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| Opening of the 42nd Annual Congress of the Grassland Society of Southern Africa | | |
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| 08:40-09:20 | Keynote Address I: Greenhouse gas emissions from intensive grazing systems | Richard J Eckard |
| 09:20-10:00 | Keynote Address II: The human dimension of rangeland ecosystem management | Urs P Kreuter |
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OPENING ADDRESS

SALEEM BADAT

Vice Chancellor, Rhodes University

The chairperson, officials of the Grassland Society of Southern Africa and the Thicket Forum, the Organising Committee, colleagues, ladies and gentlemen, molweni, good morning.

Thank you for the kind invitation to open this gathering and a warm welcome to you all to Rhodes University, to iRhini/Grahamstown, to the Makana District and the Eastern Cape. And to our international guests from other parts of Africa and the world, a very warm welcome to South Africa.

It is a great honour for Rhodes University to host this Joint 42nd Annual Congress of the Grassland Society of Southern Africa & 4th Annual Thicket Forum Meeting. I trust that you will find our facilities in accordance with your needs, and us convivial hosts.

I am a simple sociologist whose research field is higher education studies. And so my knowledge of rangeland ecology and pasture management and the subtropical thicket biome is not just extremely limited but, to be honest, non-existent. However, one is never too old to learn and part of the fun of being a Vice Chancellor is to be invited to gatherings such as yours and to visit new websites and to learn about intellectual endeavours and research and debates in disciplines and fields other than ones own.

Three statements in the documents for this conference especially caught my attention. Permit me to make some observations on each of them.

The first statement was that both the Grassland Society and Thicket Forum 'are interdisciplinary fora with a central interest in linking human livelihoods, agricultural production and biodiversity conservation'.

This wonderfully brings together the social (human livelihood), the economic (agricultural production), and the ecological (biodiversity conservation), and signals to me an acute understanding on your part that the development challenge of our society is how do we simultaneously, not consecutively or sequentially, address and balance social, and economic needs and do this in a manner that is environmentally sustainable.

To put it in another way, your statement is a specific formulation of the overall four-fold development challenge that confronts South Africa and underdeveloped or so-called 'developing countries': that is how do we pursue **economic growth**, with **social equity**, and do so in a way that is **environmentally sustainable**; that recognises the need to extend, deepen and consolidate **democracy** in our societies; and finally and crucially, do all of this simultaneously and not consecutively or sequentially.

For many good social it is not an option to postpone one or other elements of this four-fold development challenge or to tackle them in sequence. They have to be confronted, by and large, simultaneously. Further, we need a thick conception of development that is simultaneously human, economic, social, cultural and environmental and not just reduced to economic growth.

This is a formidable challenge, and requires great imagination, creativity and boldness with respect to how we define our social and economic goals, how we develop and implement policies and how we monitor the impact of our policies and practices.



There is, however, no other way – not if we wish to be stable equitable and just societies and leave a world that future generations can inhabit without the threats of great calamities that we seem to be so selfishly and recklessly keen to bring upon ourselves and bestow upon our children grandchildren and their children.

The second statement that caught my eye was the reference to both the Grassland Society and Thicket Forum being ‘interdisciplinary fora’.

As you well recognise the pressing problems and challenges of our natural and social worlds have no respect for the academic disciplines and fields that have evolved over centuries and refuse to elegantly confine themselves to the boundaries that we have drawn around our disciplines and fields. There is value to maintaining a distinction between different disciplines and fields, especially in undergraduate teaching. However, we sometimes unnecessarily make ourselves prisoners of disciplines and fields instead of being open to a meeting of minds around common problems and concerns in an interdisciplinary and multidisciplinary way that can engender imaginative new approaches to formulating issues and researching and addressing them.

The final statement that was of interest to me was this conference was expected to comprise of ‘academics, land users and government agents’. Having for the past 17 years been involved in higher education policy research and policy development and having for 7 years served as the head of the higher education policy advisory body to two Ministers of Education, it is my experience that the specific constituencies of academics, government, business and civil society are not always easy to bring together, and especially to hold together.

This is not because there is not recognition among all such constituencies of the need to work together and to build mutually respectful, beneficial, reciprocal relations to address our common concerns and challenges. The reality, however, is that there are sometimes (but perhaps here I am being too diplomatic and I should say that there are often) different and divergent interests, varying immediate concerns and therefore, understandably, differences emerge in how issues are conceptualised, which issues are prioritised, the discourses and languages through which they are discussed, and how approaches, strategies and the like are formulated.

In my view this is an unavoidable element of the coming together of different constituencies and a not unhealthy aspect of different constituencies finding each other and learning to think, debate and labour together. Whatever difficulties and tensions may arise, the important thing is to appreciate the value of such coming together, to be sensitive and respectful of different views and to recognise that we need each other if we are to address the concerns, problems and challenges that are our common lot.

To the extent that you successfully bring and hold together academics, land users, government and other constituencies, my congratulations to you on this endeavour and significant achievement.

In closing I would like to tell you a short story about a man who lost his car keys on a wet and stormy night. While searching under a street light he was observed by a kind Samaritan, who offered to help him find his keys. After searching under the streetlamp for fifteen minutes without success, the now cold and wet Samaritan asked, “Are you sure you lost them here?” The other man replied, “Not really. I lost them somewhere between the pub and the car, but here is a good place to look because it is light enough to see.”

I don’t know what proportion of time you spend in the light or in the dark. But what I am clear about is that universities and scientific disciplines and fields, must focus not only on lit areas but must also illuminate areas of darkness as part of their essential role of advancing human understanding of our natural and social worlds.

Universities and scientific disciplines and fields must, however, also illuminate in another sense. Beyond communicating with a peer scientific community, they must also engage around science and knowledge with other social actors who have an interest in the results of intellectual labour.

Stephen Jay Gould notes, there is a ‘long and honorable tradition of popular presentation of science’, and we should not make the ‘mistake’ of ‘equating popularization with trivialization, cheapening, or inaccuracy’.



He rightly states that 'the concepts of science, in all their richness and ambiguity, can be presented without any compromise, without any simplification counting as distortion, in language accessible to all...people'.

This stress on communicating beyond simply a scientific community is a call to ensure that our universities, as part of their knowledge generation and dissemination roles, engage actively with the South African public and act as catalysts of public education. After all, we are, as universities, meant to advance the public and social good.

I wish you an enjoyable stay at Rhodes University and in Rhini/Grahamstown, a stimulating and productive congress and conference, and trust this occasion will contribute to the further development of the Grassland Society and Thicket forum and to future exchanges of this kind.

And, I declare this Joint 42nd Annual Congress of the Grassland Society of Southern Africa & 4th Annual Thicket Forum Meeting officially open!

KEYNOTE ADDRESS I

Greenhouse gas emissions from intensive grazing systems

Richard J Eckard

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The Intergovernmental Panel on Climate Change's (IPCC) 4th Assessment Report concludes that the warming of the climate system is unequivocal and that there is >90% probability this warming is due to anthropogenic greenhouse gas concentrations. The report also concludes that global increases in CO₂ concentrations are due primarily to fossil fuel use and land use change, while those of CH₄ and N₂O are primarily due to agriculture.

In South Africa, Australia and New Zealand greenhouse gas emissions from the agricultural sector contribute 11%, 16% and 49% of the national total, respectively. In these countries, agriculture is the dominant source of CH₄ and N₂O, both powerful greenhouse gases with global warming potentials of 23 and 297 times that of CO₂, respectively. The imminent introduction of emissions trading and climate change bills in Australia and New Zealand will require targeted reductions in greenhouse gas emissions from all sectors of the economy, including agriculture.

The Greenhouse in Agriculture (GIA) program in Australia has concentrated its research efforts on exploring 'win-win' abatement options for reducing greenhouse gas emissions while increasing production efficiency. Breeding, feeding and managing animal numbers form the basis of GIA's strategies for reducing CH₄ emissions from animal production systems, while N₂O research has focused mainly on reducing uncertainty in inventory estimates and improving N fertiliser use efficiency.

Methane is produced by methanogens in the rumen and is largely breathed or eructated out. Research conducted by the GIA program team has shown large differences in CH₄ emissions between animals within the herd and between seasons as pasture quality varies. This research has recently focused on oil-seeds showing that supplementation of dairy cows with 2.7 kg per day whole cottonseed (23% oil) resulted in a 16% increase in milk solids production and a 21% decrease in CH₄ emissions kg⁻¹ milk solids. Feeding a tannin extract from the black wattle (*Acacia mearnsii*) at 1.5 and 2.45% resulted in a 14 to 29% reduction in CH₄ and potential N₂O benefits through reduced urinary nitrogen excretion (45 - 59%).

Nitrous oxide in soils is produced largely by the process of denitrification and to a lesser extent through nitrification. Denitrification is maximised in warm and saturated (anaerobic) soils, with available C and NO₃⁻ present as substrates. The IPCC default emission factor specified that 1.25% of all N fertiliser applied was deemed lost as N₂O. Research conducted by the GIA program team has contributed to the revision of this global IPCC factor down to 1%, and has also provided industry-specific emission factors for Australia, with a default emission factor for grazed pastures of 0.4% now being used in the National Greenhouse Gas Inventory.

With the high cost of measuring both CH₄ and N₂O emissions, it is important to couple limited field-based measurement with simulation modelling, to explore 'whole of system' impacts of abatement strategies. Modelling also facilitates the extension of limited temporal measurements



over longer timescales and wider ranges in climatic and edaphic conditions. DairyMod and EcoMod are biophysical, mechanistic models of a rotationally grazed dairy production system, used in Australia and New Zealand, respectively. These models now include algorithms for enteric methane production from ruminants and N₂O production in soil and are used to evaluate relative impacts of management practices on N₂O and CH₄ emissions in a systems context.

An emissions-constrained future seems inevitable. However, the core business of agricultural production is converting C and N into carbon and protein-based products. A key challenge for agriculture in the future is to reduce emissions by further improving efficiency, but also to capitalise on emissions trading by sequestering greenhouse gases into the soil/plant system and producing products that store carbon.

KEYNOTE ADDRESS II

The human dimension of rangeland ecosystem management

Urs P Kreuter

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Rangeland ecosystems are spatially extensive and they deliver goods and services upon which all human societies depend for survival. The continued delivery of these goods and services is contingent upon the retention of the integrity of ecological processes that generate these goods and services. Therefore, ecologists have long emphasized the “protection” of ecosystems from human impacts. This suggests that people are apart from and not integral to ecosystems. Yet, human impacts on ecosystems are difficult to “control” and impossible to eliminate. For the survival of human society and of other species that require habitats affected by human activities, human behavior as a pervasive agent of change cannot be ignored. Rather human incentives need to be harnessed in order to enhance rather than diminish ecosystem productivity.

To develop this thesis, the presentation will address six issues: (1) The three legs of sustainable ecosystem management: ecological soundness, economic feasibility and social acceptability; (2) Why the social dimension of resource management has historically been discounted; (3) Why management at the ecosystem and landscape scale is becoming increasingly necessary in the face of growing human population pressure on natural resources; (4) How the application of large scale management necessitates the inclusion of multiple stakeholders and decision makers; (5) The necessary factors for effective ecosystem management and how human behavior can be harnessed to facilitate integrated, large scale management; and (6) How the value of ecosystem services that are not traded in the market place can be estimated (e.g., contingent valuation and contingent choice methods). The presentation will also provide three case studies in which human incentives have been successfully integrated in ecosystem management. The presentation will conclude with recommendations for improving the effectiveness of integrated rangeland management at the ecosystem scale.

KEYNOTE ADDRESS III

Behaviour-based grazing management for herbivores and ecosystems

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Once understood, behavioural principles and processes can be transformed into practices that provide an array of solutions to challenges people face in attempting to manage landscapes for the well being of the many species of plants and animals that depend upon them. Unlike the infrastructure of a ranch such as kraals, fences, and water development, behavioural solutions cost very little to implement, they are not fossil-fuel intensive, and they are easily transferred from one situation to the next. In the case of grazing, behaviour-based management is increasingly attractive given growing economic and environmental concerns with fire, herbicides, and mechanical means of rejuvenating landscapes. While we have learned much during the past three decades about how genes interact with social and biophysical environments to create foraging



behaviors, scientists and managers remain generally unaware of the power of behaviour to transform ecosystems, despite compelling evidence. The issue isn't if creatures are adapting to ongoing changes in social and biophysical environments, they do so every day of their lives. The only question is whether or not people want to participate in the process. If so, behaviour-based management offers opportunities, for example, to use understanding: 1) of the relationship between palatability and plant biochemistry to rejuvenate landscapes to benefit wild and domestic animals, 2) of the importance of variety in the diet and daily grazing sequences of livestock to enhance wildlife benefits to land owners, managers, and users, and 3) of the value of biochemical complementarities for developing plant mixes for pastures that provide a full range of benefits - nutrition and health for plants, herbivores, and people - without the unsustainable costs associated with fertilizers, herbicides, insecticides, antibiotics and anthelmintics.

