grass roots

Newsletter of the Grassland Society of Southern Africa

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Grasslands Biodiversity Programme update

Fire and species dynamics

New bursaries available

Goat study group in KZN

Editorial

Dear Members

The outraged response to David Rattray's murder has been overwhelming, from a country that has had enough of crime. David Rattray was a true South African who lived, and didn't just talk, reconciliation. Why am I talking about David Rattray? He wasn't a member of the Society, or even a grassland scientist by profession, as we all know, but he studied Grassland Science at the then University of Natal in Pietermaritzburg along with many of the familiar names in our field.

I never took the opportunity to travel to Rorke's Drift and listen to his spellbinding tales of the Zulu War, and now it's too late. He will be sorely missed by his friends and loved ones, and also by many who never met him.

* * *

The GSSA is continuing its association with the National Grasslands Biodiversity Programme. Lala Steyn gives an update on the programme on page 24. Major, internationally funded conservation and development programmes such as the Grasslands Programme are initiatives where the Society can play a very important rôle, because of the wide-ranging expertise of our members.

Alan

The Grassland Society of Southern Africa is dedicated to the advancement of the science and practice of range ecology and pasture management.

We welcome any contributions to the Grassroots*, in the form of news, informative articles, reports, short research notes, scientific papers and letters to the Editor. Email Alan.Short@dae.kzntl.gov.za or admin@gssa.co.za or fax 033-3559 605 or 033-390 3113*

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Upcoming events

From www.gssa.co.za

Enviro Summit 2007: Integrated Environmental Management—How Sustainable Is Your Environment?

Date: 26-28 February 2007
Venue: Birchwood Conference Centre, Johannesburg
Website: www.iqpc.co.za/cgi-bin/templates/genevent.html?topic=479&event=11856&

Conservation and Development Strategy for the Maloti-Drakensberg Transfrontier Conservation Area: Workshop

Date: 13-15 March 2007
Venue: Howick, KZN (details to follow)
Contact: Charmaine Pollock
charmaine@maloti.org
033 239 1880

South African Soil Surveyors' Organisation Workshop

Date: 14 - 16 March 2007
Region: Elsenburg, Breederiver valley and Grabouw
Website: www.sasso.co.za
Contact: Martiens du Plessis
martiens@nwk.co.za

The 5th KNP Science Networking Meeting

Deadline for registrations: 16 February 2007
Date: 16 - 20 April 2007
Venue: Skukuza Goldfields Auditorium, Kruger National Park
Contact: Jackey Deacon
dot@mpu.co.za
082 447 1570

SANSOR Annual Congress 2007

Date: 3 - 4 May 2007
Venue: Spier Estate Conference Centre, Stellenbosch
Further details will be announced in February 2007
Contact: Melody Elliott (012) 349 1438/9

21st Annual Conference of the Society for Conservation Biology

Date: 1 – 5 July 2007
Venue: Nelson Mandela Metropolitan University, Port Elizabeth
Website: www.conbio.org/2007

The sixth extinction - conserving zoological biodiversity: 33rd meeting of the Zoological Society of Southern Africa

Date: 8 - 11 July 2007
Venue: North-West University, Potchefstroom
Website: www.natural-events.com/ZSSA/

4th World Environmental Education Congress

Dates: 2—6 Jul 2007
Venue: International Convention Centre, Durban
Early Bird Registration Deadline: 15

January 2006
Website: www.weec2007.com/

Joint 42nd Annual GSSA Congress & 3rd Annual Thicket Forum Meeting : 21st Century Challenges: Range, Forage and Thicket
Date: 16 - 20 July 2007
Venue: Eden Grove, Rhodes University, Grahamstown
Contact: Freyni du Toit admin@gssa.co.za.
Website: www.gssa.co.za/congress2007

XXVIIIth International Union of Game Biologists Congress
Deadline for submission of abstracts: 15 February 2007
Deadline for early registration: 2 June 2007
Date: 13 - 18 August 2007
Venue: Uppsala, Sweden
Website: www-conference.slu.se/iugb2007/

RTEP 2007 -ERTEP 2007 - First International Conference on Environmental Research, Technology and Policy: Building Tools and Capacity for Sustainable Production
Date: 17 - 19 July 2007
Venue: La Palm Royal Beach Hotel, Accra, Ghana
Website: www.ertep2007.uwo.ca/
E-mail: ERTEP07@uwo.ca

Joint International Rangeland/ International Grassland Congress China 2008

The Joint International Rangelands and International Grasslands Congresses will be held in China in 2008. The main theme of the Congress is "*Multi-functional Grasslands/ Rangelands in a Changing World* ", with a range of session themes that should accommodate most interests.

Sessions include themes on rangeland ecology; plant breeding; water relations; multi-use rangelands; education and training; cropping systems; weed and pest control; conservation; livestock production systems; and many more.

A wide variety of pre– and mid-congress tours are planned, which will be an exciting opportunity for many to see local production systems and explore the landscapes of this vast country.

For more information on the Congress and how to register, visit the Congress website at www.igc-irc2008.org

News

Funding opportunities for post-graduate research

A number of post-graduate funding opportunities have been advertised at various Universities.

For more information, visit www.gssa.co.za and click on the "funding opportunities" link.

Postgraduate Opportunities in Benthic Ecology and Biodiversity

Institution: University of Cape Town 2007
Topics: Marine invertebrate biodiversity, ecology and/or systematics.
Contact person: Prof Charles Griffiths at UCT (021-6503610)
Email:
clgriff@pop.uct.ac.za or Griffith@egs.uct.ac.za.

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3 MSc studentships: BIOTA - Southern Africa (Phase III)
Each bursary is worth approximately R40000, but for the latter two bursaries below there are good opportunities to apply for co-funding to raise this to R65000.

Projects:
1) Effects of termites (*Macrotermes* spp.) on soil chemistry in Namibia.
2) Effects of fog and dew on soil respiration in Namaqualand.
3) Effects of fog and dew on plant physiology in Namaqualand.

Deadlines:
Candidates need to be chosen during 2007. The projects can run 2007-2008 or 2008-2009. However, there will be a 'first come first serve' situation. If a suitable candidate applies, he/she will be given the bursary.

Contact: Dr Charles Musil
musil@sanbi.org

Dr Anthony Mills
mills@sanbi.org

Post doc opportunity:

Institution: School of Animal, Plant and Environmental Sciences, University of Witwatersrand
Topic: examining the impact rodents have as seed predators on vegetation, with field work in Kruger and Nylsvley nature reserve.
Commencing: May 2007
Contact person: Dr. Anouska Kinahan
Kinahan@gecko.biol.wits.ac.za
or Prof. Neville Pillay
neville@gecko.biol.wits.ac.za
Address: University of Witwatersrand, School of Animal, Plant and Environmental Sciences, Private Bag 3, Wits 2050, South Africa
Tel: 011-717 6452 (office); 073 325 8351
Fax: 011-403 1429

'Turn words into actions' Rwandan president urges

Kimani Chege
31 January 2007
Source: SciDev.Net

[ADDIS ABABA] Rwandan president Paul Kagame has urged fellow African presidents to heed calls by the continent's scientists for increased funding.

He also reminded them of the need to bridge the gap between promised intentions and concrete deeds.

Speaking at the African Union (AU) summit held in Addis Ababa, Ethiopia, on Monday (29 January), Kagame said that "we must be mindful that statements of intent do not remain just that â€“ statements".

Kagame said that the recommendation from African science ministers to set aside one per cent of gross domestic product for science, technology and research was not enough.

"Is this not too little too late?" he said, adding that countries need to raise the amount but also plan how best to use the money to benefit society.

"Clearly it is not just about investment in science and technology, but also about improving the efficiency of this investment for greater impact on all aspects of national life."

Kagame pointed out that Rwanda was currently spending 1.6 per cent of its gross domestic product on science and technology, but hoped to raise it to three per cent in the next five years.

This would draw it level with spending common in the developed world. The current AU average is less than 0.5 per cent.

He said that African leaders and policymakers "got it right" in 1980 when they insisted that Africa needed to use science and technology as the basis for the continent's socioeconomic development, a commitment expressed in the so-called Lagos Plan of Action.

"Twenty-seven years later, that statement still rings true," he told the summit.

His comments came shortly after strong pleas to support science and technology were made by Calestous Juma, chairperson of the AU's high-level panel on biotechnology (see African presidents urged to boost science), and the AU commissioner for human resources, science and technology, Nagia Essayed.

Kagame's comments have received wide support among African scientists, many of whom see him as a champion of science and technology across the continent.

Ghana's president John Kuffor — who was voted next chair of the AU — noted the urgent need for heads of states to work together on issues of science.

The Goat Study Group in KwaZulu-Natal

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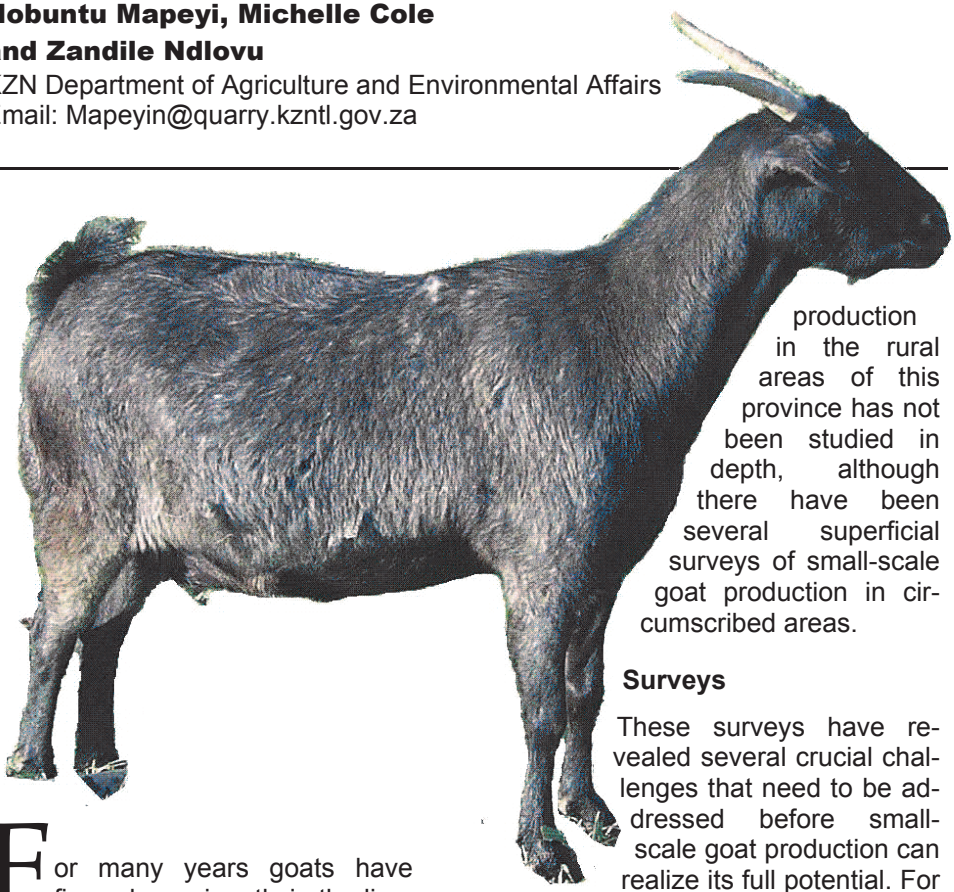

For many years goats have figured prominently in the livestock-holding patterns of small-scale farmers in KwaZulu-Natal, but the importance of this role has not been fully recognized or supported by research and extension. In particular, small-scale indigenous goat production in the rural areas of this province has not been studied in depth, although there have been several superficial surveys of small-scale goat production in circumscribed areas.

Surveys

These surveys have revealed several crucial challenges that need to be addressed before small-scale goat production can realize its full potential. For example, both established and new-entrant farmers must be able to access quality breeding stock and the lack of organised goat sales makes it difficult for the goat producers to sell young stock. These aspects have been compounded by the

commercialisation of large-scale goat production which led to increased demand and elevated prices. Unfortunately for local producers, the increased demand was met, largely, from out of province or by imports from Namibia.

While there is a breed society for Boer goats which can support the large-scale producers of this breed, there is no breed society that can support or assist the small-scale producer farming with indigenous goats.

It was also found that the majority of small-scale goat producers lack business skills and generally do not appreciate the full value of their goats, either in their culture or as a possible source of income.

One of the very important results of these surveys was the finding that the staff of the KwaZulu-Natal Department of Agriculture and Environmental Affairs realized the lack (or the inadequacy) of goat production information. Major lacunae were identified in respect of the economics of goat production particularly in respect of business planning; preventative herd health management for goats especially the control of internal parasites; and goat nutrition.

Studies in human nutrition have indicated that a large portion of the Black population is unable to digest cows' milk and this suggests that there could be a sustained demand for goats' milk and goats' milk products. While interest in milch goat production was constant, it appeared that meat production was the most important focus area.

Study trips

The present wave of interest in goat production was sparked by a couple of talks on milk goats that were broadcast on the eight rural radio stations that participate in the Department's radio initiative. This surging interest led to study trips being organised and to the formation of partnerships within the goat industry. Within KwaZulu-Natal a trip was undertaken August 2005 to identify milk goat breeding stock. This was followed by five farmers and six officials from the KwaZulu-Natal Department of Agriculture and Environmental Affairs travelling to Limpopo in early December 2005 where they saw Indigenous, Boer and Kalahari Red goats produced for meat, as well as Saanen milch goats.

After the visit to Limpopo, a feedback workshop was held and this, in turn, led to the formation of the KwaZulu-Natal Goat Study Group in February 2006 to support and mobilise goat farmers and owners and to organise events in their best interests. The activities of the Group are run by a small Steering Committee.

Information days

The first activity was the Goat Information Day held in May 2006 at Cedara. The day was an overwhelming success, with over 700

Nobuntu Mapeyi

people attending including goat owners; goat farmers; prospective goat farmers; departmental staff interested in goats; representatives of other departments and agri-businesses and NGOs.

Experts in a number of fields were invited to talk on almost every aspect of goat production. Talks were given on nutrition and health management; browsing and bush encroachment control; kid rearing and fostering; branding and security; and marketing. Several goat farmers, both small-scale and commercial, shared their experiences with the audience.

Goat producers in the southern parts of KZN considered this day so informative that it was followed by a 2-day Goat Information Workshop in July at Cedara Research station; eighteen people attended including farmers, Departmental staff and NGOs. A second workshop was held In August 2006 at the Dundee Research Station to cater for goat producers in the northern areas; approximately 100 small-scale farmers attended. Another Goat Information Day was held at Ndwedwe later and 38 farmers and 10 Technicians attended, as well as representatives from the veterinary sector. A further goat information day was held at Jozini in January and another is scheduled for Eshowe in February during 2007.

Training

General herd health and management of goats was identified as a priority. Since internal parasites were one of the major goat herd health problems identified in the initial surveys, the decision was taken to provide practical training on determining the worm burden and the need for strategic dosing (by using the so-called FAMACHA chart). Such training was organised by Departmental staff and offered

at:

- Pongola - 18 farmers (at present all own goats and want to commercialize their goat production) and 4 Departmental technicians
- Mandeni - 24 farmers and 5 representatives of different co-operatives).
- Cedara Research Station where the 8 Departmental technicians and 1 scientist from Ilembe, Ndwedwe and Maphumulo were trained.
- Cedara College - Commodity Training session for retraining extension officers conducted in conjunction with the College
- Maphumulo - 3 farmers trained at their homesteads
- Mzimkhulu - 30 farmers and 7 Departmental staff.

It was gratifying to note that the farmers responded very well to the concept of strategic dosing and the training in the use of the FAMACHA chart. Ten farmers bought the FAMACHA charts.

Goatkeepers' Veterinary Manual

Under the auspices of the Goat Study Group, more than 500 copies of the Goat Keepers' Veterinary Manual (produced by the Onderstepoort Veterinary Institute in conjunction with the Department) were distributed to farmers at information days and during farm visits and in response to telephonic requests. Several of the founder members of the Goat Study Group were instrumental in the compilation of this manual and although it preceded the development of the Group, it did serve as a powerful catalyst in consolidating enthusiasm for goat production within the Province. This illustrated, easy-to-use manual is produced in full-colour and is available in English and Zulu.

The Goat Study Group formulated a business plan which served, in respect of goat production information, to encourage the two administrative regions (North and South) of the KZN Department of Agriculture and Environmental Affairs to work closely together since requests that come to Cedara are from the whole province. The business plan, in recognizing the powerful role that radio has played in this project, allows for regular news items on goat-related issues to sustain community interest in small-scale goat production.

The Future

The demand for information on goats has been huge, and has lead to exciting directions in future research and extension activities in the Department. Cost-effective solutions to address poor kidding percentages, high mortality (especially in winter), and slow growth rates in communal farming areas need to be explored, and the Department has begun a number of research trials to address some of these issues.

Short-term influence of fire in a semi-arid grassland on (8): two less palatable grass species (*Cymbopogon plurinodis* and *Elionurus muticus*)

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Introduction

The problem of selective grazing in semi-arid grassland areas, especially as the season's progress, is well known to South African farmers (Danckwerts and Teague 1989; Tainton and Mentis 1984; Tainton *et al.* 1993). In these areas characterized by a moderately high rainfall, moderate summer temperatures and cool winters, the various dominant grass species mature rapidly during the growing season and progressively decline in palatability and nutritive value with advancing maturity (Booysen and Tainton 1984). *Cymbopogon plurinodis* and *Elionurus muticus* are the two species causing more selective grazing problems in these areas than any other species, their unpalatability being due to volatile oils apparently (Opperman *et al.* 1974; Snyman 1999; Danckwerts and Teague 1989). Consequently, undesirable practices such as extensive burning in winter followed by intensive grazing and/or overstocking are adopted in an attempt to utilize these problem species (Booysen and Tainton 1984; Everson 1999). This invariably leads to severe defoliation of palatable species and an eventual deterioration both of the vigour and botanical composition of the grassland (Mentis and Tainton 1984). The same problem occurs with accidental or run-away fires where the above two species are actually rescued from either overgrowth or smothering due to fire and therefore compete more strongly the following season for water and nutrients than the more palatable plants, which were defoliated the previous season and may have less growth reserves and poorer root systems (Snyman 1998). Therefore it was the objective of this study to quantify the short-term (three years) impact of an unplanned or accidental head fire on the dynamics of the unpalat-

able grass species (*C. plurinodis* and *E. muticus*) in an attempt to establish guidelines for its management.

Procedure

Research was conducted on the Witfontein farm, 16km outside the town of Zastron (30° 15' S, 27° 10' E, altitude 1 652m), which is situated in the semi-arid (summer mean average 629mm) region of South Africa. Rain falls almost exclusively during summer of which 65% occurs from November through March, with a peak (15% of the total) in March. The study area is situated in the moist, cool, Highveld grassland. The botanical composition of the study area was determined by Van der Westhuizen *et al.* (2001) and Van der Westhuizen (2003) from the 1986/87 to the 1999/00 seasons. The grassland was in good condition for commercial livestock production purposes and consisted of a dense sward of perennial grasses such as *Cymbopogon plurinodis*, *Themeda triandra*, *Digitaria eriantha* and *Elionurus muticus*. Perennial grass cover diminished with overgrazing in these areas. Species such as *Eragrostis chloromelas* and poor perennials like *Microchloa caffra* and *Aristida* species are more abundant. Soils in the study area are mostly fine sandy loams of the Estcourt form (Haarlem family – 2200). Clay content increases with soil depth from 11% in the A-horizon (0-300mm depth), to 19% in the E-horizon (300-400mm) and 39% in the B-horizon (400-600mm depth).

The burn treatment was a single accidental wind-driven head fire that occurred on the morning of 27 August 2000, generally a windy time of the year. Moreover, it was a wind-driven head fire (Trollope 1978). The soil and grass fuel were very dry at the time of burning as only 10mm of rain had fallen in the two months preceding the fire. Spring rains of 65mm fell one week after the burn, resulting in regrowth of the grass sward.

No information on fire behaviour could be gathered, as it was an unplanned grassland fire. Due to small temporary roads across the farm, the fire did not burn in a straight line across the farm, but in patches. The research was conducted on six plots of 30 x 30m^2 each, which were randomly set out on the same soil form; half of them on the burnt area and half on unburnt patches. The experimental layout was a fully randomized design with three replications for each treatment. Grazing history of all plots before the fire was assumed to be the same because the sites were set out in the same camp. Experimental layout is fully discussed in Snyman (2003a, 2004a). Grasses in the unburnt plots were cut at a height of 30mm 1 week after the fire. The burnt and unburnt grassland were studied from the 2000/01 to 2002/03 growing seasons (September to April). At the end of

each season (April), every treatment was cut at a height of 30mm. This was to compare growth between burnt and unburnt plots. All plots were excluded from livestock grazing for the three-year trial period, with no further accidental fires occurring. Before the fire the grassland was grazed according to the recommended grazing capacity for this grassland type, namely 6ha LSU^{-1} (Van der Westhuizen 2003), during which it was grazed only twice during the growing season for a two-week period with merino sheep.

Botanical composition was determined with a bridge-point apparatus, where 500 points (nearest plant and strikes) were recorded per plot at the end of each growing season. A benchmark site (Van der Westhuizen 2003) was used on the same soil form as the experimental layout, to compare the botanical composition of both the burnt and unburnt plots. Grassland condition was determined according to the method of Fourie and Du Toit (1983). When the species were classified, their desirability in terms of grazing value (dry matter production, palatability, nutritive value, whether perennial or annual and grazing resistance) as well as their ecological status (Decreaser and Increaser species), as defined by Foran *et al.* (1978), were considered. The classification of dry *Themeda-Cymbopogon* grassland into different ecological groups as described by Fourie and Visagie (1985) was used.

Plant density was determined by counting whole plants within 20 (0.5 x 0.5m) randomly placed quadrats per plot at the end (April) of each growing season. The quadrats were randomly distributed over every plot for each treatment.

At the end of each growing season, 20 tufts of each of the dominant grass species per plot were randomly selected to measure their basal area. This was accomplished by copying only the living parts of every grass tuft onto a transparency, after which the drawn areas were cut out and sprayed with paint to determine the area of each species, using a leaf area meter. To accurately determine the area, this was only done after the selected tufts were cut.

Herbage production or regrowth was determined for each plot at the end of each growing season (April), by clipping plants to a height of 30mm in 20 randomly selected quadrats of $1m^2$ each. The productions of the species *Cymbopogon plurinodis* and *Elionurus muticus* were separated from that of the rest of the species.

Results and discussion

Vegetation botanical composition

The species composition and mean grassland condition score of the experimental plots before the fire and four months thereafter, as well as that of a benchmark site, are presented in Table 1. The experi-

Table 1: Frequency (%) of species, ecological status and veld condition score for the grassland before and four months after burning, as well as that of a benchmark site. Percentages of a species within a row with different superscripts differ significantly (P≤0.01).

Ecological status	Species	Bench-mark	Experimental site	
			Unburnt	Burnt
Decreaser	*Andropogon appendiculatum*	0.5[a]	0.5[a]	0.2[a]
	Brachiaria serrata	3.2[a]	0.2[b]	0.2[b]
	Digitaria eriantha	8.2[a]	6.4[b]	1.7[c]
	Harpachloa falx	0.4[a]	0.5[a]	0.4[a]
	Helictotrichon turgidulum	1.0[a]	0.6[b]	0.4[b]
	Panicum stapfianum	0.2[a]	0.1[a]	0.1[a]
	Themeda triandra	25.2[a]	22.4[a]	14.6[b]
Decreaser total		***38.7***	***30.7***	***17.6***
Increaser II(a)	*Cymbopogon plurinodis*	34.2[a]	27.2[b]	18.6[c]
	Eragrostis chloromelas	9.5[a]	11.1[a]	19.6[b]
	Eragrostis plana	0.6[a]	2.0[b]	4.1[c]
	Setaria spacelata var. *torta*	3.4[a]	8.4[b]	13.6[c]
Increaser II(a) Total		***47.7***	***48.7***	***55.9***
Increaser II(b)	*Elionurus muticus*	9.8[a]	18.2[b]	12.4[c]
	Aristida diffusa	0.4[a]	0.5[a]	0.6[a]
Increaser II(b) Total		***10.2***	***18.7***	***13.0***
Increaser II(c)	*Aristida congesta*	0.5[a]	0.5[a]	1.4[b]
	Cynodon hirsutus	0.2[a]	0.5[a]	1.7[b]
	Eragrostis nindensis	0.2[a]	0.1[a]	0.1[a]
	Microchloa caffra	2.3[a]	0.6[b]	8.4[c]
	Eragrostis gumniflua	0.2[a]	0.2[a]	1.9[b]
Increaser II(c) Total		***3.4***	***1.9***	***13.5***
Increaser II Total		**61.3**	**69.3**	**82.4**
Veld condition score LSD(0.01) = 54.1		**765.1**	**724.6**	**632.8**
Veld condition (%)		**100**	**94.7**	**82.7**

mental plots were in good condition before the fire with a grassland condition score of only 5.3% lower than that of the benchmark site (Snyman

Table 2: Mean plant density (plants/m) in unburnt (UB) and burnt (B) grassland as measured at the end of the 2000/01 to 2002/03 growing seasons. Data (n = 60) are

Ecological status	Species	Season 2000/01	
		UB	B
Decreaser	*Andropogon appendiculatum*	1.42(±0.14)	
	Brachiaria serrata	1.23(±0.11)	
	Digitaria eriantha	4.16(±0.21)	
	Harpachloa falx	9.26(±0.21)	
	Helictotrichon turgudulum	3.11(±0.12)	
	Panicum stapfianum	1.11(±0.09)	
	Themeda triandra	22.21(±1.21)	11.91 (±1.12)
Decreaser total		***42.5[a]***	***11.91[b]***
Increaser IIa	*Cymbopogon plurinodis*	7.71(±0.61)	11.69
	Eragrostis chloromelas	11.29(±1.11)	(±1.35)
	Eragrostis plana	1.22(±0.16)	5.55(±1.21)
	Setaria spacelata var. *torta*	25.25(±8.14)	6.67(±0.92)
Increaser IIa Total		***45.47[a]***	***23.91[b]***
Increaser IIb	*Elionurus muticus*	13.21(±1.31)	18.19
	Aristida diffusa	1.29(±0.96)	(±2.16)
Increaser IIb Total		***14.50[a]***	***18.19[a]***
Increaser IIc	*Aristida congesta*		
	Cynodon hirsutus	1.91(±0.15)	
	Eragrostis nindensis	1.62(±0.19)	
	Microchloa caffra		3.33(±1.15)
	Eragrostis gumnuflua	2.22(±0.61)	2.92(±0.90)
Increaser IIc Total		***5.75[a]***	***6.25[a]***
Increaser II Total		**65.72[a]**	**48.35[b]**
Total		**108.22[a]**	**60.26[b]**

2000). Due to the fire the grassland condition score decreased (P≤0.01) with 12.7% four months after the fire.

Where the grassland contained a large percentage Decreaser species (30.7%) before the fire, it was dominated by Increaser II species (82.4%) after the fire. Especially the Increaser IIc species increased most due to the fire. The most conspicuous decrease (P≤0.01) in fre-

means and standard errors. Numbers within a column with different super-scripts for each season, differ significantly (P<0.01)

Season			
2001/02		2002/03	
UB	**B**	**UB**	**B**
1.33(±0.09)		1.32(±0.09)	
1.33(±0.09)		1.35(±0.07)	
433(±0.09)		2.32(±0.92)	2.35(±0.15)
8.19(±0.96)	2.32(±1.11)	5.36(±0.95)	3.32(±0.65)
2.26(±0.91)	1.32(±0.61)	3.62(±1.21)	1.56(±0.50)
1.34(±0.09)		1.33(±0.07)	
26.27(±3.15)	12.92(±1.36)	25.19(±1.26)	13.13(±1.11)
45.05[a]	***16.56[b]***	***40.49[a]***	***20.36[b]***
6.31(±0.94)	13.15(±2.14)	6.31(±1.52)	14.52(±3.16)
9.23(±1.27)	6.23(±1.15)	7.36(±0.66)	5.55(±0.91)
1.33(±0.09)		2.36(±1.51)	2.32(±0.50)
21.21(±1.53)	7.72(±1.21`)	31.39(±3.15)	5.52(±0.36)
38.08[a]	***27.10[b]***	***47.42[a]***	***27.91[b]***
11.11(±0.32)	21.92(±1.06)	11.86(±1.52)	18.91(±1.11)
1.71(±0.92)		1.43(±0.07)	1.36(±0.09)
12.82[a]	***21.92[b]***	***13.29[a]***	***20.27[b]***
			1.36(±0.09)
		1.38(±0.06)	1.62(±0.06)
		1.52(±0.51)	1.63(±0.07)
	3.33(±1.52)		3.36(±0.96)
2.31(±0.34)	2.22(±2.51)	2.36(±0.61)	2.32(±0.66)
2.31[a]	***5.55[b]***	***5.26[a]***	***10.29[b]***
53.21[a]	**54.57[a]**	**65.97[a]**	**58.47[a]**
98.26[a]	**71.13[b]**	**106.46[a]**	**78.83[b]**

quency due to fire was the species *Digitaria eriantha*, *Themeda triandra*, *Cymbopogon plurinodis* and *Elionurus muticus*. The species increasing (P≤0.01) with fire were *Eragrostis chloromelas*, *E. plana*, *Setaria sphacelata* var. *torta*, *Microchloa caffra*, *E. gummiflua*, *Aristida congesta* and *Cynodon hirsutus*. *Microchloa caffra* increased due to fire from only 0.6% of the total species composition to as

much as 8.4%. It seems that grassland in excellent condition is dominated by *C. plurinodis*, while the relative abundance of *E. muticus* and *T. triandra* are also high.

Plant density

As the grassland of the whole trial area was in uniformly good condition before the fire, it seems reasonable to assume that the plant density was statistically (P≤0.01) decreased by the fire (Table 2) for the full three seasons following the fire. The plant density of the burnt grassland was still 26% lower than that of unburnt grassland for the three years following the fire. Although the density of Decreaser species declined enormously (P≤0.01) the first growing season due to the fire, it still did not return to that of unburnt grassland three growing seasons after the fire. Since the second growing season following the fire, the density of Increaser species had started to differ statistically non-significantly (P >0.05) from that of unburnt grassland.

Cymbopogon plurinodis and *Elionurus muticus* were the two species increasing the most (P≤0.01) in density over the three year trial period due to the fire. Three year after the fire the density of *C. plurinodis* was 14.52 plants/m versus the average for the species over the three years of only 6.78 plants/m. Especially notable was that during the third year after the fire, the larger *C. plurinodis* tufts did not allow other plants in their immediate vicinity to successfully establish and develop due to competition. Large conspicuous open spaces started appearing around *C. plurinodis*. The density of *Eragrostis* species remained relatively constant over the three growing seasons regardless of fire. The species only occurring in burnt grassland were *Microchloa caffra* and *Aristida congesta*. Except for those species with a low occurrence and only found in the unburnt grassland, *Setaria sphacelata* and *Themeda triandra* were the two species decreasing most in density over the three years due to fire.

Tuft basal area

Among all species the tuft basal area of *C. plurinodis* was the highest and varied between 10.15 and 77.11cm^2 (Table 3). Taking unburnt grassland as reference, the tuft basal area of this species was stimulated most by fire, increasing 252% over the three year trial period. The large tufts formed by especially *C. plurinodis* and *Themeda triandra*, generated much combustible material, therefore leading to the significant (P≤0.01) decrease in basal cover due to die-back, the first year after the fire. The tuft basal areas of *Digitaria eriantha*, *Harpochloa falx* and *T. triandra* decreased significantly (P≤0.01) over the three years. The fire did not significantly (P≤0.01) influence the tuft basal areas of the rest of the

Table 3: Mean tuft basal area/cm of only living parts, for the unburnt (UB) and burnt (B) grassland as measured at the end of the 2000/01 to 2002/03 growing seasons. Data (n = 60) are means and range in brackets. Numbers within a column with different superscripts for each year, differ significantly (P≤0.01).

Species	Season					
	2000/01		2001/02		2002/03	
	UB	B	UB	B	UB	B
Cymbopogon plurinodis	17.15 (16.13-17.28)	11.27[b] (10.15-14.16)	19.46[a] (16.24-22.16)	49.22[b] (28.28-51.62)	19.25[a] (16.25-21.25)	67.74 (47.21-77.11)
Digitaria eriantha	9.15 (8.15-10.22)	7.16[b] (6.15-9.15)	9.14[a] (6.22-11.15)	6.15[b] (5.22-8.15)	9.16[a] (7.22-10.15)	7.13[b] (6.11-9.15)
Eragrostis chloromelas	5.15 (4.11-6.55)	5.24 (4.01-6.22)	5.61 (4.15-7.22)	5.18 (5.00-7.22)	5.01 (4.62-7.11)	5.21 (4.02-7.15)
E. gumniflua	6.17 (5.21-7.82)	6.14 (5.22-6.99)	6.42 (5.21-7.32)	6.22 (5.21-7.14)	6.16 (5.01-7.11)	5.15 (4.15-6.22)
Elionurus muticus	6.86 (5.66-7.81)	6.98 (5.91-7.15)	7.00 (4.16-8.15)	7.17 (5.21-8.16)	7.10 (5.21-8.15)	7.12 (5.22-8.44)
Harpachloa falx	5.14[a] (5.01-6.10)	3.12[b] (3.00-3.15)	5.22[a] (5.01-5.36)	3.61[b] (3.21-3.77)	5.10[a] (5.00-5.31)	3.81b (3.71-3.92)
Helictorichon turgidulum	5.24 (5.02-5.71)	4.14 (4.02-4.66)	5.51 (5.41-5.61)	4.31 (4.11-4.53)	5.26 (4.89-5.41)	4.71 (4.61-4.89)
Setaria spacelata var. *torta*	2.15 (1.89-2.61)	2.14 (2.01-2.21)	2.32 (2.11-2.42)	2.21 (2.03-2.29)	2.22 (2.11-2.33)	2.31 (2.10-2.42)
Themeda triandra	11.36[a] (10.15-12.01)	7.15[b] (6.88-7.36)	12.01[a] (11.55-12.66)	7.21[b] (6.98-7.82)	11.89[a] (11.21-12.22)	7.25[b] (6.88-7.86)

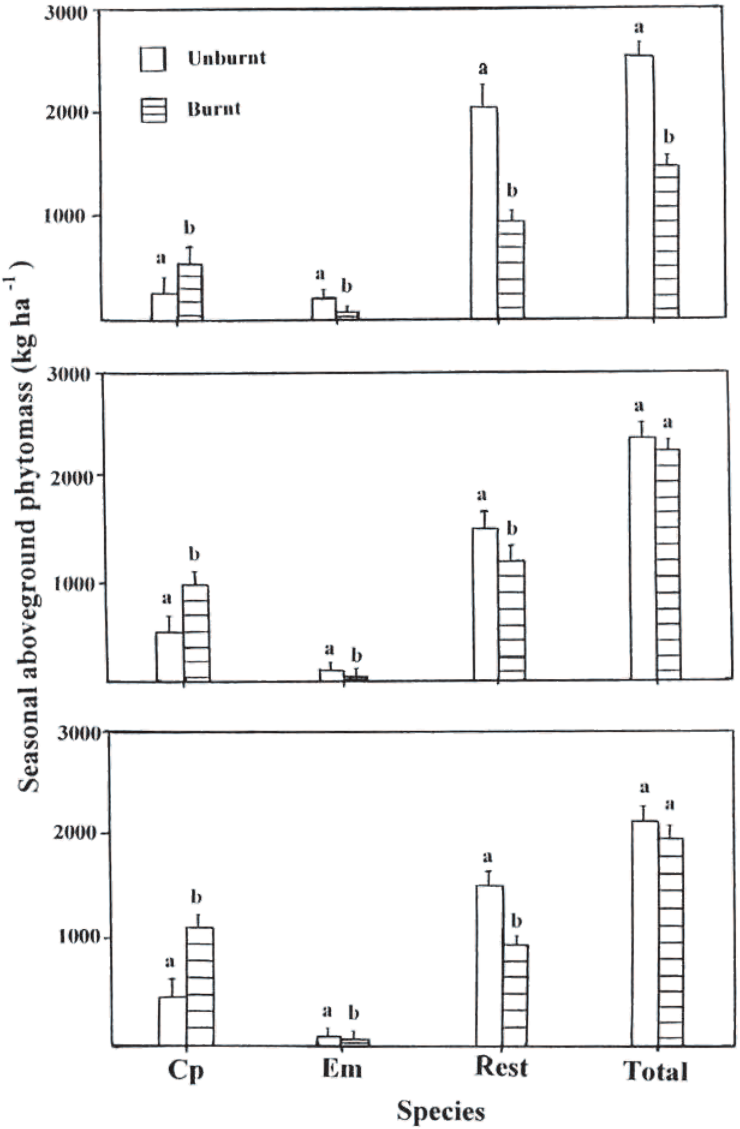

Figure 1: Mean (±SE) seasonal aboveground phytomass production (kg/ha) for *Cymbopogon plurinodis (Cp), Elionurus muticus (Em),* rest of species and total for all species. The unburnt and burnt grassland were measured over the 2000/01 (A), 2001/02 (B) and 2002/03 (C) growing seasons. Numbers within a species with different superscripts, differ significantly (P≤0.01).

species.

Aboveground phytomass production

The rainfall for the 2000/01, 2001/02 and 2002/03 growing seasons (1 August to 30 April) were 686, 620 and 592mm respectively and did not differ much from the long-term average of 629mm for the study area. The production or regrowth of *Cymbopogon plurinodis* was significantly (P≤0.01) increased by fire for all three seasons (Figure 1). In contrast, the production of *Elionurus muticus* and the rest of the grass species were decreased (P≤0.01) by the fire over the three seasons studied. Throughout the three seasons, *Elionurus muticus* had a low production due to the fire, even dropping as low as 82% the first season after the fire. The production of *Cymbopogon plurinodis* notably increased during the second and third growing seasons following the fire compared to the rest of the grass species. At the end of the second season following the fire, the production of burnt *C. plurinodis* was only 29% lower than that of the rest of the grass species in total. Three years after the fire, the production of *C. plurinodis* was 18% higher than the total production of the rest of the species that also burnt.

Only during the first season the total production of all species significantly (P≤0.01) decreased with 42% due to fire. At the end of the second and third seasons after the fire, the production of burnt grassland was only 4.6% and 2.5% lower (P>5) than the unburnt grassland.

Conclusions

This study makes a useful contribution towards understanding the dynamics of the grass species *C. plurinodis* and *E. muticus* and their reaction to burning. As these species dominate grassland in large parts of the semi-arid grassland, its correct management, whether burnt or not, is essential for sustainable utilization of this grassland ecosystem. With grassland degradation due to selective grazing in the study area *E. muticus* can increase drastically at the expense of species such as *C. plurinodis*, *T. triandra* and *E. chloromelas* (Danckwerts and Teague 1989; Van der Westhuizen 2003). With degradation due to overgrazing *E. chloromelas*, *C. hirsutus* and *E. plana* will increase at the expense of species such as *C. plurinodis*, *E. muticus*, *T. triandra*, *H. falx* and *H. contortus* (Van der Westhuizen 2003). Probably the most significant changes in grassland condition in this grassland type are due to selective grazing. According to Opperman *et al.* (1974) the unpalatable *E. muticus* causes more selective grazing problems in South Africa than any other single species. If the grassland is also subjected to burning, it will further complicate management as clearly shown in this study.

This study conclusively showed that there is no need for burning in this grassland type and that burning only further complicates its management. The grassland should be utilized efficiently without burning (Snyman 2003b, 2004b). The burning of grassland in semi-arid areas can create a situation where the old materials of previous seasons of more sour grasses like *C*. *plurinodis* and *E. muticus*, which are more poorly utilized than the more palatable grasses, are removed and the sour grasses rejuvenated in this way. The sour grasses have a built-in survival mechanism in that they get the opportunity to complete their annual life cycle due to their unpalatability (Opperman *et al.* 1974; Roberts and Opperman 1966; Opperman *et al.* 1970). They seeded and build-up growth reserves. By burning such grassland the sour grasses are rejuvenated in spring by rescuing them from old material which would have lead to smothering of the tuft (Snyman 1989), leading to increase in tuft size of *C*. *plurinodis* and *E*. *muticus* as observed in this study. This is supported by Shackleton (1989) who argued that tiller population of *C*. *plurinodis*, whose tillers survive a maximum of two years, are eventually eliminated by complete protection from grazing, because tiller mortality is marginally increased and tiller recruitment is suppressed (Shackleton 1989). However, they increase under annual or biennial burning or annual harvesting, because the increased production of secondary tillers compensates for the increased mortality of harvested or burnt tillers (Shackleton 1989). In contrast, according to most researchers, *E. muticus* can't successfully be "grazed out" nor "rested out" in the short-term (Opperman *et al.* 1974), while the tufts of *C. plurinodis* do not readily become moribund and die under controlled selective grazing for the higher rainfall areas (Danckwerts and Teague 1989).

It can further be speculated that the grassland in this study investigation would probably not have been accompanied by the very dominating large *C*. *plurinodis* tufts, three years following the fire if it was utilized in the spring of the first year after the fire, at a high stocking rate. According to Lűtge (1995) and Morris (2002) early grazing after a spring burn will minimize patch grazing. Ring *et al.* (1985) similarly noted that patches were least distinct under early intensive stocking. Where grassland has become severely encroached, fire followed by non-selective grazing with cattle, has resulted in a marked decrease of *C*. *plurinodis* and an increase in *T*. *triandra* in the Eastern Cape (Danckwerts and Teague 1989). In contrast, *E*. *muticus* cannot be controlled by non-selective grazing (Danckwerts and Teague 1989). The following of further pressure grazing periods in well-spaced successive spring periods with sufficient rest between may also give

rise to a more stable botanical composition of the study area. There may be a further danger that the grazing capacity of the burnt grassland may be totally overestimated due to the large component unpalatable plants, which are poorly utilized. This study should therefore be followed by an investigation into the ideal utilization of burnt grassland in this semi-arid grassveld area for sustainable utilization of the grassland ecosystem.

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Grasslands Programme Update

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The latest news from the Grasslands Programme…good and bad

The bad news is that the UNDP GEF intersessional work programme that should have been held in December last year to finally approve the Grasslands implementation budget was postponed until June 2007. This means that our core implementation funding has been delayed for a second time. This development is beyond our hands and those of our colleagues at UNDP GEF who have been so supportive in the programme to date.

The good news is that SANBI and DEAT have met and considered the implications and developed a strategy to enable the programme to proceed in the interim. We are also cautiously hopeful that the GEF June 2007 meeting will happen and that the funds will flow three to four months thereafter.

In short, although we don't have the $8.3million that we have requested from UNDP GEF for the five year implementation plan in the bag yet, we do have resources and commitment from DEAT and SANBI to continue and have a developed a strategy for programme activities until March 2008. We have no intention of stopping.

We also have significant stakeholder commitment to the programme, with various government, private sector and civil society organisations actively undertaking important work in the

grasslands
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grasslands biome which we need to share and reflect upon.

The level of support and interest that the Grasslands Programmre enjoys was evident at the 1st Annual Grasslands Partners Forum, held at SANBI in Pretoria from 23 - 24 November 2006. Over 150 people attended the Forum, with solid representation across the organisational and production sectors that the Programme is working in. With the opening address from Dr Steven Cornelious, Head of Department at GDACE, the Forum provided an opportunity for production sectors (agriculture, coal mining, forestry and urban), national, provincial and local government to meet and discuss the planned interventions in the different sectors and seek consensus on key content issues. The 2nd Partner's Forum will occur in October 2007.

The other good news is that SANBI has appointed a full time Grasslands Programme Manager who will be based in the SANBI Pretoria office from April this year. This is Anthea Stephens who is presently working for the urban component of the programme as a consultant. Anthea brings years of experience in managing complex environ-

Alan Short

mental programmes having been the Acting Director of the IUCN-SA Country Officer in her previous job. She holds an MSc in Environmental and Geographical Science. Florence Nazare remains with the Programme on a full time basis in the programme (based in Pretoria) and Lala Steyn remains on as a part-time consultant (based in Cape Town).

Anthea is very excited about the job saying: "*This is an innovative and exciting initiative that has a real ability to demonstrate concrete opportunities for effectively involving economic sectors in the conservation of biodiversity. This is a long-held passion of mine, and is what I believe equips me with the drive and commitment to provide the leadership, management and strategic direction required of the Grasslands Programme Manager."*

What is the implementation strategy for February 2007 – March 2008?

This strategy involves (i) implementing scaled back activities within key areas, and (ii) prioritizing human resource needs accordingly. Work within the various sectors will occur as follows:

Urban

A full time Urban Coordinator will be appointed on a 3 year contract to continue the work that Anthea has begun. This person will be located within the offices of GDACE. The urban coordinator will be responsible to roll out the urban implementation plan commencing implementation of activities around securing the 12 biodiversity priority sites in Gauteng, as well as formalizing partnerships with provincial agencies, local municipalities and the private sector in Gauteng through various agreements. The Coordinator will work on the development of a toolkit to assist decision-makers mainstream biodiversity into land use planning and management. It is anticipated that service providers will be contracted to provide inputs on the following aspects: Complete the institutional mainstreaming effectiveness scorecard with municipalities; Develop guidelines for urban eco-estates; Develop guidelines for securing urban conservation land; and Make a case for the value of biodiversity in an urban setting.

Forestry

Appointment of a forestry service provider on a part time basis over a 12 month period to continue the forestry work already begun. This person will be based in Pietermaritzburg. S/he will be responsible to initiate activities as set out in the detailed implementation plan (developed by James Jackelman) to secure biodiversity priority sites on unplanted forestry land. S/he will also be responsible for developing detailed implementation plans for the two other streams of work in the forestry component, i.e. on small

Newly appointed Grasslands Programme Manager Anthea Stephens and Grasslands Programme Officer Florence Nazare

growers and policy aspects.

Agriculture

The Agriculture Coordinator will be appointed by SANBI to be based in Pretoria by July/August this year to spearhead this component. S/he will pick up on important policy issues in the agricultural sector. These include the various draft policies being developed by DoA, such as on range and forage; the cabinet approved biofuels strategy; and taking the work forward regarding red meat certification through engagement with the private sector.

The Wakkerstroom agricultural demonstration implementation plan will be complete by March/April this year. The next step is project set-up with partner organisations such as MTPA and DALA, and the initiation of implementation activities, with a possible focus on developing the process for the declaration of a "protected environment" (PE) under the Protected Areas Act by the MEC for the area surrounding the Paardeplaats Nature Reserve of MTPA. The Wakkerstroom work will be taken forward through the appointment of a service provider on a 12 month contract. The Agricultural Task Team visits the area on 7th until 9th March undertaking a field visit, viewing conservation stewardship and biodiversity friendly land management on farm and engaging with local farmers.

The Free State river ecosystems demonstration implementation plan will be completed by April/May this year. Thereafter work in this component will go on hold until GEF funds are available.

Coal mining

The report on how and where to pilot the establishment of a wetland mitigation banking scheme in the coal mining sector will be completed within the first quarter of this year. It will be distributed to stakeholders for comment. Thereafter work in this component, which will be implemented through Working for Wetlands, will go on hold until GEF funds are available.

Communications

The Grasslands Programme has enhanced the body of knowledge on the biodiversity of the grasslands biome and the impact of production sectors on the biome. Existing staff will focus on producing and distrib-

1st Annual Grasslands Partners Forum, 23-24 November 2006

uting this information in an accessible format to raise awareness around the importance of the biome and the activities of the Grasslands Programme. This will involve preparing factual publications, developing a regular newsletter and a website for the Programme. A publication on "what stakeholders are doing for biodiversity in the grasslands biome" and a "lessons learnt during programme development" is also planned.

A reminder of what the Grasslands Programme is about

This bioregional programme aims to sustain and secure biodiversity and associated ecosystem services of the grassland biome for the benefit of current and future generation. The mission is:

- To ensure that the wise management of biodiversity contributes to sustainable development in the grasslands biome
- To ensure that production and development activities are appropriately located and managed, so that the deliver of ecosystem services is not impaired
- To mobilize and empower land users and landowners, including companies, to be effective stewards of the landscape.

The strategic approach of the programme is mainstreaming biodiversity in production sectors and the chosen sectors are agriculture (rangeland and cultivation), forestry, coal mining and urban development in Gauteng.

How do stakeholders participate in the Grasslands Programme?

The **Grassland Steering Committee** provides strategic direction to the programme and consists of the following institutions: DWAF, DEAT, DoA, AgriSA, Forestry SA, GDACE, UNDP/GEF, WWF The Green Trust and SANBI.

The **Grasslands Partner' Forum** meets annually to provide a forum for stakeholders to discuss key strategic issues facing the grasslands biome. The November 2006 Forum was well attended by over 100 participants from government, private sector and civil society.

The **Grasslands Urban Team** was born out of the Gauteng Urban Development and Biodiversity workshop that was attended by 74 people from 31 institutions held in July 2005. There are 13 members

(GDACE, 3 metros, 3 DMs, 3LMs, 1 NGO, 1 professional association, SANBI). The Team has identified 12 priority sites in Gauteng for conservation action and has designed the log frame for the urban component of the programme.

The **Forestry Task Team** was formed out of the Forestry Development and Grasslands Biodiversity workshop that was held in September 2005 and consists of representatives from: SANBI, DWAF, Forestry South Africa (FSA), large timber growers, small/emerging timber growers, private timber growers, Ezemvelo KZN Wildlife, Mpumalanga Tourism and Parks Authority, the E Cape Dept of Economic Affairs, Environment and Tourism, civil society and research institutions. The design team has developed a high level log frame for the forestry component of the programme with the following areas for intervention:

- Industry wide interventions to mainstream biodiversity
- Securing permanently unplanted forestry land that are priority sites for biodiversity and ecosystem services
- Expansion of new plantations

The **Agriculture Task Team** has representation from the Agribusiness Chamber, AgriSA, NAFU, Red Meat Producer's Organisation (RPO), National Emerging Red Meat Producer's Organisation (NERPO), Grain SA, Wildlife Ranching SA and the national Department of Agriculture. The team is being expanded to include the ARC, representatives from the provincial departments of agriculture in KZN and Mpumalanga; representatives from provincial conservation agencies/environment departments in Mpumalanga, KZN and the Free State; and the National Woolgrowers Association. A Wakkerstroom Task Team will be established to provide direction and oversight to the implementation of the Wakkerstroom agricultural demonstration project. A Steering Committee for the Free State river ecosystem demonstration is in place.

Once GEF funds are secured a **Coal Mining Task Team** will be established.

A full list of documents available from the Grasslands Programme is available separately and at: www.sanbi.org/frames/biodiversityfram.htm and follow the link to Bioregional Programmes and Grassland Project

Who can be contacted for more information?

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Joint 42nd Annual GSSA Congress & 3rd Annual Thicket Forum Meeting

21st Century Challenges: Range, Forage and Thicket

16 – 20 JULY 2007 • Eden Grove • Rhodes University • Grahamstown

The 42nd Annual Congress of the GSSA will be held in association with the 3rd Annual Thicket Forum Meeting at the Eden Grove complex at Rhodes University, Grahamstown. The Joint Organising Committee would like to invite all those interested in participating in the Congress to submit the Registration Form giving titles for papers and posters.

Grahamstown is situated in an area of great biological diversity, where a range of biomes and land uses are found: from subtropical thicket to grasslands, savannas and the Karoo, and from dairy farming to communal rangelands and wildlife conservation. The Congress aims to reflect the great diversity of rangeland types, uses and challenges found around Grahamstown, and a range of post-Congress tours are planned to complement these themes:

1. Ecological research and management issues in game reserves and conservation
2. Pastures and dairy farming
3. Veld management and rehabilitation challenges and initiatives, and
4. Developments and initiatives in communal rangelands.

SYMPOSIUM: Applying Plant-Herbivore Interactions Theory to Range Management

Prof Fred Provenza of the Department of Wildland Resources, Utah State University and head of the BEHAVE: Behavioral Education for Human, Animal, Vegetation, & Ecosystem Management Program, will be presenting the keynote address entitled "Application of animal behaviour to management of rangelands".

Currently, other speakers include Prof Peter Scogings of the University of Zululand (Browse responses to herbivory/plant defence theory: how far have we come in 30 years?), Dr Luthando Dziba of the Agricultural Research Council (Behavioural and physiologic responses of herbivores to plant biochemical defences), and Dr Susi Vetter of Rhodes University (Diet selection: implications for population dynamics/scaling up from functional response to numerical response).

A limited number of openings for presentations in this symposium are available. If you would like to contribute a presentation, either as a poster or as a platform, please contact admin@gssa.co.za.

JOINT 42ND ANNUAL GSSA CONGRESS & 3rd ANNUAL THICK FORUM MEETING
DELEGATE REGISTRATION FORM

(Fax to + 27 (0)33 390 3113 or email to admin@gssa.co.za)

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Title:		Initials:		First Name:	
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SCIENTIFIC PROGRAMME			
Do you intend presenting:	Platform? (tick)		Poster? (tick)	
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ACCOMPANYING PERSON DETAILS					
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REGISTRATION COSTS								
CATEGORY						EARLY	NORMAL	TOTAL
Grassland Society of Southern Africa Member Delegate						R 1 750.00	R 2 100.00	
Non-Member Delegate						R 2 050.00	R 2 400.00	
Residence Accommodation (Mon Evening to Fri Morning)						R 500.00	R 600.00	
All Students including Residence Accommodation						R 2 250.00	N/A	
Day Delegate	TUES	WED	THURS	days X		N/A	R 600.00	
Accompanying Person						R 900.00	R 1 050.00	
Airport Shuttle: Port Elizabeth – Grahamstown Return						N/A	R 300.00	
Post-Congress Tour: please choose tour	1	2	3	4		N/A	R 120.00	
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BANKING DETAILS: Nedbank Cheque Account 1343011299 Cascades Branch 134325

PLEASE NOTE:

1. All costs include VAT.
2. Registration costs include all meals (except breakfasts and Wednesday evening).
3. Residence accommodation is in a single room with hand basin and a communal bathroom. Breakfast is included.
4. Accompanying persons will be catered for during lunches and evening events.
5. Early registrations should be PAID IN FULL by 30 April 2007. Thereafter, normal registration fees are payable.
6. The congress organisers reserve the right to charge a cancellation fee on all registrations cancelled after 6 July 2007.