Research Station, together with Ed Granger, established the Brotherton Burning Trial on top of the spectacular Brotherton ridge. Twenty-four years later, the Eversons, together with a dedicated group of scientists and technicians from a variety of institutions and disciplines, returned to see what had happened in the intervening two decades.

The trial consisted of twelve replicated burning treatments in three blocks and a number of unreplicated demonstration treatments. The plots are 25x25 metres, and the treatments consisted of all of the commonly applied burning programmes in the Drakensberg. All four seasons were represented at annual or two-yearly burning intervals, as well as a fire-protected treatment and a five-year spring rotation, amongst others.

Between 1980 and 1990, the Eversons made many useful observations on the species diversity, productivity and growth patterns of the plants on the Brotherton trial. Those first ten years of data provide a fascinating insight into the behaviour of montane grasslands and their common species over time.

The former Natal Parks Board (now KZN Wildlife) took over the management of Cathedral Peak and the Brotherton trial in 1990. The forestry research station was dissolved and the researchers moved on to other jobs. Very little research work was done in the next few years. In the summer of 1999, several of the treatments were surveyed by Roger Uys, a MSc. student from the University of Cape Town; and the author surveyed some of the treatments in early 2001 using the same technique that the Eversons had used. Rob Scott-Shaw, a botanist at KZN Wildlife, also collected much data on key species affected by fire. None of these surveys fully addressed the original key question posed by the Eversons: what is the long-term effect of different fire regimes on plant species diversity?

As funding for KZN Wildlife began to diminish and the expense and toil of maintaining the trial became more burdensome, questions were asked about the usefulness of the trial. The journey from the offices at Cathedral Peak to the trial is a bone-jarring drive of well over an hour, depending on conditions, and this trip had to be made many times a year at great cost in labour, materials and fuel. Several of the treatments had to be discontinued for practical and logistical reasons.

In the winter of 2000, a huge wildfire swept through most of the Drakensberg, including the Brotherton ridge. At this point, the future of the trial looked decidedly shaky. Nevertheless, many people still felt that the trial had not been utilised to its full potential. So the trial was maintained, despite opposition from some quarters, for another three years.

It was against this background that, in the beginning of 2003, a small group of people came together at the University of KwaZulu-Natal in Pietermaritzburg to discuss what information could be obtained from the trial. Represented at the meeting were entomologists, soil scientists, botanists, grassland scientists, ecologists, geographers and managers from KZN Wildlife, the KZN Department of Agriculture and Environmental Affairs, the Agricultural

Research Council, the University of KwaZulu-Natal, the Council for Scientific and Industrial Research and the Maloti-Drakensberg Transfrontier Project.

The outcome of that first meeting, and months of planning thereafter, was a comprehensive survey of the Brotherton Burning Trial. At the end of January this year, a group of scientists and technicians from those various institutions booked into the new Didima camp at Cathedral Peak for what was to be a week of exhilarating and exhausting fieldwork.

Seven of the treatments are still applied (notwithstanding the wildfire of 2000): annual and biennial autumn, annual and biennial spring, alternating autumn and spring burns, the five-yearly spring burn, and the no-burn treatment.

Colin Everson (CSIR) and Terry Everson (UKZNP) surveyed the trial using the same technique as they had used before: a 200-point survey with the Levy bridge. Rob Scott-Shaw (KZN Wildlife) and Roger Uys (MolDrak) surveyed plant diversity using quadrat-based techniques to obtain frequency scores, combined with the dry-weight rank method. They also used $1m^2$ circular quadrats to survey a number of key species which may be good indicators of different fire regimes. Debbie Swanepoel (KZN Wildlife) surveyed all the treatments using Tongway's (undated) Landscape Function Analysis technique. The author surveyed basal cover in the plots using the method of Hardy and Tainton (1993), as well as taking undisturbed soil core samples from each plot at two depths to determine soil bulk density. John Usher and Jon Lawrence, from Cedara, took composite soil samples at four depths using beta samplers. These will be analysed at Cedara's Soil Fertility lab by Alan Manson and his team. Two weeks later, some of those people joined Michelle Hamer (UKZNP) for a day to help her auger holes and place pitfall traps to survey soil invertebrate diversity.

Of course, bitter experience has shown that data filed away in dusty archives can be worse than useless if they are not published. The Brotherton Project (for want of a better name) will be published as a series of papers, hopefully combined into a special issue of a peer-reviewed journal.

This project, small though it is, is an exciting multi-disciplinary and inter-institutional collaboration that will hopefully lead to lasting professional relationships between the institutions and people involved. In this age of shrinking budgets and retrenchments, no one doubts that this is the only way forward for ecological research in South Africa.

Acknowledgments

Many people were involved in the planning and surveying of the trial, and several others generously offered their services if needed. Among the latter were Drs Ed Granger and Trevor Edwards. Tad Dorasamy loaned the team undisturbed core samplers and associated equipment. Petros Ngwenya and Henry Hlela's botanical knowledge helped speed up the fieldwork greatly, while Anita Ramkisson, Carol Goge, Sonja Kruger, Derek Ruiters, Alan Manson, Charmaine Uys and Saskie Lovell assisted with scribing and many other tedious tasks. A large part of the planning was carried out by Ian Rushworth, Richard Lechmere-Oertel, who provided funding and other support, and Craig Morris, who provided invaluable statistical advice and helped to keep us focused on the scientific objectives of the trial. In addition to the above, the following people were present at the original planning meeting, and provided much valuable input: Prof. Mike Wallis, Charles Hunter, Richard Kinvig, Doug van Zyl and Prof. Kevin Kirkman.

References

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NB: see pictures on back page

Royal Society / BIOTA Colloquium: Adaptations in Desert Fauna and Flora

Apollo Theatre Victoria West 26th-29th August 2004

Collaborative Multidisciplinary research in the Arid Zone has been progressing for some years under the impetus of the BIOdiversity Monitoring Transect Analysis in Africa funded from Germany and including independent studies by southern African biologists.

In order to publicise Arid Zone research in southern Africa, the Royal Society of South Africa in conjunction with BIOTA, are hosting a Colloquium on Adaptations in Desert Fauna and Flora in Victoria West at the end of August 2004.

The preliminary agenda includes sessions which focus on the botany, zoology and ecosystems of the desert as well as multidisciplinary sessions. Plenary speakers include Prof. Gretel van Rooyen (Department of Botany, Pretoria University), Prof. Peter Grubb (Plant Sciences Department, University of Cambridge UK), Prof. Sue Milton (Department of Nature Conservation, Stellenbosch University), Dr. Richard Dean (Fitzpatrick Institute of Ornithology, University of Cape Town), Prof. Graham Mitchell (Department of Zoology and Physiology, University of Wyoming), and Dr. Guy Midgley (NBI Kirstenbosch).

Please register before 10 June 2004. Prof John Skinner and BIOTA can be contacted for further details. Email address john.skinner@up.ac.za as well as contact@biota-afric

REGIONAL NEWS

KwaZulu-Natal - Region

Prestige Grazing Symposium: Grassland Management in South Africa Yesterday, Today, Tomorrow.

By Caryn Rauff

Grassland scientists, agricultural advisors, representatives from KZN Wildlife, foresters, environmental consultants, interested parties and university students met on the 10th March at the Neil Tainton Arboretum at the University of KwaZulu-Natal, Pietermartizburg to chew over issues relevant to grassland management today and discuss ways to improve the grassland management of tomorrow. The University and the Grassland Society of southern Africa in association with the KwaZulu-Natal Department of Agriculture hosted the symposium. Speakers included Dr Terry Olckers (School of Biological Sciences UKZN), Prof Kevin Kirkman (HOD Grassland Science UKZN), Mr. Justin du Toit (Grassland Science UKZN), and Dr. Alastair Paterson (Stockowners). Mr. Richard Hurt chaired the programme and a panel of experts drawn from the various institutions initiated discussions around the topics presented. Both the presentations and the discussions that ensued were very interesting and raised some pertinent issues. Attendance on the day was also excellent, and the audience represented a wide range of activities including forestry, wetland management and commercial farming. Hard copies of the Proceedings are available from the Administrator for R20 including postage and a detailed summary of the discussion.