

September 2019

Volume 19

Number 3

All the news from

GSSA 2019

Certified organic, pasture-based, poultry production

When tree planting damages ecosystems

New GSSA President introduced

Advancing Rangeland Ecology and Pasture Management in Southern Africa

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Newsletter of the Grassland Society of Southern Africa
Grassroots



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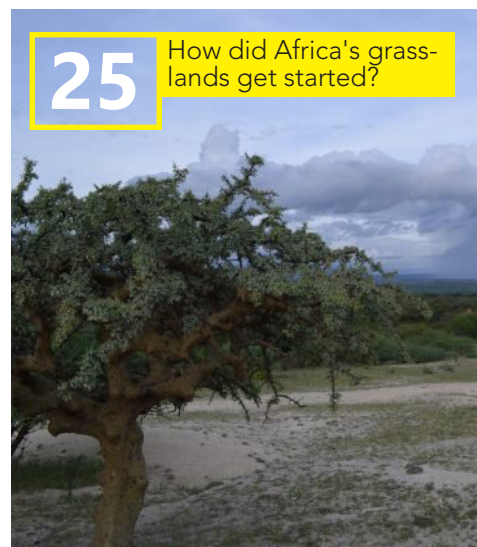
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From our editor

Welcome to another issue of Grassroots!

The 54th congress of the GSSA was recently held in Upington. This was a great success and delegates enjoyed the diversity of the Northern Cape. This year the congress started differently where tours were held at the beginning of the event and ran concurrently with the Research Skills Workshop: An introductory course to the statistical programme, R. Despite the windy weather, field trips were enjoyed by many. A brief summary and some photographs are included in this Grassroots. Congress officially opened on Monday evening and attendees enjoyed the variety of presentations, posters, discussion sessions and network opportunities. This issue of Grassroots contains some of the highlights of the event.

In this issue, Justin du Toit presents

us with a neat solution to what the singular word is for cattle. Something useful for next time we need to refer to a single bovine animal!

The Grassroots photo competition is going well and, in this issue, we congratulate our overall winner, Sigrun Ammann, on her photo titled "Lush kikuyu/ryegrass pasture at the foot of the Outeniqua mountains". Well done Sigrun! Please continue to support our competition and carry on submitting your interesting photos.

Good news is that we have had confirmation from the South African Council for Natural Scientific Professions (SACNASP) that authors of feature articles can now claim a single CPD point for each article submitted, so please keep us updated with your feature articles.

Until next time, happy reading!

Janet



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Cover Photo

Sigrun Ammann

Lush kikuyu/ryegrass pasture at the foot of the Outeniqua mountains
Grassroots photo competition winner, August 2019.



@GrasslandSociety-
ofSouthernAfrica

Despite the care and attention that we devote to the structure of this newsletter and the information it contains, the Grassroots Editorial Team cannot guarantee the completeness and accuracy of the data. The opinion expressed in each article is the opinion of its author and does not necessarily reflect the opinion of the editorial team.

Presidential Address, 54th Annual Congress of GSSA: 1 July 2019

Tony Swemmer

Current Address: SAEON Ndlovu Node, NRF, Phalaborwa

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Welcome to the 54th Annual Congress of the Grassland Society of Southern Africa. We are glad to see so many have made it all the way up to Upington here in the Northern Cape. The last congress held in the Northern Cape was in Kimberley, in 2010, and this year we have brought you even deeper into this vast region. Travelling here, one is reminded why this is such a suitable location for a GSSA congress, with so many rangelands and fairly pristine grassland and savanna ecosystems still remaining in this part of the country.

I would like to begin with an overview of some highlights for the Society over the past year. We have seen improvements in both the Society's publications. The African Journal of Range and Forage Science has had an increased number of submissions over the past year, and the ISI impact factor for our journal increased to 1.17 for 2018. This is close to the peak in 2015, and a reversal of the declines seen in 2016 and 2017. This re-affirms the upward trend in the ISI impact factor since 2015. We managed to produce a special edition in AJRFS last year, with another in progress this year, and another planned for next year. Grassroots, our on-line newsletter, has also been maintained, and with an increased number of views this year. The finances of the Society are stable, and we have managed to remain solvent and have made substantial progress in working through the backlog of audits that dates back to 2015. The GSSA Trust has been re-invigorated, with a new group of trustees having recently taken over. We have had many new members joining the society over the past year, including many from countries other than South Africa, and many young members. The number of speakers at this year's congress from outside of South Africa is also testament to the increasing exposure of the society to the international research community.

Anyone wanting to hear more details on these developments, and more on state of the society should please attend the AGM, which is tomorrow evening. However, I would like to now highlight an issue of concern for the society. While we have had many new members joining this year, there has been a long-term decline in membership. Membership

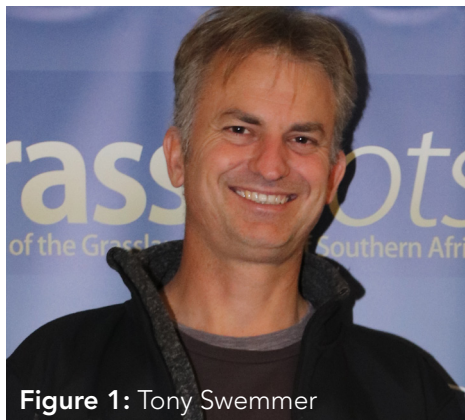


Figure 1: Tony Swemmer

was in the 300s for 2000's, and peaked at 407 in 2013. It has steadily declined since then, dropping below 300 for the first time in 2018, when we had 266 members. This year we have only 235 members so far, many of whom have not paid and therefore are not actually members, strictly speaking. What is the cause of this decline, and what does it mean for the future of the Society? This is a challenge for our future, and we need to think about what changes are needed to grow membership again. Or perhaps GSSA needs to become a smaller, more focused organization to survive?

When thinking about these questions, consideration must be given to the social and political context within which these changes have occurred. GSSA was born and evolved under a particular set of social and political circumstances. In the past, rangeland, pasture and ecological departments at universities

were larger. Academics working there probably had more time to devote to voluntary work at professional societies. Agriculture received far more support from the state, with more active agricultural institutions and extension services. These conditions enable GSSA to grow and develop. Over the past decade, we have experienced a number of changes that have challenged the Society, as well as most other professional societies in the country. These include a decline of grassland-related departments at universities, with fewer academics and less spare time for those academics that remain. The administration of public funds has changed substantially, making it more and more difficult for members working at state-funded institutions to attend. We have had many cases recently where members want to attend congress but have not been able to due to delays in getting permission to pay registration and travel costs. We have also seen the emergence of more professional societies since the establishment of GSSA, many of which compete with us for members and delegates. These include the South African Association of Botanists, the Arid Zone Ecology Forum, the Thicket Forum, the South African Wildlife Management Association, the Savanna Science Networking Meeting of SANParks and the Land Rehabilitation Society of Southern Africa. There has been a change in public interests, and the focus of politicians and academics, with grassland conservation and ecology receiving more attention, and agricultural sciences less. Finally, the arrival of the digital revolution and the start of 4th Industrial Revolution. Even massive, highly successful corporations are concerned with the rapid changes and uncertainty these bring for the near future.

It is not only the social and political context that has seen rapid change over the past decade, but also the very systems that the Society was established to study and protect. We are now well into

the Anthropocene Era, and all of the earth's ecosystems have been affected by human impacts in one way or another. In South Africa, the figure that is normally mentioned is 60%, in terms of the extent of grasslands that have been irreversibly transformed. I am not sure how old that figure is, but the true value these days is likely to be even higher. The other 40% is not pristine. Only 2.5% of our grasslands are considered to be protected. Even in these areas changes to historical fire and herbivory regimes, now elevated CO₂ and climate change, mean that these ecosystems are changing. While much grassland has already been lost, we are also now seeing small gains in grass-dominated ecosystems

the council meetings were conducted using video-conferencing. While this is not the ideal way to have meetings, it enabled council to meet regularly without substantial cost to the society. We have also revised the constitution over the past year, in order to modernize it.

Most of the changes however, have been done in a reactive way, and were changes required to keep up with our core functions and maintain 'business as usual'. Currently, hosting an annual conference, a scientific journal and a newsletter consumes almost all the resources of the Society. These are important functions, and even if we only manage to keep these going, that will

ship of ranchers and their participation in our meetings, on our programmes, and as officers of our organisation, has given the Society a vitality it would not have had otherwise. Of more importance, this relationship has probably speeded up the practice of conservation on our nation's rangelands."

I do not have the answers the various questions I have raised here, but we do have some ideas on what changes are needed. Change requires creative thinking and willingness to take risks and embrace uncertainty, and open discussion, and I hope we will engage in this over the course of this week and beyond.



Figure 2: 54th Annual Congress Group Photo: Louise Swemmer

due to the abandonment of crop fields and mining areas. The novel ecosystems that develop in these areas will slowly but surely become a significant portion of the grassy ecosystems of South, and later southern Africa.

How has GSSA evolved to keep up with all these social, political and environmental changes, and how should the society adapt to further changes in the near future? Well, GSSA has evolved to some degree over the past decade. Our membership has become far more representative of the general population of the region, although not yet at the council level. We have made some digital transitions, with our newsletter now on-line and use of GSSA page on Facebook. This year, for the first time, all

be a big achievement under current circumstances.

However, it is always good to ask if we should be doing more, and what should we be doing differently? Particularly considering the issue of the affordability of an annual conference with a smaller membership. Something that we could consider doing more of is trying to influence policy, and engaging more with practitioners who make key decisions regarding the management of rangelands and pastures. This has been raised many times in the past, and I found a reference to it as far back as 1983, in the GSSA presidential address by P.F du Toit. He mentioned an excerpt from the Journal of Range Management, which he 'heartily endorsed': "The member-

To end, I would like to thank my fellow Council members, as well as our GSSA Administrator, who have kept the Society going. Then of course a thank-you to all the delegates who have made the effort to be here this week. I wish us all the best for this conference, and hope the collegiality and networking that is mentioned for so many past congress is repeated here in Upington this year.

I hope the presence of older delegates will prove to be an inspiration and source of motivation to our younger members. Please remember that the primary purpose of this event is to share knowledge, so that what remains of our grasslands and savannas can be managed in a way that enables them to survive the Anthropocene.

Debbie Jewitt, new GSSA President, introduced

Sigrun Ammann

Current Address: Research and Technology Development,
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 Email address: SigrunA@elsenburg.com

Debbie originally hails from Benoni in Gauteng. After matric she enrolled at the then University of Natal for a BSc Agric majoring in Grassland Science under Prof Neil Tainton. During the university vacations Debbie often joined a team of scientists in the

Mpumalanga Lowveld doing veld condition assessments and vegetation surveys fuelling her passion for the "bush". Following her undergrad degree she went to UCT to complete an MSc in Conservation Biology. Her research project at the time was concerned with

plastic pollution on beaches. That was already considered a problem all those years back. More recently Debbie completed her PhD at Wits University looking at land cover changes and climate change, linked to the work she is doing at Ezemvelo KZN Wildlife quantifying the changes that are taking place in the vegetation and land use in the province.



Figure 1: Immediate past president Dr Tony Swemmer congratulates Dr Debbie Jewitt for being elected as president of GSSA for the 2019/20 year (Photo credit: Clement Cupido)

Debbie has a wide range of work experience. She started off with the ARC in KwaZulu-Natal where she was posted at the Kokstad Research Station in southern KZN to lead the well-established veld research programmes in the High-land Sourveld on the research station. Some years later Debbie expanded her skills by becoming a programmer for a number of years. However her passion has always been and is for the environment and wildlife. Debbie then had the opportunity to join Ezemvelo KZN Wildlife as an ecosystem ecologist, where she has been for many years working primarily on land cover change, climate change and threats to biodiversity. Debbie extends her passion for the natural environment to her local community where she is actively participating in conservation initiatives and sets a good example of being an active citizen.

New challenges and expanding her skills set is something that Debbie enjoys and pursues. She is a qualified drone pilot (RPL) and is looking at how these new technologies can be used to assist in conservation research and brings with it working with people in many different disciplines. Debbie is a trainer for ESRI/SCGIS conservation GIS. Currently Debbie is an associate Editor for our journal, the African Journal of Range and Forage Science.

The range of experience that Debbie brings and being motivated to always give her best for any job she is doing are ideal capabilities for leading the GSSA as the current President. I wish Debbie well for the year ahead as the new GSSA President and the work she and the Council will be doing to ensure the continued success of our Society.

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CONGRESS DINNER

Photos: Clement Cupido





Feedback on sponsored attendance to the GSSA 2019 Congress in Upington

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Gina Arena

To whom it may concern,

The 54th Annual Congress held in Upington in the Northern Cape has been my first, and hopefully not last, annual meeting of the GSSA that I have attended. I knew that the society holds significant value and relevance in terms of research scope to my own doctoral research, and so attending the congress was on my academic bucket list. The programme of talks and posters did not disappoint, but instead were diverse in topic, geographical reach and scope within the field of rangeland ecology.

The keynote addresses had to be some of the most intriguing I have been fortunate to hear. In particular, I really enjoyed the keynote addresses by Jesse Nippert and Susi Vetter on the impacts of bush encroachment on hydrological processes in the central US grasslands, and plant-herbivore interactions in the Richtersveld, respectively. It was both inspiring, encouraging and fascinating to learn about the novel research that is being conducted by these experts and their students in very different environments. As a young aspiring scientist and academic, I was really encouraged when I saw how bold and confident one can be when it comes to testing novel hypotheses and doing research to resolve, sometimes the simple, unanswered questions that fill knowledge gaps. I have definitely come away with some new perspectives and fresh ways in which to approach my own work which has further renewed my enthusiasm and motivation to continue writing my doctoral thesis.

My experience of the conference did not fall short, but rather exceeded my expectations. I enjoyed meeting and networking with some of the experts in the field, many of whom I had not met before, and to hear about their own research from the talks and poster ses-

sions. What I considered to be the most valuable aspects of the conference were the keynote addresses, the poster sessions and hearing about the other research being presented. I also really enjoyed listening to the talks presented by several others on the long-term rainfall trends across the arid parts of the country, as this is a topic that I am interested in researching in my thesis. I was pleasantly surprised to see that the trends of increasing rainfall for my study region are not unique but can be detected in other parts of the arid regions. This opened opportunities to talk about this during the tea breaks with those speakers. I appreciate that annual meetings like the GSSA create new collaborative opportunities between people that do not usually get to work together regularly, and as a PhD student, this is profoundly important to me in the early stages of my career.

I am thankful for the chance to share some of the preliminary findings from my research and I learned something valuable about public speaking: sometimes it pays to start off with a good joke to ease my own tension, but also to get the audience interested enough to listen to me speak right to the end of my presentation (especially after lunchtime!). A bonus to the conference was the opportunity to meet with all my supervisors, which is not an opportunity that presents itself often. We made time outside of conference hours to meet and discuss my progress and next steps to be taken with my thesis.

I found the conference to be well-organised and free flowing from one session to the next. I thought that the use of the QR codes and scanners was smart and streamlined the process of checking attendance registers efficiently enough to not slow things down. I personally quite enjoy being involved with the running of things, so perform-

ing the duties that were assigned to me were not cumbersome or monotonous, but instead appealing to my personality type! Timekeeping can sometimes be rather nerve-wrecking in the beginning because you really do not want to mess up the timing for the speaker and be the cause for throwing them off their focus. So, what helped me to stay focused on timekeeping while also being engaged with the speaker's topic was to keep a notepad close by to tick off each time signal for each speaker.

Lastly, although I did not attend the Annual General Meeting as I am not a GSSA member, it was interesting to be given a nice summary of the GSSA's progress over the last year, by Tony Swemmer, at the opening of the conference. The gala dinner was most enjoyable and nice to see people dress up a bit too, to celebrate those who received awards, and to see some of the "more advanced in time" delegates having some fun on the dancefloor!

I would like to express my thanks and appreciation to the Grassland Society of Southern Africa and to the National Science and Technology Forum for sponsoring me to attend and present a talk.

Yours sincerely,

Gina Arena

Plant Conservation Unit



Biological
Sciences



GSSA Awards at Congress 54, Upington

Best Paper in the AJRFS in 2019: Shared between



Cherryl Walker, Suzanne J Milton, Tim O'Connor, Judy Maguire, Richard Dean
Drivers and trajectories of social and ecological change in the Karoo, South Africa.



Bettina Weber, Alexandra Tamm, Stefanie Maier, Emilio Rodriguez-Caballero
Biological soil crusts of the succulent Karoo: A review (Joh Henschel collecting the award on behalf of the authors.)

Best Presentation



Ralph Clark,
(Almost) As rich as the Cape!? - surprisingly high plant diversity and endemism in the montane grasslands of southern Africa.

Best Presentation by a Young Scientist



Naledi Zama, *Long-term nutrient enrichment effects on productivity, species richness and soils in a natural South African grassland.*

Best Research Proposal Poster



Ethan Britz, *The impact of temperature and water limitation on the germination of legume species in the genera Medicago and Trifolium.*

Best Poster



Derryn Nash, *The relative feed quality of tall fescue (Festuca arundinacea), cocksfoot (Dactylis glomerata) and perennial ryegrass (Lolium perenne) at Cedara, KwaZulu-Natal.*
(Donna Berjak collecting the award on behalf of Derryn Nash.)

Norman Rethman Planted Pastures Award: Not awarded

Faux Pas



Several nominations were received for this award this year, including: Winner – **Timm Hoffman**

Most prolific adjudicator (awarded for the first time in 2019):



Thank you to all delegates who participated by using the adjudication form on the Dryfta app. Including the hard copies, we had 791 adjudications for Congress 54. 232 were hard copies and 559 were electronic adjudications. 43 Delegates adjudicated electronically, well done!
The winner is, **Yvette Brits**

Prestige award of the Grassland Society of Southern Africa



Anthony Palmer receives his award for his lifetime contribution to grassland science and the society.

Photos taken by Clement Cupido

SOLAR ENERGY FIELD TRIP

Marco Pauw

Renewable energy has become an important part of South Africa's energy mix and has developed into a significant industry in the Northern Cape Province.

The vast open spaces and abundance of sunshine in the northern parts of the province especially lend itself to the de-

velopment of solar power plants. Several solar farms have been constructed already and many more are being planned.

This field trip looked at the different solar power technologies in use around Upington and their environmental foot-

prints within the area. Thank you to the tour leaders for organizing this trip: Eddie Rheeder and José Cayuela Olivencia for the Khi Solar One and Abrikus Agenbag for the Karoshhoek Solar One.

Photos taken by Marco Pauw.



KALAHARI FARM & AUGRABIES FALLS FIELD TRIPS

Prof Klaus Kellner and Marco Pauw

Kalahari Farm field trip

Prof Klaus Kellner (NWU) and Mr Paul Loots (farmer) lead a tour to the farm Uitsig, 35 km north of Upington. The tour examined sustainable land management practices on a typical Kalahari farm, including a rotational grazing system with small stock, bush encroachment control, and restoration after control. There was an opportunity to hear

about the eco-tourism and hunting operations on the farm. The tour finished with a visit to the farm stall.

Augrabies Falls field trip

Nardus du Plessis of SANParks lead this field trip to the iconic Augrabies Falls National Park. This field trip aimed to provide delegates with more knowledge about the history of the park, its

management, and the research being conducted there (including monitoring of the quiver tree population within the spectacular quiver tree forest in the far western part of the park). Participants got the opportunity to visit the falls and reflect on the importance of the Orange River in an otherwise extremely arid environment.

Photos taken by Heleen Els.





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Connect with us



A neat solution to a singular problem

Current Address: Grootfontein Agricultural Development Institute, Middelburg, Karoo
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Justin du Toit

What is the singular of 'cattle'? (Hint – there is one.) Not 'cow' – those are female cattle. Similarly, not bull or ox or steer or heifer.

A bovine? That's also too general, encapsulating buffalo and bison and yaks. Sometimes people say a 'beast', presumably with the Afrikaans 'bees' as its origin, but here images of wolves and dark forests, or perhaps simply non-human animals, swamp us.

Some have ended up with awkward entanglements such as "one head of cattle".

The problem of course is that the word 'cattle' is what is termed a *plurale tantum*, a noun that appears only in the plural form and does not have a singular variant. This is in contrast with words such as 'jeans' or 'sheep' or 'wheat',

where the singular and the plural forms are the same. Cannon too – there is no such thing (or no such things) as 'cannons'.

Perhaps it is the origins of the word that caused the problems – 'capitale' in Medieval Latin meant 'property' or 'stock', morphing later to the Anglo-French 'cattel' with the same meaning, later being taken to mean livestock of any kind, and later still livestock of the bovine form.

But good news! There is a term, considered archaic now, but in desperate need of being lifted out of the bin and dusted off. The word is "neat". "Neat" refers to a cow, a bull, a heifer, et cetera, in other words the singular of 'cattle'.

"Never heard of that" one may mutter, but probably you have. Those with an affinity for things horsey or leathery

might well know "Neatsfoot Oil" – an oil rendered from the shin-bones and feet (not hooves) of cattle. This oil is commonly used as a preservative and softener of leather.

So there we have it – the singular of 'cattle' is 'neat'.

Recognising the need for the term, and knowing now that a word already exists, should be enough for us to start using it.

"Cattle and sheep grazed together in a group, one neat being fitted with a GPS collar for the purpose of recording their position" one might easily imagine reading in a manuscript published in a scholarly journal.

So who will be the first to use it? Into your starting blocks...



Photo Competition Entry: Research in Action

Trial site: Krwakrwa communal rangelands, Alice, Eastern Cape Photo: Tanki Thubela

Photo competition

Cover Photo Winners

01 - Overall winner

Sigrun Ammann
Lush kikuyu/ryegrass
pasture at the foot of the
Outeniqua mountains



02

Terry Calmeyer
Donga caused by erosion in the
Eastern Cape



03

Sigrun Ammann
The road to the pasture trials at Out-
eniqua Research Farm with George and
Cradock peak in the background



Photo competition

Research in Action Winners



01

Teddy Kinyanjui

Re-seeding using dryland native 'seedballs' grass seeds coated in waste charcoal dust from www.seedballskenya.com

02

Teddy Kinyanjui

Two men from the Ministry of Forestry and Environment in Zimbabwe who had come on a benchmarking tour to Kenya to learn about their seedball program having a laugh while using slingshots to mimic natural seed distribution. (www.seedballskenya.com)



03

Tanki Thubela

Trial burning at Dohne Agricultural Research Institute



National Vegetation Map 2018 is here!

South African National Biodiversity Institute

Dear Secretary of the Grassland Society of Southern Africa (GSSA)

National Vegetation Map 2018 is here!

We are proud to announce that the latest version of the National Vegetation Map (NVM) has been uploaded onto BGIS. Please click here to download NVM 2018: <http://bit.ly/2MtroHd>

What's new? In the latest update, there are 459 vegetation types, with a complete revision of the Thicket Biome, finer scale mapping in the Forest and Succulent Karoo biomes, removal of all wetland types (descriptions now nested within the closest terrestrial type), and small edits in the Fynbos and Savanna biomes. The seashore vegetation types have also been remapped at 1:3000 by a coastal expert and estuarine areas have been integrated with the national estuary map. For more information on all changes since 2012, please visit the VEGMAP website on BGIS.

The NVM forms the foundational data for environmental planning, ecosystem

assessments, conservation management and a broad range of vegetation research conducted throughout South Africa. It forms part of the National Vegetation Map Project (VEGMAP) led and curated by the South African National Biodiversity Institute (SANBI), in collaboration with many experts and research institutes across the country.

The NVM is the flagship product of the project that is updated every few years. Accompanying the map, are descriptions of each vegetation type, describing the vegetation characteristics, dominant taxa and abiotic features of each vegetation type. Find the description of vegetation types here.

Note that this is a beta version of the map and the final version will be released later this year. VEGMAP team continuously endeavours to improve the vegetation map and respond to any concerns that you may have.

Although we have gone through a long review process, we acknowledge that errors may be present in the new update and encourage you to alert us to

possible problems with the new version. If you find anything of concern feel free to email vegmap@sanbi.org and we will do our best to respond to your query. Alternatively if you are aware of an area in the map that you think needs to be considered for editing in the next version please fill in our questionnaire (<https://docs.google.com/forms/d/1OU5SxgAOFIqBqNi0kFOkBv2GshU8DJ24wattZFt0uMFO/edit>).

The National Vegetation Map team
South African National Biodiversity Institute

Website: <http://bgis.sanbi.org/vegmap>
Email: vegmap@sanbi.org

Have photos of vegetation types that you would like to share? Visit the VEGMAP Photo iNaturalist page: <https://www.inaturalist.org/projects/vegmap-photo-s-afr>

Have phytosociological vegetation data that you would like to share? Read more about our National Vegetation Database at <http://bgis.sanbi.org/Projects/Detail/187>

Photo Competition Entry: Research in Action

Trial site: Krwakwa communal rangelands, Alice, Eastern Cape Photo: Tanki Thubela



Photo competition

Are you a keen photographer? Have you recently taken unique photos while doing field work?

Enter them into any of the following two categories and your photo can be our next **Grassroots** cover!

“Cover” photos

Any high quality photos that are related to rangeland ecology and pasture management in southern Africa

“Research in Action” photos

Any interesting photos taken while collecting data or doing field work that are related to rangeland ecology and pasture management in southern Africa

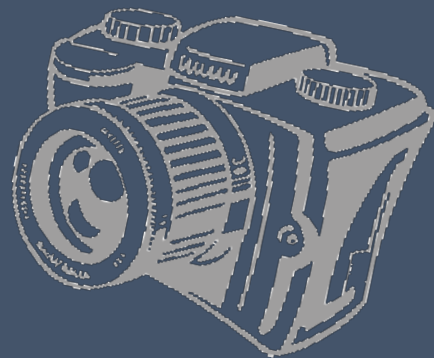
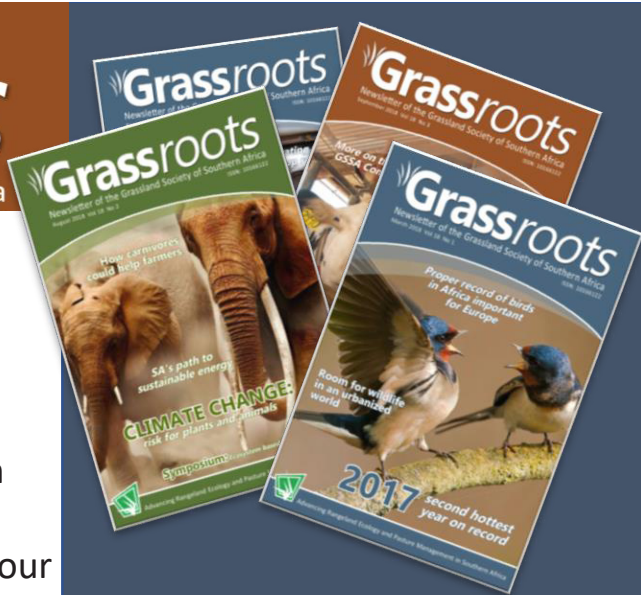
Winning photos will feature in the next *Grassroots* and the overall winning photo will be on the cover!



Competition runs for the next 3 *Grassroots* editions of 2019!

How to enter:

- Choose one of the above categories.
- Photos must be in jpg format and not exceed 10 MB.
- Email your entries with your name and contact details to photos.grassroots@gmail.com.
- Include a title and information on where and when the image was taken.
- Email your photos before 17h00 on the following dates:
 - 10 April 2019 (*May edition*)
 - 1 July 2019 (*August edition*)
 - 1 October 2019 (*November edition*)
- You will receive a confirmation email upon entrance.



*Terms & Conditions:

- Anyone is welcome to enter, except the *Grassroots*' publication team and their immediate family. Photos will be judged by the publications team.
- More than one entry is allowed.
- A participant who is announced as a winner may not enter the competition for the following editions.
- *Grassroots* holds the right to use entered photos elsewhere in *Grassroots*, the GSSA website, or for future marketing purposes without compensation to the photographer.
- A photographer will receive the necessary recognition if any of his/her photos are published by *Grassroots*.
- Winners will be notified a week before publication.

Certified organic, pasture-based, poultry production

Current Address: FarmBiz
Reprinted From: <http://bit.ly/2P8XVoa>

Carin Venter

The Ferreira family of Moedskepvlakte farm near Kirkwood, in the Eastern Cape's Sundays River Valley, specialises in organic production.

Johnny Ferreira manages the certified organic orange and lemon orchards and is also a director of the Soga Group (Sundays Organic Growers Association), which produces certified organic citrus juice.

Eddie Ferreira, Johnny's brother, runs 5 000 chickens in an organic poultry enterprise. In keeping with organic certification protocols, the hens are not exposed to genetically modified (GM) feed, antibiotics, growth hormones or animal byproducts.

The only noise in the serene pastoral setting is the contented clucking of Eddie's hens as they range on pasture in the organic orange and lemon orchards. In this stress-free environment, the chickens scratch, forage and take dust baths to keep pesky parasites at bay.

"I believe that pasture-raised chickens are different from so-called free-range chickens; free-range is a misused term. For example, in some cases supposedly free-range chickens are only allowed out for an hour a day, which, in my view, is not free-range at all," says Eddie.

Research and supply

Eddie did the homework and researched the market, the availability and the difficulties of producing organic eggs from chickens raised on an organic diet and treated in an ethical and humane way. "It was quite a gamble for me to start up a new business like this; I had no model – there was hardly anyone in the country who fed their hens non-GM feed. I had to learn from scratch.

"My first hens came from KwaZulu-Natal in August 2017. It was the only place in South Africa that could supply me with the numbers I needed. There were



Figure 1: Eddie Ferreira with his pasture-raised hens in the certified organic orchards of Moedskepvlakte.

600 hens to start, then another 600 the following month, and so on," Eddie explains.

Niche markets and logistics

"Producing organic eggs can be profitable but you have to know what you are doing," says Eddie. The South African market, he explains, is not entirely convinced of the benefits of buying organic produce and dedicated, trustworthy organic retailers are thin on the ground.

Logistics can be tricky because of the long distances between Kirkwood and the urban areas Eddie supplies, and there are significant costs associated with an egg production system that uses only organic maize and soya.

"It's hard work and it's labour intensive," says Eddie, offering advice to aspirant pasture-based, organic egg producers. "You must have a market and you must

be dedicated. You also need enough pasture to farm the chickens commercially, and that pasture needs a species mix of grass grown on organically managed soil."

Broiler chickens, tagged for slaughter at 72 days, are a recent enterprise addition to the farm. "I keep them in an airy, sunlit chicken tractor. The chicken tractor is reasonably light and we move it to a patch of fresh grass in the orchard daily, which quickly gets them off their own manure."

Hens need hectares

Chickens have an extraordinary capacity to demolish whatever is underfoot, Eddie explains. "Once you put them onto pasture, they will happily pluck about and decimate any foliage they set their 'pecking' sights on. Efficient pasture management means there must be enough pasture to move the birds con-

tinuously and allow for pasture recovery. It's labour intensive management that needs big areas of land, which many farmers just don't have."

Access to the Soga citrus orchards provided the ideal solution to the challenge of meeting the chicken pasture requirements.

The hens are kept in separate orchard camps; each camp is 50m X 37m (or six trees), an area of 1 850m². "One of the reasons we keep the hens in separate camps is to monitor their daily egg production."

Once hens get to an age where they are no longer productive, they will be replaced. But this has not happened at Moedskepvlakte yet. "We will try our best to find homes for them. There are people who want to adopt the hens or use them in their backyards. The worst-case scenario is that we will have to slaughter them, but we will do that only as a last resort," Eddie says.

Efficient eggmobiles

Eddie bought into the eggmobile concept after researching various models of eggmobiles, or mobile hen houses, with an egg laying system. He adapted his eggmobiles to suit his conditions.

"Because we run the chickens in orchards and the turning circles on the pathways are small, we can't have very big eggmobiles," says Eddie.

An eggmobile is not cheap, coming in at a cost of approximately R100 000; this includes the solar panel that powers the electrified poultry fence, the water supply and the roosting and egg laying space.

Eddie currently has 16 eggmobiles on the farm. "The mobiles are numbered and each one houses 300 hens. For example, mobiles one and two are the hen houses for the chickens that came to the farm first; eggmobile number 16 houses the youngest and most recent arrivals. Each hen has a tag on her leg linking her to the specific eggmobile."

Staff members open the hen houses early in the morning. During the day, the hens go in to lay and at sunset they go back in to roost. After this the mobile is closed.

Eggmobiles are moved, according to schedule, to a new orchard every two weeks. "Early in the morning we hook the mobiles up to a tractor, with the hens still inside, and pull it to the next orchard. We pull out and roll up the fences, then open it up. The camps are measured before the move," Eddie ex-



Figure 2: A hen gives herself a dust bath, keeping mites and lice at bay.



Figure 3: Eddie says researching the market and establishing the demand for organic eggs is the most important thing to do before setting up the production system.



Figure 4: One of the eggmobiles, or mobile hen houses, where the hens lay their eggs during the day and roost at night.



Figure 5: Two water tanks attached to the outside of the eggmobile, supply water to the chickens outside.

plains. The hens, unflustered by relocation, peer curiously out of the eggmobile during the move.

Although it sounds easy enough, moving the eggmobiles comes with its own set of challenges. "You have to be quick," says Eddie. "We have reached the point where the hens spend only about two hours longer in the mobile in the morning than they usually do."

Feed challenges

Organic, chemical-free chicken feed is difficult to source, and Eddie has had to pay for feed two years in advance to get the right feed for his birds.

Among the different types of chicken feed is a certified organic grain, which he has planted under contract. "The protein source that we use is available in South Africa, but all of it is genetically modified, so I import it from Zambia.

"I have to source the food and have it specifically grown for my operation. For example, we pay upfront for our maize in October or November, and after that a Prieska farmer plants it. The maize arrives on the farm in April and lasts for about a year."

Losses from above and below

While electric fencing helps to control theft, it is still an occasional headache. "It is pretty easy for people passing by the orchards to steal some eggs or chickens," says Eddie. "We also have a problem with hunting hawks that take out at least one chicken a day. We live with it, as it is part of nature."

Countrywide organic egg supply

Eddie says that when the hens are laying their eggs, a curtain gives them some privacy. "We don't remove or destroy the material on the outside of the egg, which is called the plume. If an egg is very dirty, we keep it aside, wash it and process it for cooking purposes. These eggs won't be sold to the retail stores."

The hens lay an average 0,8 eggs a day, or about 292 eggs a year.

The organic egg enterprise supplies about 70 retail stores countrywide, including delis, health shops and health-conscious restaurants where people want quality organic eggs.

"We do business from Port Elizabeth to Knysna, George and Plettenberg Bay, as well as in Cape Town and Johannesburg," Eddie says. To get to Johannesburg and Cape Town, the eggs are first transported to Port Elizabeth, arriving at their destinations early the next morning.

A dedicated agent collects the eggs from the airport and takes them straight to the client outlets.

Eddie enjoys farming pasture-raised hens under organic principles and says he is content with his lifestyle. "The eggs are expensive, but if you have the market it's worth producing them. One doesn't have to be a millionaire to be happy."

For more information, please contact Eddie Ferreira on 082 771 7434 or send an email to info@farmereddie.co.za.

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Climate change and the nutrient content of fodder

Current Address: Agricultural Research Council
Reprinted From: <http://bit.ly/2Z6GE3E>

Dr Klaas-Jan Leeuw

The unpredictability of South Africa's regional climate has a profound influence on feed provision for domestic livestock, game animals and people. The recent extended drought has affected feed, food and livestock prices and caused damage to farms in many areas. Possible causes of this damage include higher intensity, and more frequent occurrence of extreme weather conditions.

The paradoxical effect of GHGs

Many researchers attribute this to a measurable increase in greenhouse gases (GHGs). The primary GHGs are CO₂ (carbon dioxide), CH₄ (methane) and N₂O (nitrous oxide). In the last 200 years, from the beginning of the industrial revolution, atmospheric CO₂ concentration has doubled, and in the last 40 years GHG emissions have increased by 40%. The average global temperature has risen, by an average increase of 0,12 °C per decade during the past 60 years.

A rise in atmospheric CO₂, and sunlight on crops, leads to an increase in production. While more carbohydrates

(starches or sugars) are manufactured in plants when photosynthesis increases, the concentration of other nutrients, crude protein, zinc and iron, per kg of plant yield, is reduced. However, with higher temperatures and drier conditions the rate of photosynthesis will reduce. Thus, despite the increased CO₂, crop yield will be lower when temperatures rise during droughts.

Research conducted on the nutrient content of crops found that minerals, such as calcium, phosphorous, potassium, zinc and iron, as well as nitrogen (crude protein), were reduced by up to 8% under conditions of increased atmospheric GHGs.

Scientists predict that by the year 2050, 150 million people will not have access to sufficient protein in their diets. Reduction in zinc content will put the health of 138 million people at risk. Researchers estimate that a billion mothers and 350 million children will suffer an increased risk of anaemia. GHGs will exert a negative effect on food security. There is an acceptance that the increase in GHG concentration will decrease the nutrient content per kg of crop produced. The

impact of this for the farmer is that there will be a reduction in rangeland nutrient provision and that maize used in feeding will have a lower nutrient content per kg offered.

Future planning for farmers

Knowing this, the farmer can plan to ensure the right amount of quality nutrients are provided for profitable farming. To achieve this the farmer needs to know the veld quality and the nutrients it provides and cannot assume that historical data is valid. Historical data are based on lower average temperatures and GHG concentrations and different plant species composition.

There are cultivar differences and this information can be used to plant crops or grasses that have better nutrient composition for beef production. Nutrient availability (digestibility) must also be determined to improve choice of crop or pasture species. This will help determine the amount (kg) of crop protein produced per hectare, which can be connected to the amount of beef produced per hectare.

Photo Competition Entry: Research in Action

Inserting moisture access tubes, layout of biomass enclosure cage and slope measuring. Trial site: Krwakrwa communal rangelands, Alice, Eastern Cape Photo: Tanki Thubela



When tree planting actually damages ecosystems

Current Address: ¹Professor of Tropical Ecology, University of Liverpool. ²Senior Lecturer in Biogeography, University of Edinburgh
Reprinted From: <http://bit.ly/2zkRvrf>

Kate Parr¹ and Caroline Lehmann²

Tree planting has been widely promoted as a solution to climate change, because plants absorb the climate-warming gases from Earth's atmosphere as they grow. World leaders have already committed to restoring 350m hectares of forest by 2030 and a recent report suggested that reforesting a billion hectares of land could store a massive 205 gigatonnes of carbon – two thirds of all the carbon released into the atmosphere since the Industrial Revolution.

Many of those trees could be planted in tropical grassy biomes according to the report. These are the savannas and grasslands that cover large swathes of the globe and have a grassy ground layer and variable tree cover. Like forests, these ecosystems play a major role in the global carbon balance. Studies have estimated that grasslands store up to 30% of the world's carbon that's tied up in soil. Covering 20% of Earth's land surface, they contain huge reserves of biodiversity, comparable in areas to tropical forest. These are the landscapes with lions, elephants and vast herds of wildebeest.

Savannas and grasslands are home to nearly one billion people, many of whom raise livestock and grow crops. Tropical grassy biomes were the cradle of humankind – where modern humans first evolved – and they are where important food crops such as millet and sorghum originated, which millions eat today. And, yet among the usual threats of climate change and wildlife habitat loss, these ecosystems face a new threat – tree planting.

It might sound like a good idea, but planting trees here would be damaging. Unlike forests, ecosystems in the tropics that are dominated by grass can be degraded not only by losing trees, but by gaining them too.

Where more trees isn't the answer

Increasing the tree cover in savanna

and grassland can mean plant and animal species which prefer open, well-lit environments are pushed out. Studies from South Africa, Australia and Brazil indicate that unique biodiversity is lost as tree cover increases.

This is because adding trees can alter how these grassy ecosystems function. More trees means fires are less likely, but regular fire removes vegetation that shades ground layer plants. Not only do herbivores like zebra and antelope that feed on grass have less to eat, but more trees may also increase their risk of being eaten as predators have more cover.

More trees can also reduce the amount of water in streams and rivers. As a result of humans suppressing wildfires in the Brazilian savannas, tree cover increased and the amount of rain reaching the ground shrank. One study found that in grasslands, shrublands and cropland worldwide where forests were created, streams shrank by 52% and 13%

of all streams dried up completely for at least a year.

Grassy ecosystems in the tropics provide surface water for people to drink and grazing land for their livestock, not to mention fuel, food, building materials and medicinal plants. Tree planting here could harm the livelihoods of millions.

Losing ancient grassy ecosystems to forests won't necessarily be a net benefit to the climate either. Landscapes covered by forest tend to be darker in colour than savanna and grassland, which might mean they also absorb more heat.

As drought and wildfires become more frequent, grasslands may be a more reliable carbon sink than forests.

Redefine forests

How have we reached the point where



Figure 1: Gorongosa, Mozambique. The habitat here is open, well-lit and with few trees. Caroline Lehmann, Author provided

Figure 2: A mosaic of grassland and forest in Gabon. Kate Parr, Author provided



the unique tropical savannas and grasslands of the world are viewed as suitable for wholesale “restoration” as forests?

At the root of the problem is that these grassy ecosystems are fundamentally misunderstood. The Food and Agricultural Organisation of the UN defines any area that’s half a hectare in size with more than 10% tree cover as forest.

This assumes that landscapes like an African savanna are degraded because they have fewer trees and so need to be reforested. The grassy ground layer houses a unique range of species, but the assumption that forests are more important threatens grassy ecosystems across the tropics and beyond, including in Madagascar, India and Brazil.

Forest should be redefined to ensure savannas and grasslands are recognised as important systems in their own right, with their own irreplaceable benefits to people and other species. It’s essential people know what degradation looks like in open, sunlit ecosystems with fewer trees, so as to restore ecosystems that are actually degraded with more sensitivity.

Calls for global tree planting programmes to cool the climate need to think carefully about the real implications for all of Earth’s ecosystems. The right trees need to be planted in the right places. Otherwise, we risk a situation where we miss the savanna for the trees, and these ancient grassy ecosystems are lost forever.

Figure 3: A flowering aloe in Madagascan grassland. Caroline Lehmann, Author provided



How did Africa's grasslands get started?

Current Address: Columbia University
Reprinted From: <http://bit.ly/2ZoJ0Kp>

Kevin Krajick

Between 10 million and 6 million years ago, vegetation across much of the world underwent a transformation, as warmth-adapted grasses displaced previously dominant plants, shrubs and trees. The new grasses carried out the chemical reactions required for photosynthesis in a distinct new way. Scientists have labeled this new process the C4 pathway. In East Africa, the changeover coincided with the evolution of mammal lineages that we recognize today, including early human ancestors. Today, C4 plants comprise about one-quarter of the Earth's vegetation, from the Great Plains of North America to western China, Australia and much of sub-Saharan Africa.

What is the origin of these plants, and why did they spread so far and wide? A new study in the journal *Nature Geoscience* tries to get at this question by

looking at deep-sea sediments off east and west Africa, which contain traces of past plant life and the conditions under which it existed. It shows that both northwestern and eastern Africa experienced a spread in C4 plants starting around 10 million years ago, at a time when carbon dioxide in the atmosphere was dipping, but there were no apparent changes in rainfall or dust deposition.

We spoke with co-author Cassandra Rose, who did the research as a Ph.D. student at Columbia University's Lamont-Doherty Earth Observatory. The study was carried out also by Lamont-Doherty scientists Pratigya Polissar (who is the lead author), Kevin Uno, Samuel Phelps and Peter deMenocal.

What are C4 plants, and what makes them important?

Plants need sunlight, water and carbon dioxide to perform photosynthesis, but there are differences in the very first step of photosynthesis, when the plant converts CO₂ into useable molecules. About 85 percent of all plants use what we call C3 photosynthesis. C4 plants use a slightly different kind that produces a 4-carbon compound in that first step. Hence the "C4" moniker. C4 plants lose less CO₂ and water back to the atmosphere during photosynthesis than C3 plants, so they're able to out-compete C3 plants in hot, dry places. C4 photosynthesis has brought humans some very important food crops like corn, sugar cane, sorghum and millet. C4 plants also dominate subtropical and tropical grasslands like the African savannah today. We might not have those iconic grasslands, and zebra, gazelles and other mammals without them. There are also hypotheses that

Figure 1: Savannah grasslands in southern Kenya, where remains of many early humans have been found. Credit: Kevin Krajick/Earth Institute



link the evolution of C4 grasslands in Africa to the evolution of our own line, the hominins, including humans.

What do we know about when they first came along, and spread?

Scientists think that C4 photosynthesis evolved somewhere around 35 million years ago, but C4 plants didn't really become widespread until much more recently, between 10 million and 6 million years ago. When and why they spread, particularly in Africa, is still a very active area of research, and the major focus of our study. The story of why C4 photosynthesis came about is pretty interesting and has to do with the earth's climate history over the last 30 to 40 million years. C4 photosynthesis requires more energy than the traditional C3 style, but it fixes carbon more efficiently. That's a really important adaptation if you are a plant growing in a low-CO₂, high temperature, high-light environment. This is where climate history comes in. Over the last 50 million years, the earth was transitioning from high levels of atmospheric CO₂ to lower ones. C3 plants in hotter, high-light environments would have found it increasingly difficult to grow because one of their major foods, carbon dioxide, was becoming more scarce. That made an opening for C4 plants.

Did C4 plants have any impact on human evolution?

We think they're connected, but we're still working on understanding exactly when and how. We now know that C4 grassy ecosystems were already present when the earliest hominins appeared, around 7 million years ago. We also know that human evolution occurred during a period when many areas were transitioning from C3-dominated forests and woodlands to more open C4-dominated grasslands. And we know that by the time hominins first appeared, many other large mammals, like horses, elephants and rhinos, already had diets comprised of C4 plants. Most but not all of our hominin ancestors included some amount of C4 plants or C4 plant-based

foods, such as meat from grazers, in their diets. But as to the exact connection to human evolution, we still don't have a clear answer yet.

What have been the dominant ideas about how these plants took over in many places?

A leading hypothesis is that aridity and declining rainfall are major drivers. An important consequence of aridity and changing rainfall patterns is fire, which promotes the spread of grasslands. Thus, fire, aridity and rainfall are interconnected. We know from several recent studies that C4 plants become more common during dry periods across northern and eastern Africa, and less common during wetter periods. This is exactly what you would expect, given their evolutionary advantages over C3 plants. However, the exact cause for their initial large spread during the Miocene between 10 and 6 million years ago has been elusive, in part because there are few long-term climate, vegetation and CO₂ records that reach back that far. Developing long-term records of fire would be a big step toward understanding the role of biomass burning in the spread of C4 grasslands.

How did your study approach this question?

We went to the only place that has continuous sediment records that reach back over 25 million years: the ocean floor. We analyzed geochemical fossils—plant leaf waxes that were preserved in ocean sediment cores offshore from the western Sahel, and equatorial West Africa and East Africa over the last 25 million years. Using published sea-surface temperature records and our new analysis of dust-flux records, we found that the rise in C4 plants in northern Africa coincides with dramatic high-latitude cooling and increasing pole-equator temperature gradients. We suggest that atmospheric CO₂ declined across a critical threshold 10 million years ago, allowing C4 plants to finally gain the competitive edge that they needed to spread at the expense

of C3 plants. This means that rainfall and temperature patterns in Africa were already close to that critical threshold when CO₂ crossed it. This is helpful and relevant information for understanding the climate context of human evolution.

Right now, carbon dioxide in the air is skyrocketing, due to human emissions. What are the implications for C4 vegetation, other plant life, and us?

The rise in carbon dioxide is much more rapid than anything scientists have observed in the geologic record, including the Paleocene-Eocene Thermal Maximum of about 56 million years ago. So we aren't sure yet how this is going to affect vegetation and ecosystems. But theoretically, increasing atmospheric CO₂ levels will diminish the biochemical advantages of C4 photosynthesis over C3 photosynthesis, and that would result in a decrease of C4 biomass. The Intergovernmental Panel on Climate Change's last report suggests that increasing CO₂ concentrations up to about 600 parts per million—which may be exceeded by the end of this century—will enhance photosynthesis, particularly in favor of C3 plants. It would also increase plants' water-use efficiency. But these improvements will become less as CO₂ rises higher over time. Other important factors that affect all plants are temperature, disturbances like human land use, fire and invasive species, and the availability of water. Even though plants may photosynthesize more quickly with increasing CO₂, many of our important foods, like wheat, rice and maize, may have lower nutrient quality with higher CO₂ and higher temperatures. That would impact human health and global food security.

More information

Pratigya J. Polissar et al. Synchronous rise of African C4 ecosystems 10 million years ago in the absence of aridification. *Nature Geoscience* (2019). DOI: 10.1038/s41561-019-0399-2

Journal information: Nature Geoscience

Photo Competition Entry: Research in Action

Re-seeding using dryland native 'seedballs' grass seeds coated in waste charcoal dust from www.seedballskenya.com Photo: Teddy Kinyanjui



Mechanical methods for Karoo veld restoration

Current Address: Stockfarm
Reprinted From: <http://bit.ly/2Mx7gnL>

Koos du Pisanie

The Northern Cape is known for its frequent droughts and low rainfall, and veld may be degraded by severe overgrazing, especially after long dry seasons. But this part of the country can demonstrate a surprisingly abundant response in regrowth after some decent rainfall. However, to keep the land resource sustainable, veld restoration must be an ongoing task for farmers in this region.

There are many theories on how to restore and improve veld, with various options such as high-pressure grazing, deforestation, reduction of livestock numbers and grazing plans presented.

Piet Roux is a well-known farmer who farms between Prieska and Britstown, using mechanical methods to restore and improve his veld. Although a lengthy process, it is an inexpensive one, and his excitement is evident when he talks about the successes of his restoration project. His main concern is not the profit he can generate from the farm, but rather what he can do to preserve the land for future generations.

Treatment of bare patches

Piet, whose father started farming in the early 1950s, is a fourth-generation farmer on the farm Biega. Piet's father had the idea of breaking up the soil surface on the large bare patches on the farm. This loosening of the soil would aid seed germination and allow plants to get a foothold in the soil.

Piet's grandfather died young and the farm was rented out for close on 15 years before his father started farming. He soon realised that the former tenants had overgrazed the veld, and that restoration would be a major undertaking.

"There were a lot of practical problems that needed attention," Piet explains. "The camps were too big and there weren't enough water points. One of the things that bothered my father was

the bare patches found across the entire farm, especially around water points where animals gathered. If one takes all the bare patches into account, it works out to a considerable loss of grazing."

A new angle on an old idea

Piet had a good look at the bare patch restoration his father had done. The re-

sults his father got were good, but Piet saw there was room for improvement, especially with regard to the depth to which the soil had been ripped. The ripper was not equipped with wings to push the soil away and out of the furrows, and the rows were too wide.

Armed with a good idea of what his father had actually wanted to achieve



Figure 1: Piet Roux is excited about every new shrub that emerges from the dry Karoo soil. Here he points out the new seedlings that have germinated in ripped furrows in his veld.



Figure 2: A Karoo farm welcomes every shrub. Young plants can thrive because the furrows can hold water for a longer period. Piet says it is wonderful to see how the ecosystem develops.

and how he could improve on it, Piet approached his local agricultural extension officer. Together they drew up a long-term plan to improve the quality of the veld. "We systematically started rehabilitating camps wherever it was possible," says Piet.

He describes veld restoration as a never-ending, time-consuming process, but says that if it is done correctly the results are very good. In years when the Karoo receives normal rainfall, veld improvement can be seen within 18 months.

Value of mechanical veld restoration

According to Piet, there are many factors that may lead to bare patches in the veld. These include overgrazing, drought, slope, vegetation and clay soils that do not absorb water quickly.

Rainwater, says Piet, should not be allowed to drain away but should rather be stored in the ground immediately. "The infiltration ability of soil is dramatically improved once it has been ripped and the compaction shield broken. The loosened soil creates an environment where it is easier for insects such as ants to dig their tunnels and holes. This makes it possible for every drop of rain to be stored as it uses the insect tunnels to penetrate the soil. The small surface depressions created, can also retain water," he adds.

According to Piet, you need to apply shrewd judgement when ripping fur-

rows. Every furrow is a small drainage channel and on sloping ground, ripping must be done diagonal to the flow of the runoff. If the furrows are incorrectly placed, the water drains through to the low-lying areas and the upper parts will not get their share of water.

Some of the first camps on the farm that were ripped are on slopes with a slight incline. The areas at the top of the slope, where he ploughed a few years ago, improved much quicker than the areas at the bottom of the slope. He explains that the vegetation in these camps recovered so well, that it now retains and utilises the water, reducing drainage to the lower lying areas. The recovery of the veld and grazing in the treated areas is remarkable.

Minimal costs

Although there are claims that mechanical veld restoration is expensive, Piet has explored many possibilities and says this is the cheapest method he can use on his farm.

According to prices at the time of writing this article, the direct costs per hectare are:

- Diesel: R75 (at R15/ℓ).
- Labour: R40.
- Repair and maintenance: R50.

This adds up to a total running cost of R165 per hectare.

A slow process

As veld recovery is a slow process, Piet plans his management carefully. The camps where the bare patches have been ripped are left to rest that year. He believes rest is a very important part of the process if you want to get good results.

He never exceeds the carrying capacity of his farm. "Grazing specialists agree that reducing livestock numbers is a key factor in veld restoration."

Helpful tips

Piet shares the following information with other producers:

- Identify camps that have already been grazed.
- Livestock must be kept out of the camp for at least a year.
- Use the correct plough.
- Plough to at least 300 to 350mm deep.
- Row widths should not exceed 1,4m.
- The cultivation speed should not be faster than 4 to 5km/h. At this rate, 4 to 5ha a day can be treated.
- A 40kW tractor has enough power.
- If the tractor is too powerful, the tines can be damaged by sub-surface rocks and ripper maintenance expenses will increase.

For more information, phone Piet Roux on 073 161 4615.

Environmental Rehabilitation Guide for South Africa

Environmental Rehabilitation Guide for South Africa has just come off the press and is now available for sale.

About the book

Environmental Rehabilitation Guide for South Africa aims to help environmental managers and practitioners, farmers, consultants, government officials, politicians, environmental activists and decision-makers in industry understand why environmental rehabilitation is necessary, the standard to which it should be done, and how to do it. Though the book focuses on rehabilitation in the humid and semi-arid regions of South Africa, the principles it uses are applicable across environmental management.

It is a practical guide that explains, for any given case, derivation of a rehabilitation objective, its boundary conditions, the interventions to be applied, and simple powerful metrics that can be used to measure achievement. The key elements of much rehabilitation – landscaping, runoff control and revegetation – are explained in terms of what the finished rehabilitation product should look like and how to get there.

The book includes 67 exhibits featuring full-colour images of rehabilitation and revegetation examples, useful summary tables, problem-solving flow charts, graphs, and more.

It is available as a print edition in South Africa (www.publisher.co.za), and in ebook format (Kindle and ePub) from major international retailers. More about the book and a short preview can be accessed on www.publisher.co.za.

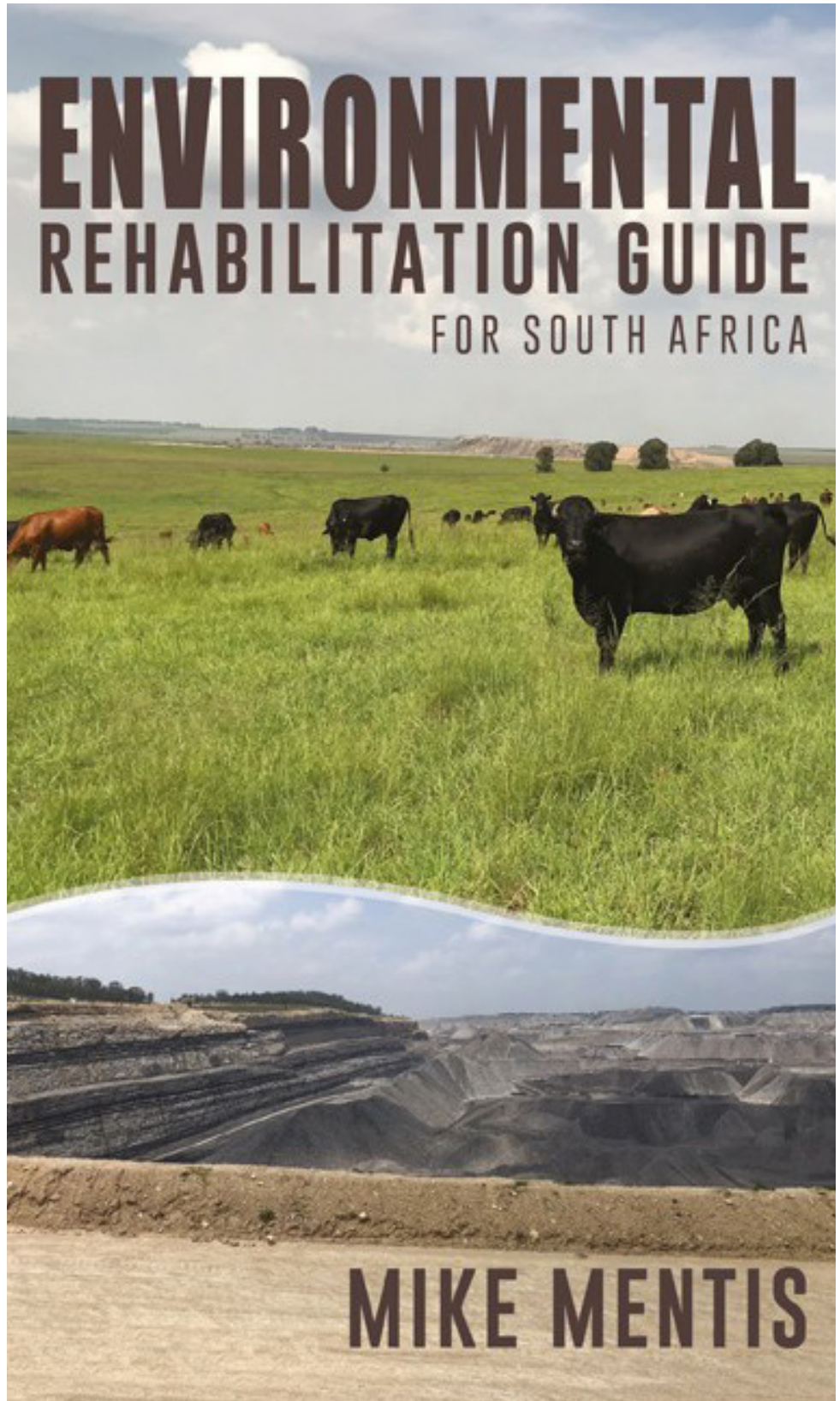
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Buy the Kindle ebook on Amazon here <https://amzn.to/2U09OLS>

Figure 1: The Environmental rehabilitation guide for South Africa has recently been released.



Upcoming events

1 - 5 Sept 2019

South African Wildlife Management Association (SAWMA) Conference. Wilderness Hotel, Southern Cape. See website for more: <http://sawma.co.za/conference-2019/>



2 - 7 Sept 2019

International Long Term Ecological Research Network 2nd Open Science Meeting. Hosted by Helmholtz Center for Environmental Research, UFZ. In Leipzig Germany. For more visit: <http://ilter-2019-leipzig.de>



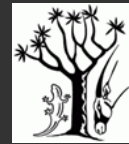
22 - 27 Sept 2019

8th World Conference on Ecological Restoration to be held in Cape Town, SA. Visit <https://ser2019.org/> for more.



8 - 10 Oct 2019

Arid Zone Ecology Forum (AZEF) Conference in Kimberley, Northern Cape. Contact Gill Murray (AZEF Secretariat) at gill@azef.co.za or 083 609 1773 for more details. Registrations close on 9 September 2019.



15 - 19 Oct 2019

Veld Management Course by Africa Land-Use Training. Cost: R4,950. For more, contact Frits van Oudtshoorn at 078 228 0008 or courses@alut.co.za.



4 - 8 Nov 2019

The Conservation Symposium, St Ives, KwaZulu-Natal Midlands. For more info see: <http://www.conservationsymposium.com/> or contact Freyni DuToit. Email: secretariat@conservationsymposium.com or cell 083 256 7201 (WhatsApp and SMS only), or Facebook Messenger.



Looking further ahead: 25 - 30 Oct 2020

Joint XXIV International Grassland (IGC) and XI International Rangeland (IRC) congresses to be held in Nairobi, Kenya. The theme is 'Sustainable Use of Grassland/Rangeland Resources for Improved Livelihoods'. Information is available here: <http://bit.ly/Kenya2020>



If you would like to advertise your upcoming event, please contact us and we will include it in our next edition.

Photo competition

Are you a keen photographer? Have you recently taken unique photos while doing field work?

Enter them into any of the following two categories and your photo can be our next **Grassroots** cover!

“Cover” photos

Any high quality photos that are related to rangeland ecology and pasture management in southern Africa

“Research in Action” photos

Any interesting photos taken while collecting data or doing field work that are related to rangeland ecology and pasture management in southern Africa

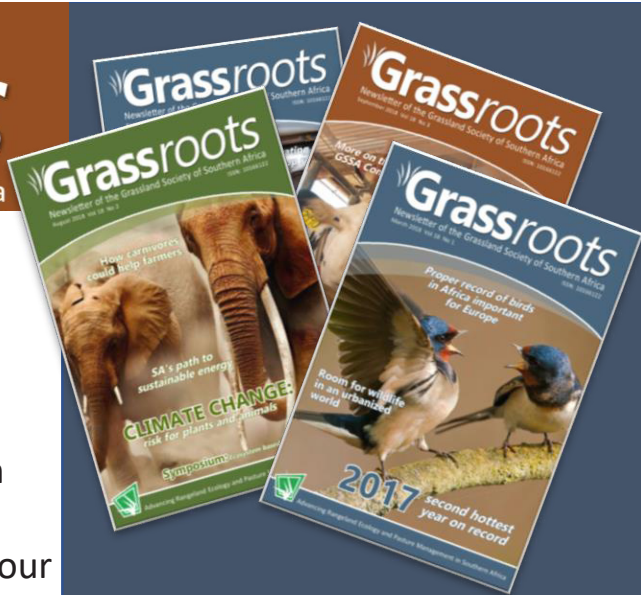
Winning photos will feature in the next *Grassroots* and the overall winning photo will be on the cover!



Competition runs for the next 3 *Grassroots* editions of 2019!

How to enter:

- Choose one of the above categories.
- Photos must be in jpg format and not exceed 10 MB.
- Email your entries with your name and contact details to photos.grassroots@gmail.com.
- Include a title and information on where and when the image was taken.
- Email your photos before 17h00 on the following dates:
 - 10 April 2019 (*May edition*)
 - 1 July 2019 (*August edition*)
 - 1 October 2019 (*November edition*)
- You will receive a confirmation email upon entrance.



*Terms & Conditions:

- Anyone is welcome to enter, except the *Grassroots*' publication team and their immediate family. Photos will be judged by the publications team.
- More than one entry is allowed.
- A participant who is announced as a winner may not enter the competition for the following editions.
- *Grassroots* holds the right to use entered photos elsewhere in *Grassroots*, the GSSA website, or for future marketing purposes without compensation to the photographer.
- A photographer will receive the necessary recognition if any of his/her photos are published by *Grassroots*.
- Winners will be notified a week before publication.