Grassroots

Newsletter of the Grassland Society of Southern Africa
August issue, Vol 12 No. 3
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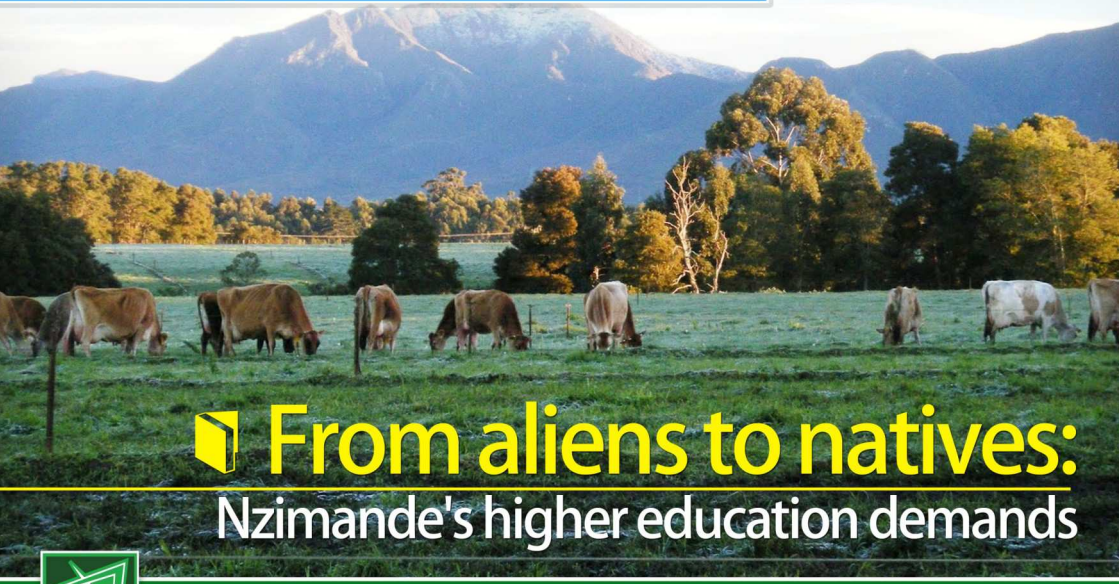
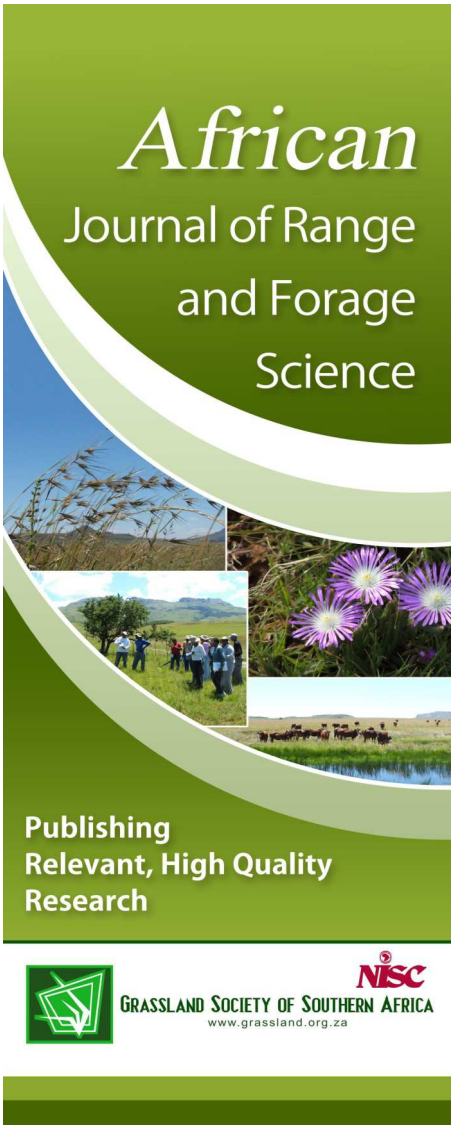
Holism: The future of range science to meet global challenges?

- "No Go" Mining areas to be announced soon
- Young minds look at old data



From aliens to natives:
Nzimande's higher education demands

Advancing Rangeland Ecology and Pasture Management in Southern Africa



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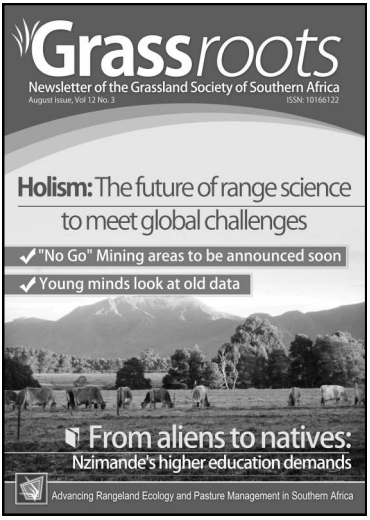

On the Cover: *Photograph by Machelle Zeelie, Outeniqua Research Farm*

Features

Regulars

Editor's Note

Welcome to the third edition of Grassroots for 2012. The 47th Annual Congress of the Grassland Society of Southern Africa held in Langebaan, Western Cape province was of the best. Thanks to Igshaan Samuels and team for organizing such a wonderful Congress. For those who could not attend this year's congress find a full report of the 47th Congress in this issue of Grassroots. The next 48th GSSA congress will be held in Limpopo province, Modimolle (former Nylstroom). There is always a room for improvement; I suggest that the organizing committee improve from this year's congress.

It was encouraging to see a good number of young scientist/students presents platform, posters and proposal in this year's congress, we hope to see even more next year and beyond. We also had a total of 10 keynote presentation, and guess every one enjoyed their talks.

We have devoted a lot of space to the subject of "Holism". And indeed, it was the subject of much lively debate and discussion at the Congress. In addition, there is a handy list of recent publications, a great deal of news and report-backs and information on up-coming events too.

Julius Tjelele

Letter to the Society

Kotie van den Berg is the recipient of this year's Peter Edwards Award.

To begin with, I want to thank the GSSA for the privilege and honour of receiving the Peter Edwards Award for the Best Conservation Farmer in the Western Cape. In the spirit of the Olympic Games, it feels like receiving a gold medal . . . although it is actually the farm that won the award! It just so happened that I did not make a speech at the award ceremony. That may give the impression that I do not care about the award, which is of course not the case. So, I would like to take this opportunity to share some thoughts about the farm, myself and conservation. Doing it through the GSSA Newsletter is probably also the best way.

I want to start by congratulating Dr. Loraine vd Berg with her election as president of the GSSA. Good luck with all the extra work and responsibilities. On a lighter note (with all the political nepotism around us . . .), I just want to state that Loraine's position has absolutely nothing to do with my receiving of the award! (We just share a surname, but are not related!)
I was born in 1947 – the same year when the *Soil Conservation Act of 1946* came into operation. Murraysburg was the first district in the (then) Cape Province, and the second in South Africa to be declared as a soil conservation district. My grandfather was one of the co-workers to get Murraysburg declared as a soil conservation district and became the first chairperson of the Soil Conservation Committee (SCC). Later, my father also served as chairperson of the SCC in Murraysburg. About 25 years ago I became chairperson of the SCC. Conservation; seems to be a heritable trait!

Through the years the name and approach of the SCCs changed. The name changed from SCC to Conservation Committee and then to Landcare Forum. The change in approach was also for the better. The emphasis shifted from mechanical and structural conservation to biological, agricultural resource conservation to holistic environmental conservation.

The farm Beeldhouersfontein has been in the Van den Berg family for almost one hundred years. My wife, Lina, and I are the third generation to farm here. The farm is situated in a region known as the Sneeuberg, with a diverse topography and vegetation. The vegetation varies from typical karoo, to mixed grassveld to highland *Merxmuellera* sour grassveld with "fynbos". The altitude varies from 1300 m to 2200 m, and the rainfall from 300 mm to 500 mm per annum – with snow during the winter months.

The conservation process on the farm was started by my grandfather after the devastating drought of 1933. He started by controlling stock numbers and building small structures to combat soil erosion. After World War II, my father started to develop the infrastructure by building more fences and by improving the water supply for livestock. He also started to experiment with controlled burning and oversowing to improve the sour grassveld.

I always had an interest in farming and we had long and interesting discussions. Naturally, there were more questions than answers, so I decided to study agriculture at the University of the Free State with Pasture Science as one of my majors.

During my studies in the late 60's, several things happened to spark the interest of scientists, farmers, and even students, in veld and conservation. I was privileged to study under Prof. Brian Roberts from whom I learned the basics of conservation. My first job was at Grootfontein Agricultural College where Dr. Piet Roux became my practical mentor. I also learned a lot from my colleagues and from farmers at "Farmers Days" -- which were very popular during those times.

From 1975 to 1977 I lectured at UFS with Prof. Daan Opperman as a wonderful leader. In the beginning of 1978 I left the academic career to become a "veld" farmer. I farmed with my father for ten years which was a win-win partnership in every sense of the word.

Since 1994 we had a number of above average rainfall seasons which helped with veld conservation and veld improvement. The last two seasons were far above average, which definitely helped a lot to be selected for the Peter Edwards Award. There is much more to say on the subject of conservation, but let me conclude with the following:

- Conservation is mainly a commitment to a way of living, which you should do – not to get financial or other rewards, but out of respect for Creation and the environment.

- The main goal should be to leave the environment in a better condition than you have received it.

If you get any rewards, like the Peter Edwards Award, it is a pleasant surprise, a privilege and a bonus!

Thanks again.

Kotie van den Berg

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Young Minds Look at Old Data

Nicky Allsopp, SAEON Fynbos Node

The students, under the supervision of Professor Dominic Mazvimavi at the Institute of Water Studies in the Department of Earth Sciences, are exploring a variety of questions associated with the long term experimental catchment monitoring at Jonkershoek and Jakkalsrivier. Four of the students will be using data from the Jonkershoek and Jakkalsrivier catchment experiments and two will be doing field based studies.

Data from the 1930s onward

The CSIR has recently transferred custodianship to SAEON of the data from the experimental catchment monitoring programmes which were run in places like Jonkershoek, Jakkalsrivier and Cathedral Peak. Some of this data, such as that from Jonkershoek, stretches back to the 1930s and consists of several million records.

The experimental catchment monitoring programmes were set up to answer questions about how much water alien plantation species such as pines may use compared to natural vegetation. The evidence came out in favour of maintaining indigenous vegetation in catchments to secure the long-term sustainability of water delivery. Other evidence was used to determine the best fire cycles and season of burn in fynbos and grasslands for securing water delivery of high quality.

Answering new questions

However, data of this length continues to supply opportunities for answering new questions. In this day and age questions around the impacts of global change on the hydrology and ecology are particularly coming to the fore.

The students are exploring a variety of questions associated with the long term experimental catchment monitoring at Jonkershoek and Jakkalsrivier.

The students will be studying specific details of flood and low flow regimes, comparing between catchments and sites and asking questions such as have the catchments maintained similar responses to rainfall over time. One project will specifically look at temporal and spatial variation of rainfall in Jonkershoek, while another will look at potential changes in evapotranspiration. These projects can potentially refine hydrological models of impacts of global change on water delivery.

Two of the students will be engaged in more hands-on research and will be accompanying Node Technical Officer, Abri de Buys, on his regular monitoring rounds. One student will investigate the accuracy of rating equations in estimating flow rates and another will be examining the quality of water in the upper reaches of the Eersterivier.

Managing large data sets

Victoria Goodall, Node Data Scientist, will be helping the students get to grips with managing extremely large data sets, many with data recorded at hourly time intervals over several decades, as well as provide input on statistical approaches.

The Applied Center for Climate and Earth Systems Science (ACCESS) is acknowledged for funding for bursaries for four of the students.

SAEON Newsletter

From Aliens to Natives: Nzimande's Higher Education Demands

Higher Education and Training Minister Blade Nzimande has plans to turn students and lecturers nationwide into information technology "natives". Every university must have a dining hall, every university student should have an email address, and the provision of laptops to certain students would be explored, Nzimande told a dialogue series convened by the ANC at the University of Johannesburg's Soweto campus on Thursday.

At the event, which the Mail & Guardian understands to be part of an ongoing series of engagements with all sectors leading up to the party's policy conference in June. Nzimande also addressed the burning issue of capacity at higher education institutions and the need to improve the quality of teaching at further education and training (FET) colleges.

The meeting, convened by ANC secretary general Gwede Mantashe, was titled "The State of Higher Education in South Africa: Prospects and Challenges". All 23 vice-chancellors of universities were invited but only one attended, the University of Johannesburg's Ihron Rensburg. Four other universities sent representatives.

Speaking about improving infrastructure at higher education institutions and the need to assist students who could not afford to buy their own food, Nzimande said there should be a dining hall at every university.

"There are some universities that don't have dining halls. Students don't go to university to cook, they go to university to learn."Dean of the faculty of science, engineering and technology, at Walter Sisulu University Phinda Songca, said the "revolution in information and communication technology [ICT] brought competencies that can be appropriated by all sectors and have an enormous impact on society".

'ICT aliens to natives'

He recommended that higher education address ICT setbacks "so our universities, FET colleges, students and lecturers are converted en masse from ICT aliens to natives, and they will perform better".In response, Nzimande said: "if you are a university student you must have an email address and access to wifi". He said the department was "considering" the idea that National Student Financial Aid Scheme of South Africa (NSFAS) students be given a laptop along with their textbooks.

Mail & Guardian

'No-go' Mining Areas to be Announced Soon – Molewa

Mineral Resources Minister Susan Shabangu would soon announce 'no-go' areas for mining, based on ecological sensitivity, Environmental and Water Affairs Minister Edna Molewa.

Speaking at a business briefing in Johannesburg, she said that the Department of Environmental Affairs (DEA) and the Department of Mineral Resources would also publish jointly developed mining and biodiversity guidelines.The DEA was working with other government departments to ensure that mining methods were less destructive and that appropriate mitigation and rehabilitation measures were in place and financially provided for. Molewa indicated that the mining industry currently accounted for about 7.7% of South Africa's gross domestic product and that it would continue to be a significant contributor."It is therefore imperative that this important sector be treated as key in our greening of the economy.

"Not only do we need to address the significant legacy of environment degradation caused by past policies and practices, but also ensure that current and future mining activities take place in such a way that we do not leave the same undesirable legacy for the next generation," she urged.

Regarding land-use patterns, South Africa had made progress in mainstreaming environmental sustainability in the development processes. Molewa said this was visible in the integrated development plans and spatial development frameworks at local government level. "It is time to implement a resource-efficient, low-carbon and pro-employment growth path. Government, the private sector and civil society need to be jointly and actively involved as partners in this process. The conservation and wise use of our natural capital, which is valued, is key to ensuring a sustainable future," the Minister stressed.

Economic growth, business continuity, food and energy security and drinking water supplies were also currently under increasing pressure."With finite limits to freshwater availability, we must always be innovative in our water resource management so that we deliver the much-needed water to sustain growth for humanity and the environment," Molewa stated.She warned that if South Africa wished to broaden its agricultural base, equity in water use was necessary.

"For agriculture to effectively drive green growth resilience, the focus should be on support of agrarian societies in implementing and using alternative inputs that are less vulnerable to fluctuating oil prices, alternative mechanisation options, water harvesting and irrigation technologies, and strengthening financial flows and investment in the sector," Molewa said.

Irrigated agriculture currently made up 60% of the South Africa's water user and was also the sector where large savings could be achieved with a focus on the efficiency of distribution systems, such as pipelines and canals, the Minister suggested.

"We must always be innovative in our Water Resource Management so that we deliver the much-needed water to sustain growth for humanity and the environment"

Ash Pile - *Flip Breytenbach*

Creamer Media's Engineering News

IV International Wildlife Management Congress
Cooperative Wildlife Management across Borders: Learning in the Face of Change

Ian Rushworth, Ezemvelo KZN Wildlife

Despite being home to the most diverse array of wildlife on the planet, with some of the most serious and complex challenges in respect of the conservation thereof, Africa had never hosted an International Wildlife Management Congress. That all changed during 9-12 July 2012 when the IV International Wildlife Management Congress (IV IWMC) was held in Durban, South Africa. The Wildlife Society (TWS) in partnership with the Wildlife and Environmental Society of South Africa (WESSA), South African National Parks (SANParks), and Ezemvelo KZN Wildlife (EKZNW) hosted and organized the congress. Appropriately, the theme of was 'Cooperative Wildlife Management across Borders:"Learning in the Face of Change"

Sub-themes included human dimensions of wildlife management and conservation, climate change, wildlife health and disease, wildlife population management, endangered species recovery, invasive species, trans-border cooperation and conservation, natural resource use and sustainability, and habitat restoration, modification and stewardship.

The first day started with workshop sessions, followed by the opening ceremony with usual pomp and speeches. The four workshops covered animal trapping techniques (summary of international research efforts conducted over the last 20 years to develop humane traps and trapping techniques as well as providing practical instruction in the types of traps and setting techniques used for research and in the management of wildlife); road ecology for Africa (highlighted the state of road ecology internationally and in Africa, identification of key lessons and principles of road ecology for Africa); Synoptic modeling of animal location data (a new approach of analysis of animal location data that combines animal movements, home range and resource selection analyses); and the use of porcine zonapellucida(pZP) immunocontraception as a technique in the management of captive and free-ranging wildlife populations, with emphasis on African elephants.

The remaining three days were run as a series of day-long themed symposia run in conjunction with three parallel sessions of presentations. Two plenary sessions stood out for me: Shaun Mahoney gave a stirring introduction to private land conservation, politics and ethics.

I was amazed at the extent of wildlife ranching in Texas where game has obtained economic value, but also noted some of the resultant impacts of artificial feeding and introduction of exotic species. This provided a glimpse of where the southern African wildlife industry is heading, and reinforced the need for strong policy and regulatory oversight in southern Africa! The point was made that we should be wary of the claims made about the conservation contribution of wildlife ranching, as beneath the claimed conservation benefits are serious negative impacts of fencing, genetic manipulation and pollution, and predator control, and that in many respects well run commercial livestock ranches may be better for the environment!

The plenary session on rhino management gave an overview of the trends in populations and poaching – and reminded us that in the recent past we have witnessed the extinction of at least three subspecies of rhino - and made public for the first time a proposed new approach, being championed by Ezemvelo KZN Wildlife, of establishing a legalized trade in rhino horn run through a central selling organization. The theory is that the legal trade will remove the speculation that is driving up the horn prices, meet some of the demand, and change the risk-to-reward ratio for poaching syndicates. Whilst there will always be uncertainties, the current approaches are not effective enough, and the trade can easily be stopped if there are unintended consequences.

Overall, the talks highlighted the global demise of wildlife and wild systems in the face of exponentially growing human pressure we are witnessing unprecedented rates of extinctions and disruptions of ecosystems and the services they provide to humanity. The massive impact of the new shale gas industry was profiled, where it was highlighted that political and economic pressure will see massive expansion, but where few options for mitigation of the impacts were provided. The need for landowners and other affected parties to have input into the establishment and operation of the industry was highlighted. Of course the impacts of climate change on wildlife and natural systems are being increasingly recorded and reported on, sometimes with surprising outcomes.

There is a growing trend towards fertility control as an alternative to culling in charismatic species or where there is strong public interest. Examples of kangaroos in Australian urban areas and African elephant were provided demonstrating that contraception can work. However, the management and budget overheads are enormous. Whilst contraception is a society values-driven necessity, that same society will need to accept that an increasing trend to non-lethal control will diminish budget for other aspects of saving threatened species. It is not generally appreciated in other parts of the world that the meat from culling represents an important protein source in impoverished rural communities, and provides an incentive to tolerate wildlife and its associated impacts which otherwise would not be there.

As humans and wildlife come into closer and closer contact, and as we attempt to create borderless transfrontier conservation areas, the issue of animal disease management is increasing in importance. Talks at the conference highlighted the importance of understanding animal ecology and behavior to develop effective disease management programmes – non-selective control programmes, such as that for bTB in English badgers, may exacerbate rather than reduce disease transmission.

The impact of rich nations' almost irrational fear of foot and mouth disease, and the consequent draconian policy, and how this affects the African livestock industry, wildlife and rural livelihoods, was highlighted. As wildlife gains importance in regional economies (wildlife and associated tourism and hunting already contributes more than agriculture in southern African GDPs) veterinary authorities, agriculture and conservation are going to have to re-think and re-define how animal diseases are approached and managed. At what point is agriculture going to compensate the wildlife industry for the introduction of bTB into wildlife herds with the associated costs and impacts?

Perhaps understandably there was a predominance of talks from North America (base of The Wildlife Society, funding) and southern Africa (location, focus on wildlife). Notably, there were very few talks from South America, northern and western Africa, Europe (understandably) and Asia (other than India and Sri Lanka).

The same pattern was apparent in the delegates. I personally gained knowledge across a diverse range of subjects, and have already started incorporating some of this in my work. It is just regrettable that for me - like so many other African conservationists - this is likely to be the first and last IWMC that we attend because Africa has now had its turn and the costs of international conference attendance are prohibitive.

ABSA Wildlife Conference

The Economy of Ecology: Empowering the Wildlife Sector to Invest in Responsible Wildlife Management

Minette van Lingen, DAFF-Grootfontein ADI

The third annual ABSA Wildlife Conference was held in Port Elizabeth on 31 May 2012. The theme of the day was "The Economy of Ecology: Empowering the wildlife sector to invest in responsible wildlife management". The speakers that contributed to the day included Dr Flippie Cloete from the North-West University's Centre for Environmental Science, Dr Mike Knight from SANParks, Dr Johan Joubert from Shamwari Private Game Reserve, Ernst Janovsky from ABSA Financial Solutions, Japie Buckle from SANBI and Matthew Norval from the Wilderness Foundation.

Dr Flippie Cloete opened the day's proceedings with his presentation "Investing in change". His talk highlighted that game ranching and game farming should not be confused and that many game ranchers are actually game farmers especially when breeding intensively with rare species like buffalo and sable etc. Game farmers and stock farmers are experiencing the same economic pressures and because the financial returns from farming with rare game species are so much greater than conventional stock farming the game farming industry has grown tremendously with many new farmers converting from stock farming to game farming. Currently the breeding value of rare species determines the price, which in many cases exceeds the industry's wildest expectations such as a buffalo bull sold for R 18 million or a golden gnu for R 1.2 million. He warned that this trend is not sustainable and posed a question of what will happen when the supply of these animals exceeds the demand. He urged the game industry to explore other options to find ways to stimulate the demand for game products like meat and skins as it is such a unique product.

Dr Mike Knight looked at national policy and parks management plans. He used the example of one of their very successful parks namely Addo National Elephant Park to explain how protected areas can be utilised to fight poverty and to protect ecosystems. He stressed that it was important to conserve unique biodiversity and reduce critical threats with efficient and effective management and that the objectives of any management strategy should not only include conservation of biodiversity but strive to uplift local communities and to promote sustainable ecotourism. Knight also drew a lot of response when he criticized the game industry for the "fashion trend" of breeding with rare, colour variants with recessive genes like golden and king wildebeest, etc.

According to Knight such animals are not natural and do not contribute to conservation and that these small intensive farming operations only contribute to fragmentation of natural systems.

Dr Johan Joubert continued on the topic of management of protected areas using Shamwari Private Game Reserve as a case -study and gave insight into their winning formula for environmental, social and financial sustainability. He explained that private game reserves often experience problems with funding so they reverted to using the term "Big 5 Reserves" and advocating 5-star game lodges to entice tourists, but with the current economy it is becoming more difficult to fill beds within the reserves. According to Joubert to be able to remain financially viable these private game reserves will have to rethink their approach and offer something different. He concluded that it will always remain a challenge to balance the needs of the accountants' *vs* the needs of the hoteliers *vs* the needs of the conservationists.

Ernst Janovsky explored the strategic financial services and considerations for wildlife and agri-sectors. According to Janovsky it is important for game ranching in South Africa to be profitable as this will contribute to conservation, but that this will inevitably lead to game ranches becoming bigger. Policies governing the game ranching industry should also be reconsidered as it is a farming activity and should therefore fall under the Department of Agriculture.

It is also of great importance that new markets in Asia and India be investigated as the economic crises in Europe and America will lead to a decrease of visitors from these markets. Japie Buckle discussed the degradation of biodiversity in game ranching. According to him it seems that land managers have lost the ability/ knowledge/willingness to manage land properly. This was ascribed to the difficult economic climate, expenses with regards to erosion control, the lack of subsidies and agricultural extension services and the fact that we have highly erodible soils. Game farming is a science often more complicated than livestock farming, and most game ranches are too small for the diversity of species that land managers would like to keep, which often leads to increased degradation. According to Buckle these are serious issues that need to be addressed to ensure sustainability of the game ranching sector over the long-term.

Matthew Norval gave insight surrounding the role of private game ranches and agri-lands in conservation corridors. Norval believes that many productive commercial farms have the potential to make a positive contribution to conservation objectives. This can be done via voluntary contractual agreements with private land owners to establish conservation corridors and this would provide opportunities to consolidate and expand protected areas. These agreements would also stimulate conservation-friendly economic development in regions and also protect areas from inappropriate development, with a good example being that of the Mountain Zebra – Camdeboo National Park corridor project.

The day was ended off with a panel discussion on rhino protection, where the panel and delegates explored the impacts of militarisation, legalisation and conservation policy as possible solutions to the current rhino crises. Dr Knight stressed the fact that 93% of Africa's rhino are in South Africa and that we were losing about 1.2 rhino every day. He felt that all the options should be considered but that we must make sure that what we are doing is really in the best interest of rhinos. Dr Joubert supported his argument but he felt very strongly against the dehorning of rhino as he felt it sends a message that we have already lost the battle against rhino poaching.

There were mixed feelings regarding legalising trade in rhino horn as some delegates felt it would decrease the black market activities as prices would drop and others fell it would make no difference as it would not decrease the demand for rhino horn. The panel concluded that the way forward should be to increase intelligence, create improved awareness and to gain the necessary equipment and funding to be able to react proactively rather than reactively as is the current situation.

2012 Panel of Speakers from left to right: Dr Johan Joubert (Shamwari Group), Derrich Gardner, Japie Buckle (SANBI), Matthew Norval (Wilderness Foundation), Dr Mike Knight (SANParks), Ernst Janovsky (Absa), Dr Flippie Cloete (North West University). *Photograph - Avenue-IMC*

The Biodiversity Information Management Forum

Paula Hathorn, SANBI

Making a difference: the Forum explored the role of information collection and management to support research, policy, biodiversity management and a comprehensive national monitoring framework, and was held from 12 to 13 June 2012 at the Old Mutual Conference Centre, Cape Town, South Africa

In the opening address to the Biodiversity Information Management Forum (BIMF) 2012 Jon Hutton, Director of UNEP World Conservation Monitoring Centre, emphasised that measuring biodiversity is not a trivial task because biodiversity is multi - dimensional and complex. Biodiversity information is required to encompass variety, quantity, composition distribution and quality of biodiversity.

In his presentation Dr Hutton pointed to a number of shortcomings across the links of the biodiversity data chain from data gathering, data organising, data sharing, data synthesis to analysis and tools for decision. However, he pointed to the success of high quality national biodiversity centres such as SANBI in organising data and developing tools for decisions. Delegates at the BIMF were clear that strong taxonomic and natural science skills should remain the solid foundation of biodiversity information management.

An exciting initiative that contributes to gathering data and monitoring biodiversity was launched at the Forum. Carmel Mbizvo, SANBI DDG, officially launched the southern African citizen science portal iSpot by uploading an observation of the iconic *Leucadendron argenteum*. www.ispot.org.za

Data quality was the theme of the training course hosted by the South African Biodiversity Information Facility (SABIF). Participants appreciated the experience and expertise of trainer, Arthur Chapman, of the Australian Biodiversity Information Services, and expressed interest in inviting him to return to South Africa and continue build local capacity through sharing his extensive biodiversity information skills.

A group photo of all BIMF participants - *Photograph: SANBI*

Lively discussion as delegates respond to the round table inputs on achievements and challenges in ensuring biodiversity data is relevant - *Photograph: George Davis, SANBI*

Millennium Development Goals Review Summit and Exhibition

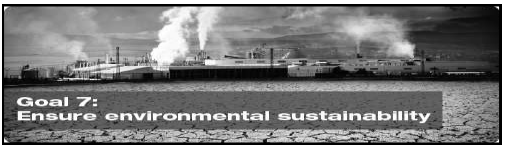
3 – 4 May 2012

M Igshaan Samuels , Agricultural Research Council

The aim of the summit was mainly to identify and discuss how the private sector may assist government and stakeholders from across the world to accelerate progress towards achieving their respective Millennium Development Goals (MDG) that are due in 2015. The summit also provided a platform to outline directions how governments can facilitate further business involvement for sustainable development and achieving the 8 MDG goals.

The 8 MDG goals are to:

1. Eradicate extreme poverty & hunger
2. Achieve universal primary education
3. Promote gender equality & empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria & other diseases
7. Ensure environmental sustainability
8. Develop a Global Partnership for development



Several businesses, including agri-businesses had exhibitions and their representatives made presentations about how their products could assist in achieving some of these goals. However, due to visa constraints most of the key delegates and exhibitors were not in time for their presentations or exhibitions. Ensuring environmental sustainability (Goal 7) in the longer term is the goal GSSA could make a significant contribution to, especially in South Africa.

This would include reducing our carbon footprint, promoting conservation farming methods, conserving ecosystem services, discouraging habitat destruction and encouraging environmental rehabilitation.

The MDG Summit & Exhibition which was scheduled for the 24th – 25th of April 2013 next year in Johannesburg South Africa is now going to be held in the United Kingdom on the 8th – 9th May 2013 at the NEC in Birmingham.

For more information on the event and how to register please visit the event site www.mdgsummit.org.

47th Annual Congress of the Grassland Society of Southern Africa

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Congress 47 was the first attempt by the Society to reduce the carbon footprint of congress delegates and empower to the community where the Congress was held. Initiatives taken to reduce our carbon emissions included planting trees donated by Western Cape Department of Agriculture at three public schools in Langebaan and Saldanha Bay.

Environmental education sessions were held to teach the staff of Club Mykonos about the impacts that people might have on the planet and how these impacts could be reduced. Staff were trained on ways to recycle their waste, an initiative the management showed interest in taking up permanently in the future.

The Congress started with the Best Farmer SA course on Monday morning which was facilitated by Riaan Dames, an extensive animal production specialist. The course focussed on rangeland management by using the principles of the controlled fodder flow grazing strategy and animal behaviour. At the meet and greet function on the Monday evening, Prof. Johan Hattingh, Professor of Philosophy at Stellenbosch University delivered a mind stimulating talk entitled: "Adaptation and human flourishing in an era of global climate change".

During his talk he challenged policy responses to climate change and outlined why these policies are inadequate in addressing our human needs. During the next three days, presentations were held covering themes such as fire ecology, plant chemistry and quality, restoration ecology, managing biodiversity, vegetation monitoring, ecosystem services and invasive plants. A total of 10 keynote presentations, 63 platform papers and 32 research posters were presented. A special session was also held where an additional 20 research proposals were presented by students.

Keynote presentations were delivered by several invited local and international speakers. These included keynotes by Dr Alan Andersen from CSIRO Sustainable Ecosystems in Australia who presented on "Fire management in Australian tropical savannas: biodiversity, greenhouse gas abatement and indigenous livelihoods". Dr Mohammed Said, from the International Livestock Research Institute (ILRI) in Kenya talked on "Natural resource management and biodiversity conservation in the drylands of Eastern Africa". Dr Urs Kreuter from Texas A&M University in the USA presented on "Rangeland sustainability, capital and investment in ecosystem services: a social -ecological systems approach".

The Annual Congress also hosted several special sessions. A special session on rangeland commons was held where several presentations were delivered in response to a position paper by Dr Susi Vetter from Rhodes University which challenges the objectives of the draft policy for the sustainable management of veld (range) and forage resources in South Africa. In her talk, she outlined alternative issues that the policy should focus on to ensure sustainable land use on rangeland commons. Response papers were delivered by several social and natural scientists which provided an integrated approach for sustainable land use in rangeland commons. The papers delivered during this session will be published in a special issue of the African Journal of Range and Forage Science in March 2013.

The special planted pastures day was held and was of high standard. The keynote address by Nelius van Greunen, a farmer who also served as a producer member in all structures of the dairy industry over the past 20 years, was instrumental in introducing this session. This session was well structured and the importance of sustainable research led by well-trained scientists on well-organized research facilities within the target area was emphasized. The soil quality for sustainable pasture production session held as a special session for the first time at the GSSA Congress. The keynote address was presented by Dr. Anthony Mills and prompted much interest.

Apart from the scientists from various disciplines, the session also attracted many professionals from the industry, such as seed companies and laboratory service providers.

A special session on bush encroachment was themed "Perspectives on drivers, dynamics and management". Prof. William Bond from the University of Cape Town presented a keynote on "CO_2 and other global change influences vs local drivers". Proceedings of this session and the follow-up session to held at the Arid Zone Ecology Forum Conference to be held in October 2012 will be published in a special issue of the AJRFS.

Congress participants also went on various mid-congress tours which included visits to the West Coast Fossil Park and West Coast National Park where they learned about the Scientific approaches to environmental rehabilitation. At !Khwa ttu San Cultural Village delegates learned about historic and present San cultures and lifestyles. At Buffelsfontein Game and Nature Reserve approaches to alien control in the reserve were discussed and the visit to the Cape West Coast Biosphere Reserve focussed on the Langebaan RAMSAR site. A post-congress tour was organized for delegates to visit Robben Island and Table Mountain. Unfortunately, the weather was extremely bad and both parts of the tour had to be cancelled due to high winds and rough seas. Delegates were instead taken on a tour of Cape Town sights and then enjoyed some time at the V&A Waterfront.

On the social scene, several delegates went on sundowner boat trips on the Langebaan lagoon. Participants also took part in a Greek evening on the Wednesday where they were able to break their plates after eating and of which no one had a problem doing. The Gala Dinner was held at Boesmanland Kombuis which include an auction where various sponsored art were sold. Proceedings of the auction will be donated to organizations whose objectives include environmental protection.

At the Gala Dinner, Dr Mark Hardy was awarded with the Prestige Award for his overwhelming contribution to rangeland and pasture sciences in South Africa. Kotie van den Berg of the farm Beeldhouersfontein near Murraysburg received the Peter Edwards Award for the Best Conservation Farmer. The award was presented in recognition of his sound application and practice of the principles of range and forage science and conservation. Dr John Mworia received the award for the Best Paper Published in the African Journal of Range and Forage Science in 2011, for his article entitled "Patterns of seed dispersal and establishment of the invader *Prosopis juliflora* in the upper floodplain of Tana River, Kenya". An Award for Outstanding Academic Achievement was handed to Gabrielle Solomon from the University of the Western Cape in recognition of her Honours.

Winners of the Congress Awards were

- Best Platform Presentation: Alan Andersen - "Fire management in Australian tropical savannas: biodiversity, greenhouse gas abatement and indigenous livelihoods"

- Best Poster Presentation: Dawood Hattas - "The quantification of condensed tannins in African savanna tree species"

- Best Platform Presentation by a Young Scientist: Pieter Swanepoel - "Establishing baseline values for soil quality indicators in the southern Cape"

- Norman Rethman Award: Leana Nel - "The effect of seed coating on the germination and emergence of Lucerne (*Medicago sativa L.)* in sub-optimal environments"

- Best Research Proposal Poster: Nobuntu Mapeyi: "The effect of biogas slurry on fodder production at Macubeni community in the Eastern Cape". Ms Mapeyi will be attending the Annual GSSA Research Skills Workshop in 2013 as part of her prize.

- Faux Pas Award: Melake Fessehazion: discovering that the boiled egg he had taken at breakfast was in fact still raw when he broke it over his plate full of food!

Pieter Swanepoel

Nobuntu Mapeyi

Group Photo of delegates at the 47th Annual GSSA Congress

Grassland Society of Southern Africa Prestige Award Presented to Dr Mark Hardy

Kevin Kirkman, University of Natal

During the Gala Dinner of the 47th Annual Congress of the Grassland Society of Southern Africa, Mark Hardy was presented with the GSSA Prestige Award. 16th to 20th July 2012, Western Cape Province, South Africa

Mark Hardy obtained a Diploma in Forestry from the Saasveld Forestry College in 1976. He was posted to the Drakensberg region of KwaZulu-Natal where he developed a strong interest in grasslands and the management of grasslands. This led him to resign from the Forestry Department and enroll for a BSc Agriculture degree in Grassland Science at the University of Natal in 1978. Being a "mature" student, Mark made excellent progress and completed his degree in 1981. He then enrolled for a Masters degree which he completed in 1983.

Mark went on to work for the Department of Agriculture, based at Cedara, as a researcher in Grassland Science. His main focus was on veld research, but he also maintained a strong interest in pasture research. During this time he maintained strong links with the University of Natal in a research capacity. He enrolled for a PhD degree in 1990, which he completed in 1994. His PhD studies were focused on studying the relative impacts of sheep and cattle veld composition and condition, and the impact of these ratios on animal performance. This work remains a highlight of his career. In 1998 Mark relocated to the Western Cape as a specialist scientist in the Western Cape Department of Agriculture, where he focused largely on developing crop rotation systems with pastures as an intermediate in the rotation. This work was, and still is, highly regarded. In addition to this, Mark made significant contributions to developing a research friendly environment in the Western Cape which remains the envy of other provinces.

During his career, Mark published widely in scientific journals and also published many semi-scientific and popular articles. His overall contributions to the Grassland Science community and to the Society will be remembered for many years.

Mark retired recently, to Montagu in the Western Cape, but remains active in his role as Extraordinary Professor at the University of Stellenbosch, and will continue to make contributions to the Grassland Science community in various ways and will continue to stand out in the field of Grassland Science.

The Whole and the Sum of the Parts: Exploring Alternative Approaches to Rangeland

Kevin Kirkman
University of KwaZulu-Natal
e-mail: kirkmank@ukzn.ac.za

Special Session held at the 47th Annual Congress of the Grassland Society of Southern Africa, 16th to 20th July 2012, Western Cape Province, South Africa

Historically, the Holistic Management™ movement in its various forms over the years and the rangeland science establishment have had an uneasy relationship characterized by antagonism and mistrust. This is unfortunate, as both groups have the same overall vision and aims, being broadly to conserve and restore rangelands through various sustainable management approaches.

The scientific establishment follows well established scientific methodology, based on experimentation and the collection of robust data with the results being subjected to rigorous peer review before gaining credibility. This approach is often criticized as being slow, cumbersome and unresponsive to new ideas. Scientifically based management approaches are often characterized by a high degree of inertia, relying on a large body of scientific evidence for justifying resistance to change or requiring a large body of evidence before embracing and recommending change. Scientists and the scientific method are often criticized for being reductionist i.e. placing a lot of emphasis on the functioning of the components that make up the whole, and not focusing on the whole.

Alternate groupings, such as Holistic Management, are not restricted in this way, and have the freedom to pursue and promote alternate ideas and approaches quickly, without rigorous testing and peer review.

Holistic management, as the name implies, is focused on the whole, with less emphasis on the parts that make up the whole. Land users and managers, who are searching for solutions to management problems, are often attracted to an approach that appears more vibrant and exciting than the seemingly slow moving scientific approach.

Fortunately, in recent years increasing dialogue between the apparently divergent approaches has resulted in increased understanding among scientists and people associated with the holistic Management movement. As part of this dialogue, Mr Jozua Lambrechts presented an invited keynote address at the 47th Annual Congress of the GSSA, on behalf of Mr Allan Savory (President of the Savory Institute) who was not able to be present.

The address focused on the role of range science to meet global challenges, with emphasis on the benefits of the holistic approach. As part of a fascinating presentation, Mr Lambrechts outlined the history of the Holistic Management approach to rangeland management and discussed success and failures, giving insight into past experiences. Examples from the Savory Institute's ranch in Zimbabwe were used to illustrate the approach and emphasize the role of animal impact in range management.

The presentation conveyed a strong message regarding desertification, biodiversity loss and climate change, and the role of rangeland scientists and managers in tacking these issues proactively and together. This presentation was followed by a presentation on the use of fire and oxen in rehabilitating degraded rangeland, by Robin Ford, Wayne Truter and Mike Peel. The authors highlighted the role of using fire and grazing animals in changing and improving rangeland condition, manifested by a decrease in abundance of unpalatable species and a consequent increase in grazing value of the rangeland.

The final presentation in the session was presented by Keith Ramsay, on behalf of Heleen Els, and was focused on the importance of adapted breeds of cattle in sustainable systems. This fascinating presentation touched on the importance of unusual traits such as the ability of a cow to scratch its ear with its hind foot in tick control. This and many other interesting facts about the adaptive abilities of cattle and the sometimes inappropriate traits that are currently selected for, certainly proved thought provoking when considering sustainability of extensive cattle farming activities, and the impact that cattle have on rangelands.

The three presentations generated some lively discussion, with the main issues arising from the first presentation on Holistic Management. In essence, it seems that there is a lot of common ground between scientists and the Holistic group – probably more than both groups realized. There are, however, still some areas of disagreement or possibly misunderstanding. These include the role of fire in ecosystems and the issue of animal numbers. Most scientists recognize the role fire plays, but the Holistic Management practitioners tend to denigrate fire and its potential benefits. The Holistic Management movement continues to promote stocking levels that most scientists feel are unsustainably high, and there is still some uncertainty about this. The increasing levels of dialogue can only benefit the end user of the resultant recommendations. namely farmers, land managers, conservationists and the general public.

Holism: The Future of Range Science to meet Global Challenges

Allan Savory and Jozua Lambrechts
The Savory Institute
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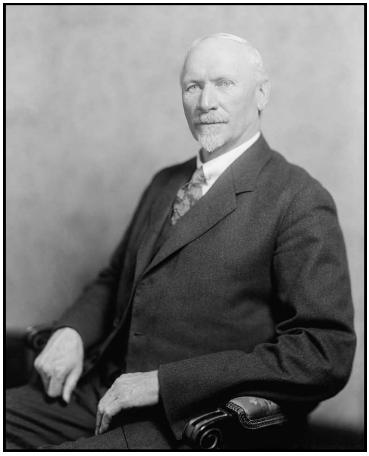
Introduction and Background

The perfect storm approaches - with global population rising, agriculture producing more eroding soil than food, and the world's vast grasslands turning to deserts – leaving in its wake man-made droughts, poverty and violence. I hope to inspire you to take the steps needed to avert this storm and, thus, to attain great achievements as professional researchers and managerial custodians of the vital grasslands and savannas of the world including this Mediterranean region in which you meet. The world's seasonal rainfall rangelands, I believe, hold the key to the survival of civilization as you will learn.

Never in history has humanity faced the extreme dangers we do today of man-made desertification and climate change. It is no exaggeration to state, for reasons I will shortly explain, that the entire future of civilization hangs on the slender thread of learning to manage livestock properly on the world's grasslands that are desertifying rapidly on your watch.



Jan Smuts - *Harris & Ewing Collection Wikimedia Commons*

The theoretical foundation of my work over the past half century was provided by Jan Smuts which makes it appropriate that we meet today on his home ground where he was born on 24 May 1870 near Riebeeck-Wes.

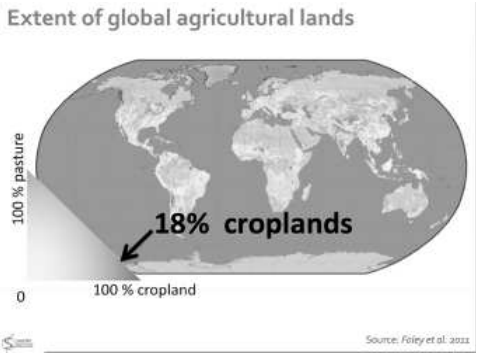
As you know, Jan Smuts - lawyer, botanist and soldier - fought a hard and bitter campaign against the English as a Boer War General. But he went on with the rank of Field Marshal to command British forces and to serve as an advisor to two British cabinets during both world wars, due to English magnanimity and appreciation of his intellect.

It is no secret that the international range science profession and your institution have waged a bitter war against my work, and holistic planned grazing, for almost half a century. I do believe our war is ending, and that your magnanimity in inviting me to address you today is testimony to your integrity and caring for the future.

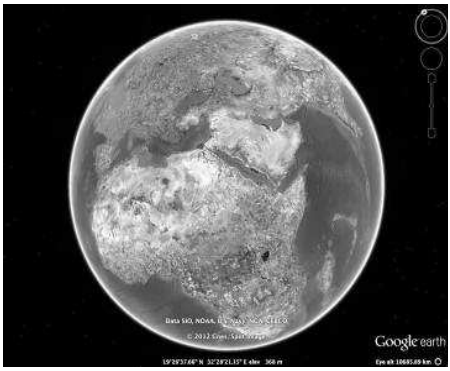
My interest in the grasslands and savannas resulted from my passion to save Africa's wonderful big game animals. It did not take long to realize that the destruction of habitat was the greatest danger to wildlife. From there, it was but a small step to understanding that this habitat destruction, threatening wildlife, did not differ from the habitat destruction that had destroyed many civilizations, and today presents a global threat greater than all the wars ever fought.

Agriculture, its Importance and Impact

Agriculture is not crop production alone, as commonly believed. It is the production of food and fibre from all of the world's land surface and waters. Of the world's land less than 20% is under cropland production with the remaining 80% under non-cropland agriculture, predominantly livestock and wildlife on the vast grasslands, savannas and man-made deserts of the world. In many African countries the amount of land under crop production is less than 10% with some as low as 1%.In the entire region stretching from North Africa through the Middle East to Pakistan and on up into China, one of the most troubled in the world, many countries have only 1% to 5% cropland with the rest being grasslands essentially under livestock and wildlife and little else.



Global proportions of croplands and non-cropland agriculture - *Foley et al 2011**



Vast region across North Africa to China desertifying seriously - *Google Earth*

**Reprinted by permission from Macmillan Publishers Ltd: Nature) Foley et al 2011, Solutions for a cultivated planet), copyright 2011*

Agriculture made civilization possible. Without agriculture we could not have cities and towns, a government, an army, a university, businesses or your profession. But agriculture, today produces more eroding soil than food even in the U.S. And agriculture, mainly pastoralists, caused the major man-made deserts like the Sahara and Tihama. Desertification being exacerbated by annually burning more than a billion hectares of grassland a year in Africa alone. All leading to ever increasing droughts, floods, poverty, social breakdown, emigration, violence, cultural genocide and suffering. Further, these symptoms of faulty agriculture have nothing to do with climate change, though they are now seen as effects of climate change.

Agriculture, when we weigh up the soil carbon emission from the destruction of soil, expanding desertification and biomass burning, as well as the destruction of tropical forests and millions of cattle being fed grain, is contributing as much as, or maybe more than, fossil fuels to climate change. What is more serious is that climate change is likely to continue even in a post-fossil-fuel world unless we address desertification and agricultural destruction of soil causing it to no longer hold both the carbon and water it formerly did.

I do not believe any informed scientist would dispute what I have laid out over the last five minutes. Yet, we repeatedly hear that agriculture will need to adapt to climate change while mainstream institutional scientists forge ahead promoting more of the very cropping and range management practices causing climate change.

Why is your profession so important? It is because the world (ordinary people, people working the land, political leaders developing policies etc.) looks to you for expert opinion on the greatest areas of the world's land surface - essentially two thirds of Earth's land area – and restoring that land mass is crucial to averting climate change, restoring fresh surface and ground water resources, feeding humanity and mitigating poverty, violence and war.

I can think of no single profession more vital to the future of global civilization than range science!

In the 1950's, when the seriousness of the desertification of the world's grasslands and savannas first dawned on me and I began seeking practical solutions, I was an institutional scientist working for a government. Realizing that political and other pressures made scientific integrity well neigh impossible for me, I became an independent scientist, supporting my work in any way I could.

I was fortunate to be able to stand on the shoulders of people like Jan Smuts and the French pasture scientist Andrée Voisin in particular. I regretted not studying range science at university. This failing of mine, however, proved fortuitous. Just as the finest candle makers could never have conceived of nor developed electric lights, so too breakthroughs in ecology, range science and management were bound to come from people on the fringe.

Holism

Einstein said he believed two constructs would prove important to the future of humanity - his own of relativity and Jan Smuts' construct of holism.

Holism is a concept that has been hijacked to mean many things to many people with little understanding. We have had one major global paradigm shift in history, from the Earth being the centre of our universe to the sun being at the centre. We are currently in the early stages of the second global and probably greater shift in our world view. The shift from a mechanistic to a holistic world view.

It was Smuts who first warned us as scientists that we would never understand nature (the main aim of science) till we understood that nature only functioned in wholes and patterns. Because of our mechanistic worldview, the simplicity of this concept is difficult to grasp. Whole atoms forming whole molecules, whole cells, organs, organisms, populations, communities and so on to a whole universe.

Some try to explain holism using the cliché that the whole is greater than the sum of the interconnecting parts. Whilst a step in the right direction, this fails to capture the idea because parts and interconnections are mechanistic concepts having no counterpart in nature. Nowhere is our lack of comprehension of the holistic nature of our ecosystem better illustrated than in the case of the three great issues of today – biodiversity loss, desertification and climate change.

Each is being addressed separately by different institutions and even within such institutions – universities, environmental organizations, governments and international agencies, and in separate international conferences. Yet they are one and the same inseparable issue.

Desertification simply does not occur without biodiversity loss. Desertification is only a symptom of biodiversity loss – i.e. the loss of plant mass and biological cover of the soil, leading to the available rainfall becoming less effective. And desertification and soil destruction generally leads first to a change in micro-climate and ultimately macro-climate - a process greatly accelerated since the exploitation of fossil fuels.

Without addressing soil destruction and desertification, climate change is impossible to prevent or address.

That management needs to be holistic and can never be reductionist was initially strongly resisted but is increasingly being accepted. I also believe we all accept management should be based upon good science.

Good Management - the need to manage holistically

Let us first look at what management that is holistic means, and then look at current range science. Many today confuse holistic management with integrated management in which many disciplines come together in management situations. Desirable and useful as combining different disciplines is, it does not in any way constitute holistic management.

Allow me to explain. Management, especially in agriculture, involves making and acting on decisions that are always dealing with social, economic and environmental complexity. Complexity is the essence of soft systems (human organizations) and natural systems (nature) as defined in Systems Science. Such arrangements have emergent properties, including unpredictable emergent properties. They are self-organizing and thus able to function with components missing, and when problems occur they are extremely difficult to solve.

Humans (including farmers and range scientists) make decisions to achieve objectives. No conscious decision is made that does not involve an objective – grow maize, eradicate alien plants, control soil erosion, buy a car or run livestock. No range management action is taken without an objective and no development project, or government policy, is formed without an objective. What is most important is that all objectives need a context. Without context objectives become loose cannons on the deck liable to lead to unintended consequences.

A simple example makes the point. I say I intend to light a fire (my objective) and ask your opinion if I should do it or not. You have no idea what to say as my objective lacks a context. If the context is to cook our food - great, if the context is to burn down our home - not so great. So it is with every objective of every person, institution or government. Objectives - without adequate or appropriate context are loose cannons.

The context for almost all objectives given our mechanistic world view, if we think deeply, narrow down to one of three things - "need", "desire" or "addressing a problem". To heal an eroding gulley, wage a war on "alien" plants, settle wandering pastoralists, clear invading brush, reduce livestock, or feed starving mothers and children in the Horn of Africa all fall into one of the three common contexts - need, desire or addressing a problem.

With development projects, and with policies of governments or international agencies, we find – if we analyze a broad array of them - the context is almost without exception the need to address a problem.

Now, because of the holistic nature of the ecosystem, societies, cultures and agriculture as well as economies they all function in complex wholes and patterns. In this unavoidable daily reality of great complexity, the three contexts I've presented - need, desire or addressing problems - simply do not provide a real world or adequate context to make sound management decisions or to develop sound projects and polices. The context is generally too simplistic for the real world complexity. Thus, not surprisingly, most of our objectives when achieved are followed by unintended consequences – some good some not too good. And in the case of development projects and government, or international policies, few objectives are ever achieved while almost all result in unintended consequences. This we witness culminating in the global problems of chaos in financial and economic systems, mounting violence, increasing desertification and climate change.

You do not need to look far in any direction to see how our focus on solving problems without a holistic context leads to ever escalating problems in range science. A hundred years of rotational and other grazing systems, livestock reductions, technological interventions to prevent soil erosion, poison alien plants, clear encroaching brush and control gullies -- only to see desertification expand -- increasing the severity and frequency of both drought and flood, poverty, violence, migration, cultural genocide of ranchers and pastoralists. All this contributing to climate change unintentionally.

We see such unintended consequences from objectives without an adequate holistic context in other fields than range science - examples include feeding grain to livestock, producing ethanol from corn or now biofuels leading to land grabs and social turmoil and of course the war on drugs leading to crime worse than in the heyday of the prohibition of alcohol. So common is the phenomenon of unintended consequences, first noted by economists, that some use the term "law of unintended consequences" and books have been published on the subject.

Defining an appropriate holistic context in any managed situation is not difficult. It involves people describing the lives they want to lead based on their deepest cultural, spiritual and material values – followed by forms of production to ensure such lives and a description of their life-supporting environment in such condition that it would sustain such lives for thousands of years.

Given a holistic context, as we do when using the holistic framework in management situations, we find objectives can be assessed more sensibly, achieved more easily and do not as easily lead to unintended consequences. This we have observed over the many years that it took for me and the thousands of people working with me to develop the holistic framework. And we have observed this encouraging success from households to farms, ranches, pastoral communities and in the analysis of a great many projects and policies.

During the Carter Administration the U.S. Department of Agriculture engaged me to put some 2,000 scientists through training in the analysis of policies and projects using the holistic framework. These officials, and university faculty members, evaluated many of their own projects and policies dealing with symptoms of the serious desertification of the United States - increasing droughts, floods, noxious weed invasions, brush encroachment, soil erosion, disappearing wildlife, failing rural towns and more. They found no project or policy that would not worsen situation due to unintended consequences.

This was simply because all of their objectives lacked a holistic context. Those American scientists covered almost all the same sort of policies being advocated in most nations including your own by your profession. Similar work I did with officials in Lesotho and India led to similar conclusions.

Now let me move on to my second point earlier, namely that management needs to be not only holistic, but based on good science.

Good Science - the brittleness scale

I believe using currently available knowledge, good science and defining a holistic context for policy and project objectives, we can reverse agricultural degradation of the environment in about a third of the world's land where atmospheric humidity is well distributed throughout the year.

However, that is not enough in the greater two thirds of the world of a seasonal rainfall nature. This is because current management practices and policies dealing with these vast areas are not founded on good science but rather on deep beliefs that have assumed scientific validity.

Let us look at the tools available in range science to manipulate our environment at large, including reversing desertification to address climate change. Humans have had two tools for about a million years – technology and fire – to impact our environment. Technology includes everything from sticks and stones to axe or spear to hunt, spade to plant, herbicides, genetic engineering, tractors, ploughs etc.

About 15,000 or so years ago, with the advent of domestication of plants and animals, we developed the idea of using rest, or non-disturbance, as a tool. Early examples were shifting agriculture and pastoralists moving livestock. Today we see this in concepts like national parks where we leave it to nature, and we see it in removing or reducing livestock as practiced by your government or that of the US, Israel or China.

Over all of human existence the only other tool we developed was using small organisms to make cheese, wine, medications, compost, compost teas etc.

Train in any profession in any university in the world and you are unknowingly trained to use human creativity, money and labour through technology, fire or non-disturbance/rest to deal with our environment at large.

While these tools have worked very well in environments where humidity was spread throughout the year, unfortunately there is no tool here that could prevent, or reverse, desertification in two thirds of the world where humidity was not spread throughout the year – the savannas, grasslands, Mediterranean and arid areas of the world. Thus, It is not surprising that Elisabet Soutouris describes us – when seen from space - as a “desert making species”.

The reason desertification was inevitable and defied all range science attempts to understand or reverse it, and also why discovering it's cause evaded us for thousands of years, is simple and logical to explain in hindsight. It is because the bulk of the world’s land is of seasonal rainfall nature and no technology even imaginable, fire or resting the land can maintain the effectiveness of the available rainfall the way that vast grazing herds and pack hunting predators once did. Today in practical terms only much vilified livestock properly managed to mimic these natural patterns can do what is required on the scale and with the frequency required. Let's investigate this further.

The vast grassland, savannah regions experience seasonal rainfall and thus dry or dormant periods in every year – high or low rainfall. They do not enjoy the more even distribution of humidity of even low rainfall areas in much of Europe or some, mainly coastal, areas of the U.S.

In such seasonal environments perennial grass plants, and their dead litter, provide most of the soil cover and more so as rainfall gets lower and insufficient for a full canopy of tree cover. Such grass plants co-evolved with their living soils, with vast herding herbivore populations and pack hunting predators. Most perennial grasses have growing points close to ground level out of harm's way because they co-existed with billions of grazing herbivores. From a holistic perspective one can say they used to function in wholes or patterns of soil, soil life, plants, herbivores, predators and more in functional communities constantly sequestering vast amounts of carbon and water in the soil and playing a role in cycling the necessary ambient atmospheric carbon to all life forms. Soil was the greatest fresh water storage place – greater than all lakes, rivers and dams.

Grass plants grow profusely during the growing season, but every year as the atmosphere dries off most of the plant above ground dies. This plant mass dying every year during a compressed period of the year, needs to decay biologically and rapidly for growth to continue uninterrupted in the following season. However in the absence of adequate herbivores digesting lignin in a symbiotic relationship with micro-organisms, the old material that stands upright breaks down gradually through oxidation and weathering. This gradual chemical/ physical breakdown leads to smothering of growth points and the death of many grass plants.

What follows varies with amount of rainfall but generally leads to healthy grasslands shifting to some form of woody or tap-rooted plants and bare soil covered with algae. As plant spacing opens up and bare soil increases, the available rainfall becomes less effective leading to desertification. This process happens more rapidly where rainfall is lowest.

Good Science - the predator-prey relationship

In such environments the functioning whole in the past included those masses (billions) of large herding herbivores and their pack hunting predators, ensuring bunching for protection, and constantly moving – breaking soil capping, trampling down plat material, grazing, dunging and urinating and planting of seeds - to maintain overall soil cover and grassland health.

As humans over much of the world – over a very long period of time - killed off most large herbivores, using their ability to organize through language, driving animals over cliffs, into wetlands, surrounding with fire or using stone driving walls into killing grounds and more, they soon learned that the grasslands shifted from rapid biological decay to gradual oxidation and weathering and it was but small step to using fire to maintain grasslands.

Grassland oxidizing and shifting to woody vegation following 15 years of resting from grazing. Atlanta Research Station, Zimbabwe - *Photo: Allan Savory*

In this 1980's picture we see slowly oxidizing grass, dark grey to black in colour, after fifteen years of no livestock leading to nature filling the vacuum with woody plants in high but seasonal rainfall in Zimbabwe on the Atlanta Research Station.

Unfortunately, fire is merely rapid oxidation that while it removes the dead mass of plant life stifling grass growth thus keeping adult plants alive, it also leads to exposed soil between plants, massive atmospheric pollution and to less effectiveness of the available rainfall, or desertification over time.

The other tool acceptable to your profession and mainstream science is some aspect of technology but no technology imaginable is likely to ever replace biological breakdown and decay over so much of the world every single year, nor is it needed when animals can do all we need.

So, to avoid or reverse desertification mainstream scientists are left with only the tool of resting land. This is done, to varying degrees, under the name of "conserving" land or "leaving it to nature". Fortunately, there are many research plots, long rested from livestock, as well as national parks and wilderness areas in seasonal rainfall environments that we can study.

Chaco Canyon New Mexico, managed by US National Parks Service following 70 years of resting from all grazing and vast sums spent on soil conservation measures - *Photo: Allan Savory*

If we do study these sites, we note extreme desertification as we see in this picture of land managed by the US National Parks Service. This land has been rested for over 70 years while having vast amounts of money spent on many technological interventions to prevent soil erosion. Desertification as we see is a bad as anything in Africa or China. That rest, or inadequate disturbance, led to desertification escaped us because of our beliefs. I also fell into this trap for years and am today embarrassed by papers I published in which I, like other scientists, interpreted the data to fit our beliefs. In the Tuli Circle on the Botswana border thousands of cattle died as the land degraded in the 1960's and we thought it would recover. But then some 50,000 head of game died and it became even worse, and I published a paper noting that the land had degraded to a point of no return. How wrong I was to learn when later we were able to restore perennial grassland in such areas using nothing but greatly increased numbers of cattle and holistic planned grazing.

I also did the research and wrote the first reports saying we would have to cull elephants causing damage in newly formed preserves due to excessive numbers. A team of scientists formed to evaluate my work agreed with me. We subsequently shot some 40,000 elephants in Zimbabwe only to see the situation worsen. We were all wrong.

Long ago range scientists, presumably observing the damaging effects of resting such environments, realized the beneficial effects of millions of animal hooves. In fact, as you know, because of this realization, but also a belief that livestock caused desertification, American universities developed giant machines, such as the Dickson Imprinter, to mimic the essential periodic high disturbance of large herbivores.

Many of those range scientists also developed countless ways to reseed dying grasslands and the machinery for a plethora of soil conservation measures. Today one has only to drive around the desertifying United States to see millions of hectares of failed check dams, contour ridges, reseeded ranges and failed poisoning and mechanical removal of so-called noxious plants. Despite all these techniques the desertifying grasslands continue their march toward woody plants and bare soil, drought, flood, poverty and cultural genocide of ranching communities.

Travel hundreds of miles through the desertifying United States and you will see a handful of cattle on over-rested ranges. At the same time, hundreds of thousands of cattle are crowded into feedlots being fed grain. And, this model of cattle management is being spread around the world.

Any relatively intelligent person knows that this model creates many unintended consequences from excessive pollution, resistance to antibiotics, meat of low nutritional value, public reaction against eating meat and millions of humans undernourished as grain goes to feed animals that cannot digest it well. The unintended consequence of the objective of grain feeding cattle still not understood is the consequent increased desertification of the US rangelands due to too few livestock overgrazing plants while over-resting the land.

Good Science - time versus animal numbers

When I first realized we had no option but to use livestock in high numbers instead of machines and planting grasses, shrubs and trees to reverse desertification, I still faced the problem of overgrazing. As you know, overgrazing is blamed for causing desertification. The range science position, as you also know, is supported by thousands of peer reviewed studies of grazed and overgrazed rangelands in countless rotational and other grazing systems. This research presented two difficulties when viewed holistically. First, rangeland cannot be grazed or overgrazed. Only plants can be grazed or overgrazed, and so much more than grazing of plants is happening on rangelands supporting animals.

Secondly, although the idea that overgrazing is connected to numbers of animals is the foundation of range science, I have never been able to find a single peer-reviewed paper that in any way connects these two things - overgrazing of plants and number of animals. Throughout these studies, the assumption has been consistently made that any overgrazing of plants occurring meant too many animals were on the land. Belief assumed scientific validity - despite lack of evidence.

André Voisin*

** Reprinted with permission from Mme.Marthe Rosine Voisin*

Fortunately, the French pasture researcher Andrée Voisin provided the needed breakthrough when he established that plants became overgrazed only when exposed to grazing for too long, or re-exposed after insufficient recovery time between grazings. And, this information was published in five major languages sixty years ago now. Changing animal numbers only changed the number of plants overgrazed or over rested. On relooking at all the research available from earlier plant physiologists, as some of the first range scientists seemed to be, I found Voisin's position constantly supported and never refuted. Finally, I could see that managing the time the plants were exposed to the animals was the way to greatly increase livestock numbers without overgrazing plants. And, if that could be done, we might also achieve the amount of trampling and grazing required, and that I had observed on healthier land still supporting large herds of wildlife with pack hunting predators.

Using the science to improve management - the need for holistic planned grazing

Realizing that livestock could be used to mimic nature's herds of old I still did not know how we might do this. Herding seemed out of the question with some 15,000 years of highly knowledgeable pastoralists constantly moving modern rotational and others grazing systems – had accelerated desertification even in higher rainfall seasonal environments. Early Afrikaaner farmers had noted this but were ridiculed. This includes John Acocks, the botanist who first stated, in the 1960's, that South Africa was "overgrazed" but "understocked".

The essence of the problem was finding a way to address the complexity of dealing with the needs of livestock, wildlife, plants, soils, soil organisms and erratic weather simultaneously while still making a profit. Grazing systems were designed to simplify this complexity, and pastoralist herders had never accounted for it adequately.

I first tried Voisin's rational grazing. Voisin, having understood the failings of rotational grazing, had developed rational grazing – meaning thought out or planned and never simply rotated. While rational grazing had proven so successful in the relative simplicity of European more humid climates and pastures, I quickly ran into trouble dealing with the greater complexity of seasonal rainfall rangelands, where we were also integrating wildlife and croplands - and dealing with very erratic rainfall while also beginning to incorporate social and economic factors.

Ecologists, wildlife and range scientists had never addressed such complexity in management. So, rather than reinvent the wheel, I simply took the hundreds of years of European experience as taught at Sandhurst, the British Royal Military Academy, and the planning process they had found best suited to immediate battlefield conditions. Military planners having established a process of building the best possible plan at any moment through simple sequential steps building on one another, I had only to develop a chart to plot the emerging plan that could cater for the dimensions of time, area, numbers and behaviour for which military planning did not cater. Planning on a chart also provided other advantages such as the ability to plan grazings backwards at critical times, to plan animal moves through a minefield of other considerations concerning wildlife, weather, fire, cropping and other land uses. It also provided me with the ability to plan constantly for droughts on the basis of time not areas of land, thus keeping production of both animals and land higher than conventional planning for drought reserve grazing. All of these necessary things no imaginable rotational or other grazing system could address.

Holistic planned grazing as it has become known was immediately successful in restoring grassland health under increased livestock numbers and has continued to be successful wherever used since the 1960s. Today holistic planned grazing is being practiced on well over 20 million hectares on four continents and it is being taught by the Africa Centre for Holistic Management to semi-literate pastoralists and agro-pastoralists from Zimbabwe, Namibia to Kenya, Somalia and Ethiopia.

Let me use but one example of how planned grazing restored degraded grassland.

Entire ranch was devoid of grass when some appeared on recently graded airstrip in 1978. *Photo: Allan Savory*

Here is a picture of my plane on a recently graded airstrip in the Karoo area near Beaufort West in the 1970's. As we know from the historical record, and work of John Acocks, this was once grassland teeming with millions of antelope of many types but with low and erratic rainfall. By the 70's this ranch was only able to support a few sheep living on desert bushes and we actually measured 6 km from one annual grass plant to the next.

Some annual and a few perennial grasses appeared after the grader making the airstrip had broken the hard capped soil surface, so we took the picture. On this ranch we then doubled the livestock numbers using holistic planned grazing to begin reversing the desertification and we based all timing on the needs of grass plants not desert bushes.

Grassland at same site in 2012.
Photo David Jack.

Now in 2012 the ranch looks as we see in this picture, with the old airstrip in the background. Once more grassland is returning because of increased livestock properly managed.

I should mention that in the 1960s apart from the international Charter Trial in which we established that a doubling of livestock numbers could be safely conducted with planned grazing, we also ran an "Advanced Project" on Liebig Ranch in the southern lowveld before expanding planned grazing too widely.

For this project designed to push the stocking rate to what was considered extreme, the worst land possible was selected. Land on which there was not a single perennial grass plant to be seen in over 100 mile drive. On this land we increased the stocking rate by 300% in the first year. And over the following 8 years with planning of the grazing done twice a year it became productive perennial grassland once more, producing five times as much meat per acre as the surrounding 220,000 acre control area.

No range management measures, feeding or seeding were required and the total cost of water and fencing was $1.80 per acre.

This project was then subjected to three years of rotational grazing when the managers stopped using the holistic planned grazing process using one to two day grazing periods at the same stocking rate. By the fourth year so many plants were seriously overgrazed that it had to be destocked entirely.

A great lesson was learned in that even experienced managers in that case could not substitute planned grazing as a process with a rotational grazing system.

I believe, after nearly fifty years of consistent success with holistic planned grazing in many countries and through all manner of seasons, that we can assume it safe to replace grazing systems with a planning process to deal with complexity.

Liebigs Advanced Project, Zimbabwe, designed to push holistic planned grazing to see if failure could be caused under extreme pressure, before widespread adoption. Land representing the worst that could be identified in the country was selected, with not a single perennial grass found within many miles. Cattle were then increased 300% using holistic planned grazing, resulting in the formation of healthy perennial grassland *Photo: Allan Savory*

And here I need to make an appeal to you to try to understand the difference between a planning process that can never be replicated and prescriptive grazing systems that can be replicated for research. Over the years I have observed vast sums of money and man hours of effort researching and publishing papers comparing grazing systems that could never work. There is nothing wrong with management systems when used in all situations where things are predictable. Examples are inventory management, vehicle maintenance, accounting systems and the like in any business. However no business would endeavour to run on the basis of a management system to deal with it's day to day complexity and unpredictability. Likewise no grazing system can ever account for the complexity involved in managing soils, plants, livestock wildlife, erratic weather, cultural and social issues, economy, fires and more.

In all my years of planning grazing, over four continents and many countries from small mixed farms to giant ranches and pastoral rangelands, I have never seen two plans the same. Some plans involve many herds, others one, some have most animals moving through paddocks, or herded using virtual paddocks. Some plans have some animals on continuous grazing to allow other animals to move faster. Some have herds entering a paddock as another herd vacates it and some have herds allocated certain areas of land and so on. Sometimes the animals are grazing plants severely but most times not doing so.

We even developed one plan with a single cow herd of 500 and single sire bulling using one bull to 90 cows. The only name that fits what is done is holistic planned grazing. And this is what ranchers and pastoralists world wide are gradually being taught to do when the objective or goal of running livestock of any sort is within a holistic context.

The results I am personally most excited about are those where we are running 400% more livestock on planned grazing fully integrated with a substantial wildlife population and we see in these before and after pictures at the Africa Centre for Holistic Management in Zimbabwe.

Liebigs Advanced Project four years after abandoning holistic planned grazing in favour of high intensity rotational grazing system *Photo: Allan Savory*

Condemnation of livestock

In summary let me return to the vilification of livestock. Nothing is endangering humanity and currently causing more suffering and violence more than this condemnation of the only thing that can practically and realistically address desertification and it's role in climate change if properly managed. Your profession is strangely silent on the matter. Let me deal with the main reasons one hears and answer each argument made.

Livestock overgrazing causes land degradation or desertification. Yes, livestock are certainly causing land degradation or desertification, but entirely due to the way we have always run them. Run as we have done for centuries without holistic context and simplified grazing systems, livestock have led to both carbon and water moving from soils to atmosphere. But run in a holistic context mimicking nature and by planning their grazing, livestock result in both carbon and water being sequestered in grassland soils. There is no option but to use properly managed livestock if we want to address desertification, heal the land and make rainfall effective.

Livestock emit methane. Yes they do, as does any animal or micro-organism capable of digesting or decaying lignin that humans cannot digest. New research is suggesting healthy grassland soils include methantrophic bacteria that oxidize methane. The resultant carbon dioxide having no more carbon than the original cattle feed contained. Assume me wrong. Assume livestock emit ten times the methane they do. We still have no option but to use properly managed livestock to address desertification and carbon retention in the largest areas of the world's land without unintended consequences.

Livestock consume too much water. This is true when cattle are run in factory-like settings being force fed grain that they did not evolve to eat, and when we factor in all the water consumed in growing the feed and lost on monoculture grain fields with over 95% bare soil pumping water out of the soil night and day through capillary action and evaporation. Cattle properly managed on the land increase the effectiveness of the available rainfall resulting in greater soil water retention far in excess of any water cattle could ever consume.

Summary

Finally, as the perfect storm approaches we have not only to reverse desertification on the world's rangelands but also to sequester the excessive or legacy load of atmospheric carbon.

While planting trees results in carbon moving from atmosphere to plants almost all such carbon is subsequently released over the life of the trees to maintain the vital ambient carbon cycle vital to all life. And helpful as tree planting is, it cannot address desertification where rainfall is too low for full soil cover under trees with their litter. So we are left with the world's grasslands and livestock properly managed as the key to survival of civilization as we know it. The main place where we can address drought, flood, poverty and violence while sequestering the world's legacy carbon load without any fear of unintended consequence – is the realm of your chosen profession.

No technological solution can ever, as I have explained, reverse desertification and any such solution to sequestering carbon, when dealing with nature's complexity on this magnitude, is an objective without holistic context and thus carries a high chance of unintended consequences.

I hope that I have given you much food for thought. I have made many strong statements that no scientist in his or her right mind would do unless basing everything stated on the best science available. The years of academic attack and ridicule, without highlighting any flaws in either the science or the planning methodology have been hard to endure but have also had the unintended consequence of sharpening the rigour of thought and practice.

We are in what I call the greatest, and if lost, the last war humans will fight. The war to learn to live in harmony with ourselves and our environment. And you in the range science profession have a major role to play. It is a role and responsibility you will fail to carry out if you continue business as usual studying and developing grazing systems that do not address social, economic or environmental complexity.

I believe that some of your leaders are very aware of this and that is why they so magnanimously invited me to address your gathering today for which I thank them.I believe a whole new world of opportunity is opening up for you; An opportunity to live truly meaningful lives leading vast change serving the needs of our nations and the world. Opportunity to do exciting new research of which so much is needed in support of management; opportunity to break discipline boundaries in management in the spirit of holism.

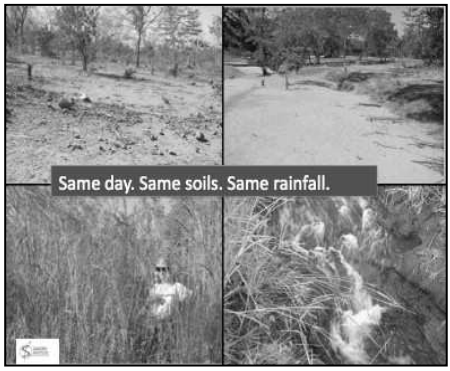
Earlier I mentioned biodiversity loss, desertification and climate change being one issue, and not three barely associated issues. What profession could pull all together better than yours? Promoting such change against institutional inertia and paradigm paralysis to save mankind will require keen minds, moral courage and leadership from you. I envy the opportunity before you to rise to the occasion and I wish you success.

Allan Savory
The Savory Institute

"Management needs to be Holistic and can never be Reductionist"

Left ground largely bare for over 30 years regardless of seasons and right following heavy impact with cattle and holistic planned grazing. Pictures taken October two seasons apart. Dimbangombe Ranch, Zimbabwe - *Photos Allan Savory*

Left bare and eroding for more than thirty years. Right following very heavy animal impact and holistic planned grazing four seasons later. Dimbangombe Ranch, Zimbabwe *Photos Allan Savory*.



a) Top left, grassland close to river. b) top right, typical river view in Hwange communal lands, Zimbabwe. c) lower left, grassland close to river and d) lower right, river flow on Dimbangombe Ranch, Zimbabwe. Pictures taken same day at end of rains when land at it's best throughout the year. *Photos Allan Savory*

Reply to Allan Savory's Feature Article:
'Holism: The Future of Range Science to Meet Global Challenges'

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Ever since visiting the Africa Centre for Holistic Management near Victoria Falls in early 2008 I have been intrigued by the concepts promoted within this current feature article by Allan Savory. Overall I thought that this was a very well-written article and that Allan did a great job in clearly expounding each of the various concepts for the reader. Some of his concepts are robust and can be well supported by the scientific literature, some need fine-tuning, while others are clearly spurious.

While I do not agree with everything in his article, I think that it is an important paper that highlights some problematic concepts in rangeland science itself and challenges the rangeland science profession to investigate some of these issues in greater depth. Allan may not have published much in the peer-reviewed literature but there are few who have stimulated more debate and research into grazing management than Allan Savory and he has, therefore, made a great contribution to rangeland science. I will now attempt to address some of the major issues raised by Allan.

Holism

In his article Allan states: '*Some try to explain holism using the cliché that the whole is greater than the sum of the interconnecting parts. Whilst a step in the right direction, this fails to capture the idea because parts and interconnections are mechanistic concepts having no counterpart in nature*'.

A colleague pointed out to me that perhaps what Allan is trying to say is that a reductionist mechanistic view of nature cannot explain all the various outcomes, which in many ways is true as an outcome is often the product of complex higher-order interactions that can be difficult to predict. For example, a simple reductionist view that long-term heavy grazing reduces plant diversity has been shown to be only true in unproductive habitats (such as on shallow, moisture-stressed soils) but that heavy grazing generally increases plant diversity in productive habitats because it removes the light-inhibiting litter that smothers many small plant species (Proulx & Mazumder 1998; Osem *et al.* 2004; Bakker *et al.* 2006).

In other words grazing intensity interacts with the potential for litter production in affecting plant diversity such that extremely unproductive habitats do not accumulate enough litter to smother the growth of shade-intolerant species with the reverse being true in productive habitats. In another classic example, one that all range managers should clearly understand, McNaughton's hypothesis of facilitation of grazing by large herds of herbivores (McNaughton 1984) is often not supported by empirical examples, but these inconsistencies were shown to again be explained by an interaction with habitat productivity (Hobbs & Swift 1988). In unproductive habitats quantity, not quality, limits intake by herbivores so grazing by large herds of herbivores often reduces intake and growth rates for co-existing herbivore species (e.g. Derner *et al.* 2006).

In more productive environments grasses grow tall and fibrous and quality not quantity limits intake such that grazing by large herds of herbivores removes coarse grass and stimulates fresh digestible regrowth, which increases intake and growth rates by coexisting herbivore species (e.g. Odadi *et al.* 2011). I will give a third example, which also addresses Allan's criticism of fire.

There is no doubt that frequent fires, especially in the absence of grazing impact, are harmful to rangeland as they result in soil crusting, reduced soil moisture and decreased soil nitrogen (Mills & Fey 2004).

When fires are controlled by grazing, however, such that they occur at patchy scales and at much lower frequencies, combined with heavy grazing impact as large herds of animals are attracted to their nutritious regrowth, very different effects occur.

High quality short grasses are favoured, rates of nutrient cycling are greatly increased, invasion of alien species is halted and patchy heterogeneity in grassland structure across the landscape is created (Fuhlendorf & Engle 2004; Anderson *et al.* 2006). Contrary to Allan's claims that fire results in low tuft density and bare spaces in rangeland, the highest basal cover and tuft density grassland that I have ever seen is on a ranch in the Dundee area of KwaZulu-Natal, where the rancher, Clive Bunting, applies infrequent fire combined with high animal impact created by concentrated season-long grazing on the burned areas only, followed by season-long resting (Figure 1). Not too far away a well-known holistic rancher has been unable to attain this degree of cover and soil protection despite keeping fire out (more on the reasons later).

Thus the effect of fire on rangeland does not operate in a simple linear manner, it interacts with fire frequency and grazing impact, but once we understand the interactions its effects are predictable. The absolute and uncompromising condemnation of the use of fire for rangeland management by holistic managers demonstrates a blinkered, over-simplified and non-holistic understanding of fire ecology.

When fire is understood with a holistic understanding of the interacting mechanisms of timing and extent of area burned, grazing concentration and impact, grazing duration and recovery duration, it becomes clear that fire is a useful and sustainable tool in rangeland management, as shown in Figure 1.

An almost complete carpet of *Themeda triandra* on Strathearn ranch near Dundee (KwaZulu-Natal), created by an interaction of infrequent fire and season-long grazing followed by season-long resting. This surely represents the pinnacle of rangeland condition. Note the almost complete cover of grass and associated soil protection plus a lack of low-quality undigestible material, something a holistic managed herd will never have the pleasure of grazing on because cattle are continuously moved from rested patch to rested patch, never being allowed to maintain a short leafy sward such as this one.

While fire frequency and extent has declined in the Serengeti since the rise of the wildebeest population, a portion of it still burns every year despite having the greatest herds of wildlife on earth. Wildlife now merely controls its frequency and spatial extent and certainly takes advantage of the high forage quality created by fire. Fire always has been and always will be an integral part of the ecology of African savanna ecosystems.

These three examples demonstrate that a simple linear mechanism cannot explain these holistic outcomes because they are interactive. Nevertheless, these interactions are mechanistic in nature. In this regard, Allan's notion: '*because parts and interconnections are mechanistic concepts having no counterpart in nature*' is hard to justify. For example, an ecological system clearly has distinct parts interconnected to various degrees and operating through various mechanisms to give rise to a whole range of ecological processes. Microbes are clearly parts that through the mechanism (m) of mineralization of organic matter release nutrients into the soil (an interconnected part with microbes) for plants (an interconnected part with the soil) to absorb (m) and grow (m) to be eaten (m) by herbivores (an interconnected part with plants) to give them energy to move and trample (m) thereby breaking soil crusts, and graze (m) thereby removing litter or improving forage quality, etc). Finally, interactions of all these mechanisms can produce emergent properties which can be difficult to predict when our understanding of the system is poorly developed.

As our knowledge of mechanisms and their interactions increases, however, so does our ability to model (conceptually and mathematically) all these interacting mechanisms in a holistic, whole-system manner. So to conclude on this section, I certainly agree with Allan's contention that one needs to manage with a holistic understanding of rangeland. Contrary to his claims that science does not deal with wholes, science has always aimed at a holistic understanding of ecosystems – a holistic approach to science is called synthesis, which when combined with conceptual and mathematical modelling, attempts to understand and predict unexpected outcomes.

Trampling is important for removing aerial litter and increasing its decay rate, breaking soil crusts and increasing seedling establishment.

I whole-heartedly agree with this concept as demonstrated by the following examples: '*Regular treading prevents the accumulation of standing dead and fragments litter*' (McNaughton *et al.* 1988).

'*There was also an influence of animals on seedling density during this period. Density was 316 seedlings /m^2 in animal hoof prints in the burned area, significantly higher than in the surrounding area*' (McNaughton 1983).

Holistic Planned Grazing allows Considerably Higher Stocking Rates than Recommended Carrying Capacities.

There is good empirical support for this statement: '*Experiments in Serengeti National Park, Tanzania, provide direct evidence that large, free ranging mammalian grazers accelerate nutrient cycling in a natural ecosystem in a way that enhances their own carrying capacity*' (McNaughton *et al.* 1997).

There are holistic ranchers in the Ghanzi region who are stocked at three times the recommended stocking rate (over 5000 cattle on 18 000 hectares), the range continues to improve while a neighbouring ranch which uses continuous grazing is unable to approach anywhere near the recommended stocking rate (400 cattle on 10 000 hectares) because of the loss of key perennial grasses that provide dry-season grazing. Clearly, management can greatly influence carrying capacity.

Resting is Not a Tool to Restore Rangeland

I certainly agree with this. Rangeland without animal impact will become a degraded rangeland. In my opinion, the use of total rest to restore rangeland is perhaps the greatest false concept in rangeland science.

Some form of impact followed by sufficient rest in the various seasons is needed to create micro-sites for seedling establishment (McNaughton 1985), get litter on the soil surface and reduce fire frequency (McNaughton et al 1988). Under grazing results in poor basal cover (Fuhlendorf *et al.* 2001; and many other studies) and capped soil surfaces as well as loss of palatable short grass species and even the animals that depend on those short grasses (Belsky 1992; Western & Gichohi 1993).

The concept of basing livestock management on natural patterns of wildlife herding, migration and grazing is appealing and I firmly believe that we as rangeland managers and scientists can learn a lot from wildlife grazing patterns (see a detailed analysis of this in Fynn 2012). Allan is right when he notes that severe and intense grazing and trampling effects do not harm rangeland but on the contrary improve it so long as it is a transient effect that gives sufficiently long recovery periods for perennial grasses to recover vigor. Allan is also correct when he notes that a grazing system will fail because it is rigid and inflexible, not allowing adaptation to the highly dynamic spatial and temporal variability of forage quantity and quality in rangelands. This was noted in an analysis of wildlife foraging patterns with the suggestion that grazing management cannot be conducted efficiently through an inflexible and rigid grazing systems approach (Fynn 2012).

This is where I believe Holistic Planned Grazing (HPG) is onto something, it is flexible. It needs refining though as there are several conceptual flaws in the way it is implemented. Holistic managers attempt to maintain large dense herds aimed to provide maximum impact over a short period, where an area is grazed for only a few days and rested for months thereafter to ensure that the perennial grasses are able to recover sufficiently.

The long rest after grazing is important but the implications of resting an area for months are problematic if you intend to graze it in the same season because over the rest period grasses have grown out, developed tough indigestible structural material and dead leaf as well as undergone large declines in nutrient concentration in their tissue. Consequently, livestock that are constantly moved from one rested patch to another are forced to consume poor quality forage leading to reduced growth and conception rates (Hobbs & Swift 1988; Wilmshurst *et al.* 2000, Odadi *et al.* 2011; Fynn 2012). While holistic managers are claiming that this form of grazing simulates natural patterns of grazing by wildlife, a detailed analysis of wildlife grazing patterns shows that during the wet season wildlife almost never moves from patch to patch of long-rested grassland. Instead, they prefer to utilize previously grazed areas or recently burned areas where the regrowth is short, has high nutrient concentrations and is highly digestible so that they can maximize their yearly intake of nutrients and energy (Fynn 2012). An example from the Serengeti demonstrates this:

'*Wildebeest often doubled back on their migratory pathways to graze the regrowth and gazelles concentrate their grazing on areas previously grazed by wildebeest*' (McNaughton 1985). From observations like this and in many other areas the concept of grazing facilitation was developed and a theoretical basis was established for why large herds of herbivores are beneficial to themselves and others (Vesey-FitzGerald 1960; McNaughton 1984).

Clearly the holistic claim that vast herds pass quickly through and area and do not return for months is a false concept – it is not supported by numerous herbivore foraging studies nor optimal foraging theory (Fynn 2012), but as a caveat, they may do this in unproductive areas or in drought years where quantity, not quality is limiting (Hobbs & Swift 1988), again demonstrating the need for a synthetic (whole) understanding of ecosystem functioning and outcomes. While holistic managers often claim that grazing of regrowth may be good for cattle production but is harmful to the sustainability of a perennial grass and is, therefore, contrary to their holistic goals, scientific evidence shows that these assumptions are not correct. Grassland may be kept short and in a high-quality state by heavy grazing over an entire growing season without any negative effects so long as it is rested for the next entire growing season (Turner *et al.* 1993; Kirkman 2002) – clearly if this were not so the massive herds of wildlife would have degraded their own resource base by their well-documented regrazing of regrowth over a season.

As noted earlier Clive Buntting's ranch uses this season long grazing and resting under the Venter-Drewes approach (see Venter & Drewes 1969) and has the best rangeland one will ever see (Figure 1). Importantly it is also a flexible approach that enables adaptation to rainfall variability in deciding where and how much of the ranch to graze (see Venter & Drewes 1969). The reason for its success lies in its flexibility (see Fynn 2012) and in the fact it provides excellent animal impact. Despite claims that HPG provides great animal impact, grazing periods are too short in duration and spread over the entire ranch (diluting the impact per unit area), and, therefore unable to keep the grass short and force grass plants to spread laterally.

By contrast, Clive's approach creates much greater impact because the cattle graze only half the ranch each year (rather than the whole ranch under HPG) and, therefore, have much higher effective densities per unit area for the season. As noted for the Serengeti: '*the functional biomass density of the nomadic community in its wet-season concentration areas,* ***rather than averaged over the entire region****, is exceptionally high in the Serengeti*' (McNaughton 1985). In natural grazing ecosystems such as the Serengeti or the Savuti and Makgadikgadi systems of Botswana, animal impact is rarely achieved by grazing in tightly bunched herds. I have rarely seen a herd of zebra or buffalo grazing all bunched up, they don't like it because it results in too much competition for food and so they spread out when they graze.

The percentage of time that they may bunch because of predators amounts to fractions of a percentage of total time. In reality animal impact is determined by movement patterns, the total area available for grazing and the amount of time that animals spend in an that area over the season (number of hooves/unit area/unit time; more time = more hoof impact, less area to range over = more hoof impact, e.g. McNaughton 1985) such that even one or two cows can create better animal impact when kept in an a small area all season than a herd of 500 cows that passes through for a short time.

Ranchers who attempt to force their cattle to stay in densely bunched herds all the time are creating an unnatural situation that is going to negatively impact upon animal production and profits. However considering the costs of fencing and its maintenance and the need for flexible grazing, I do believe in a planned herding approach to keep the cattle in the areas that one wants them to be and if really necessary to bunch them on rare occasions to achieve some objective. Planned herding is especially important for managing communal grazing areas and for managing habitat for wildlife.

Finally I was surprised to see that Allan also condemns pastoralists as being responsible for desertification. The old traditional pastoralists of African savannas such as the Masai and those of the Sahel were known to use flexible herding of livestock in large herds that simulated in great detail the great wildlife migrations of the Serengeti.

For example, the Sahel pastoralists used to follow identical migration patterns on rainfall gradients to the Serengeti wildebeest, which involved using a low-rainfall, wet-season resource and a high-rainfall, dry-season resource, while tracking patchy thunderstorm events across the landscape (see Breman & De Wit 1983; Fryxell & Sinclair 1988). It has been noted that desertification of the Sahel only started when colonial governments started disrupting grazing patterns and movement associated with these great transhumance migrations (Fryxell & Sinclair 1988).

How on the one hand can one applaud the role of the great wildlife migrations in maintaining great rangelands but condemn pastoralists who were doing exactly the same thing? To conclude then, science is the search for truth and the whole truth at that, not just partial truths. It may get waylaid temporally in partial truths or even blatant untruths but eventually untruth is exposed and false hypotheses are discarded. Science will eventually confirm and endorse the many truths of holistic management but at the same time will expose and discard the many untruths harbored by this interesting idea.

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Upcoming Events

Research Skills Workshop, 12 to 13 March 2013, Pretoria, South Africa www.grassland.org.za contact: Freyni du Toit, email: admin@grassland.org.za

48th Annual Congress of the Grassland Society of Southern Africa, Advancing rangeland ecology and pasture management in Africa, 15 to 19 July 2013, Weesgerus, Modimolle, Limpopo, South Africa, www.grassland.org.za contact: Freyni du Toit, email: admin@grassland.org.za

Tools for Wetland Assessment, Wetland delineation, assessment of wetland ecosystem services, assessment of wetland health, guidelines for developments and wetlands, 10 to 14 September 2012, Rhodes University, Department of Environmental Science, Grahamstown, South Africa, www.ru.ac.za/environsci, contact: Zelda Kirstein, email: z.kirstein@ru.ac.za

Outeniqua Research Farm Information Day: Sustainable milk production from planted pasture. Presented by the Western Cape Department of Agriculture on Outeniqua Research Farm near George, 30 October 2012 Contact Pieter Swanepoel or Janke van der Colf 044 8033700, pieters@elsenburg.com; jankevdc@elsenburg.com

Symposium of Contemporary Conservation Practice, Exploring the practice, science and value of nature conservation, 22 to 26 October 2012, Fern Hill Conference Centre, Howick, KwaZulu-Natal, South Africa, www.kznwildlife.com/symposium, contact: The Secretariat, email: symposium@kznwildlife.com

The Economist - Feeding the World Summit, What Africa needs in order to reproduce the Brazilian miracle, 15 to 16 November 2012, Hilton Sandton Hotel, Johannesburg, South Africa, http://cemea.economistconferences.com/event/feeding-world-africa/fees-and-registration email:africa@economist.com

Regional Workshop for Central America and the Caribbean on implementation of the Global Strategy for Plant Conservation in the context of the Strategic Plan for Biodiversity 2011-2020, 15 to 17 November 2012, Mexico City, Mexico, www.cbd.int/doc/?meeting=5126

International Union of Forest Research Organizations: Inaugural Meeting of the Risk Analysis Working Party, Risk analysis of forest invasive alien species, 19 to 23 November 2012, Dehradun, Uttarakhand, India, http://iskanalysis-iufro.org

Council News

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The venue for Congress was very good and it was pleasing to see the large number of delegates attending the Congress, as well as the AGM. A number of very interesting symposia and sessions were organized for Congress, attracting practitioners and researchers from all over South Africa and some international delegates, including USA, Kenya, Australia, Benin and Namibia. Be on the lookout for a special issue of our Journal in 2013 with papers from the "Communal Rangelands Workshop". Dr Mark Hardy, a retiree from the Western Cape Department of Agriculture received the Prestigious Award from the GSSA at the Gala Dinner.

It was also the first "Green" Congress. In order to reduce the Congress carbon footprint 60 trees were donated to three different local schools, recycle bins were also available for the duration of the Congress at the reception for delegates and we made use of a carbon neutral company for shuttle services, namely The Green Cab. Some of the Congress Organising Committee members also took some of their time to give a recycling course to Club Mykonos staff members. The Editor-in-Chief of the African Journal of Range and Forage Science informed us that the ISI rating of the journal has increased from 0.25 (2009-2010 data) to 0.6 (2010-2011 NISC are very pleased with the new impact factor which seems to be based on the general good performance of a number of papers, as opposed to relying on one particularly good paper, with 40% of articles being cited at least once The AJRFS now ranks 25th of 35 journals in the Biodiversity category (moving up from 31st last year). The journal is 16th of 37 South African journals in the Science Citation Index (moving up from 29th last year). We would also like to welcome newly elected members to Council

President: Loraine van den Berg
Vice-President: Igshaan Samuels
Honorary Secretary: Yolandi Els
Honorary Treasurer: Justin du Toit
PRO: Mota Lesoli

Additional Members: Pieter Swanepoel,Natasha Gabriels and Ian Rushworth

Hope to see you all next year at Congress 48 to be held at Weesgerus, Modimolle, Limpopo from 15 to 19 July 2013. Members are requested to make inputs and suggestions regarding Congress 48. Congress 49 will be held at Black Mountain Lodge in the Free State and Congress 50 at St Lucia in KwaZulu-Natal.

Recent Publications in the Grassland Science and Related Disciplines

South African Journal of Science 2012:108(5/6), 'God is my forest' – Xhosa cultural values provide untapped opportunities for conservation, Cocks ML, Dold T, Vetter S, http://dx.doi.org/10.4102/sajs.v108i5/6.880

Ecology 93:1297–1304, Spatial and temporal changes in group dynamics and range use enable anti-predator responses in African buffalo, Tambling CJ, Druce DJ, Hayward MW, Castley JG, Adendorff J, Kerley GIH, http:www.esajournals.org/doi/abs/10.1890/11-1770.1

Journal of Ecology 100: 932–938, Long-term demographic consequences of eavesdropping for sagebrush, Karban R, Ishizaki S, Shiojiri K, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2745.2012.01974.x/abstract

Biotropica, Volume 44, Issue 4, Pages 498-505, July 2012, Emergent Impacts of Ant and Spider Interactions: Herbivory Reduction in a Tropical Savanna, Larissa Nahas, Marcelo O Gonzaga, Kleber Del-Claro, http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7429.2011.00850.x/abstract

Journal of Vegetation Science, Volume 23, Issue 4, pages 796–802, August 2012, Plant species richness: the world records, J. Bastow Wilson, Robert K. Peet, Jürgen Dengler, Meelis Pärtel, http://onlinelibrary.wiley.com/doi/10.1111/j.1654-1103.2012.01400.x/abstract

Applied Vegetation Science, Volume 15, Issue 3, pages 383–389, August 2012, Validation of a high-resolution, remotely operated aerial remote-sensing system for the identification of herbaceous plant species, Fumiko Ishihama, Yasuyuki Watabe, Hiroyuki Oguma, http://onlinelibrary.wiley.com/doi/10.1111/j.1654-109X.2012.01184.x/abstract

Ecological Applications 22:1308–1319, High richness and dense seeding enhance grassland restoration establishment but have little effect on drought response, Carter, Daniel L., and John M. Blair, http://dx.doi.org/10.1890/11-1970.1

Journal of Ecology, Early View (Online Version of Record published before inclusion in an issue), Continental-scale variability in browser diversity is a major driver of diversity patterns in acacias across Africa, Michelle Greve, Anne M. Lykke, Christopher W. Fagg, Jan Bogaert, Ib Friis, Rob Marchant, Andrew R. Marshall, Joël Ndayishimiye, Brody S. Sandel, Christopher Sandom, Marco Schmidt, Jonathan R. Timberlake, Jan J. Wieringa, Georg Zizka, Jens-Christian Svenning, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2745.2012.01994.x/abstract

Ecology Letters, Early View (Online Version of Record published before inclusion in an issue), Eight questions about invasions and ecosystem functioning, David L. Strayer, http://onlinelibrary.wiley.com/doi/10.1111/j.1461-0248.2012.01817.x/abstract

Wildlife Science, Connecting Research with Management, Joseph P. Sands; Stephen J. DeMaso; Matthew J. Schnupp; Leonard A. Brennan, http://www.crcpress.com/product/isbn/9781439847732

Biotropica, Early View (Online Version of Record published before inclusion in an issue), Population Structure of Woody Plants in Relation to Land Use in a Semi-arid Savanna, West Africa, Katrin Jurisch, Karen Hahn, Rüdiger Wittig, Markus Bernhardt-Römermann, http://onlinelibrary.wiley.com/doi/10.1111/j.1744-7429.2012.00864.x/abstract

Ecology 93:1527–1539, Uses and misuses of bioclimatic envelope modelling, Araújo, Miguel B., and A. Townsend Peterson, http://www.esajournals.org/doi/abs/10.1890/11-1930.1

Global Change Biology, Volume 18, Issue 8, pages 2532–2545, August 2012, Net ecosystem exchange modifies the relationship between the autotrophic and heterotrophic components of soil respiration with abiotic factors in prairie grasslands, Nuria Gomez-Casanovas, Roser Matamala, David R. Cook, Miquel A. Gonzalez-Meler, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2012.02721.x/abstract

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Northwest Sci. 85(2):411-429, 2011, Climate change impacts on Western Pacific Northwest prairies and savannas, Bachelet, D, http://www.bioone.org/doi/full/10.3955/046.085.0224

Conserv. Biol. 26(2):294-304, 2012, Effects of connectivity and spatial resolution of analyses on conservation prioritization across large extents, Arponen, A., http://www.ncbi.nlm.nih.gov/pubmed/22268786

Member Profiles

Dr. Eric Cofie Timpong-Jones is a Research Fellow in Pasture and Range Management at the Livestock and Poultry Research Centre, Institute of Agricultural Research, College of Agriculture, University of Ghana-Legon. His qualifications include both a PhD and a BSc Agriculture majoring in Animal Science from the University of Ghana and an MSc in Land Ecology from the University of Twente in the Netherlands. His research interests are monitoring and evaluation of range resources, harvest management of forage species, and ruminant livestock performance on forage species

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Taimi Kapalanga
Gobabeb Research & Training Centre
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Rooted from Mopane Savannah that she gave up for the desert. For the love of the habitable planet earth, Taimi studied Natural Resources - Agricultural, Land Restoration and Environmental Management. She came to the Desert in 2006 as a junior researcher at Gobabeb Research and Training Centre. Currently, she works as a senior research technician at same institution where she is responsible for the in-house coordination of planning and implementation of climate, ecological monitoring and restoration projects as well as data management and provision to interested parties. Nature excites her most. Ms Kapalanga is up for any challenging project on agriculture, climate, land restoration, waste and pollution management, biodiversity and environmental monitoring. "I enjoy nothing more than listening to music, hiking and photographing as walking through nature."

Alan Barret holds a PhD in Environmental Management. He works at UNISA in their Applied Behavioural Ecologyand Ecosystems Research Unit (ABEERU). He is involved with various research initiatives undertaken in the unit and assists post graduate students with their field work, research proposals, data collection and data analyses.

Alan Barrett
UNISA
barreas@unisa.ac.za

His research interests include:
- Phenological monitoring of various plant species to determine the effects of climate change on them
-Primate ecology, feeding strategies and behavior
-Elephant habitat utilization and movement patterns
-Energy availability in landscapes and how such it utilized by various consumers
-Mapping and modeling seasonal changes to resources in animal home ranges, seasonal variations in home range sizes and utilization, animal movement patterns and distances travelled etc.

For this membership, Carina Kurpershoek is the primary representative of Centurion Academy, a private, accredited, tertiary institution in Pretoria, Centurion. Centurion Academy was established in 2000 and presents, amongst other diplomas and courses, a three year Diploma in Nature Management. It is a fully accredited Diploma course that prepares students to become field rangers but also managers of a nature reserve. The students must complete the Field Guide Association of Southern Africa's (FGASA) Level 1 as well during their diploma studies and it is incorporated into the course through a partnership with Africa Nature Training, an accredited FGASA trainer. She is one of the lecturers currently presenting the Diploma Nature Management and present the subjects Veld Management for the first and second years and Introductory Statistics for the second years.

Her academic qualifications include a BSc (Ecology) and a BSc (Hons) in Wildlife Management completed through University of Pretoria. She is highly interested in the subject of rangeland management and it is also what the second year Veld Management deals with. She believes that one needs to manage the vegetation first before one can manage the wild animals properly.

Carina Kurpershoek
Centurion Academy
carina@ca2000.co.za

New and Resigned Members

New Members

- Alan Barrett, Senior Lecturer at UNISA
- Alan Wheeler, Ecological Co-ordinator for the Karoo Area for CapeNature
- Almero Bosch, Ecologist at Timbavati Private Nature Reserve
- Andrew Cauldwell, Senior Environmental Ecologist at Natural Scientific Services
- Centurion Academy with Carina Kurpershoek as their representative
- Eric Timpong-Jones, Research Scientist at the University of Ghana
- Louis Strydom, Development Bank of South Africa
- Natasha van de Haar, Botanist at Scientific Aquatic Services
- Sydwell Matsila, Project Manager at the Department of Environmental Affairs
- Taimi Kapalanga, Senior Environmental Researcher at Gobabeb Research and Training Centre
- Yolanda Pretorius, Consultant at the Elephant Specialist Advisory Group for South Africa

Resigned Members

- Ernest Mokua, North West Department of Agriculture and Rural Development
- Erwin Leibnitz, Longmeadow Home Farm
- Festus Ajayi, Research Fellow at the Institute of Agricultural Research and Training, Nigeria
- Hallam Payne, Lecturer at the University of KwaZulu-Natal
- Ibo Zimmermann, Polytechnic of Namibia
- John Power, Manager of the Mammal Project for the North West Provincial Government
- Mkhululi Mkhize, Specialist Agriculture Advisor, KwaZulu-Natal Department of Agriculture and Environmental Affairs
- Neels de Ridder, Eastern Cape Department of Rural Development and Agrarian Reform
- Tanya Smith, Field Coordinator of Drakensberg Crane Conservation Project for Endangered Wildlife Trust
- Thapelo Loabile, DAFF - Land Use and Soil Management
- Zukiswa Ngxowa, DAFF - Land Use and Soil Management

The Grassland Research Database is active!

The Grassland Research Database is a fully searchable database that provides an easy to use gateway to all research in the grassland biome. It includes journal articles, post graduate theses, environmental assessment studies, and other grey literature on biodiversity and rangeland research.

Abstracts and links to full articles are provided making this exciting new database extremely useful and easy to navigate. You can conveniently search the database by keywords for all articles related to the grassland biome on, for example, biodiversity, fire management, land rehabilitation, grazing management, ecosystem services, rangelands, ecology, or water conservation. The database currently holds over 2500 references dating back to 1950 and it is growing.

Try it out!

http://www.grassland.org.za/resources/grassland-database

grasslands
LIVING IN A WORKING LANDSCAPE

The Grasslands Programme

The Grasslands Programme is one of SANBI's bioregional programmes which aims to innovate, pilot and mainstream new models for biodiversity management. It does so through integrating biodiversity objectives into the major production sectors operating on South Africa's grassland biome, namely agriculture, forestry, urban development and coal mining. Its implementation approach is based on partnership between the government, the private sector, civil society and the academic sector. The Programme has piloted projects in Gauteng, KwaZulu-Natal, Mpumalanga, Free State and the Eastern Cape. In addition, the programme works at a national level to strengthen the enabling environment for mainstreaming biodiversity into these sectors. The first five years of the Programme is funded by the UNDP Global Environment Facility (GEF).

Strength in partnerships

One of the Grasslands Programme's important partnerships is with the Grassland Society of Southern Africa. This partnership has been specifically around the development of the Grassland Research Database, following a recommendation from the Grasslands Research Task Team (RTT). The RTT is an advisory committee of the Programme that developed the grasslands research strategy to improve the coordination, prioritisation and integration of research on grasslands biodiversity conservation. Better coordination of research in the grassland biome should facilitate more effective identification of research gaps and improve aware of existing knowledge.