Grassroots

Newsletter of the Grassland Society of South Africa

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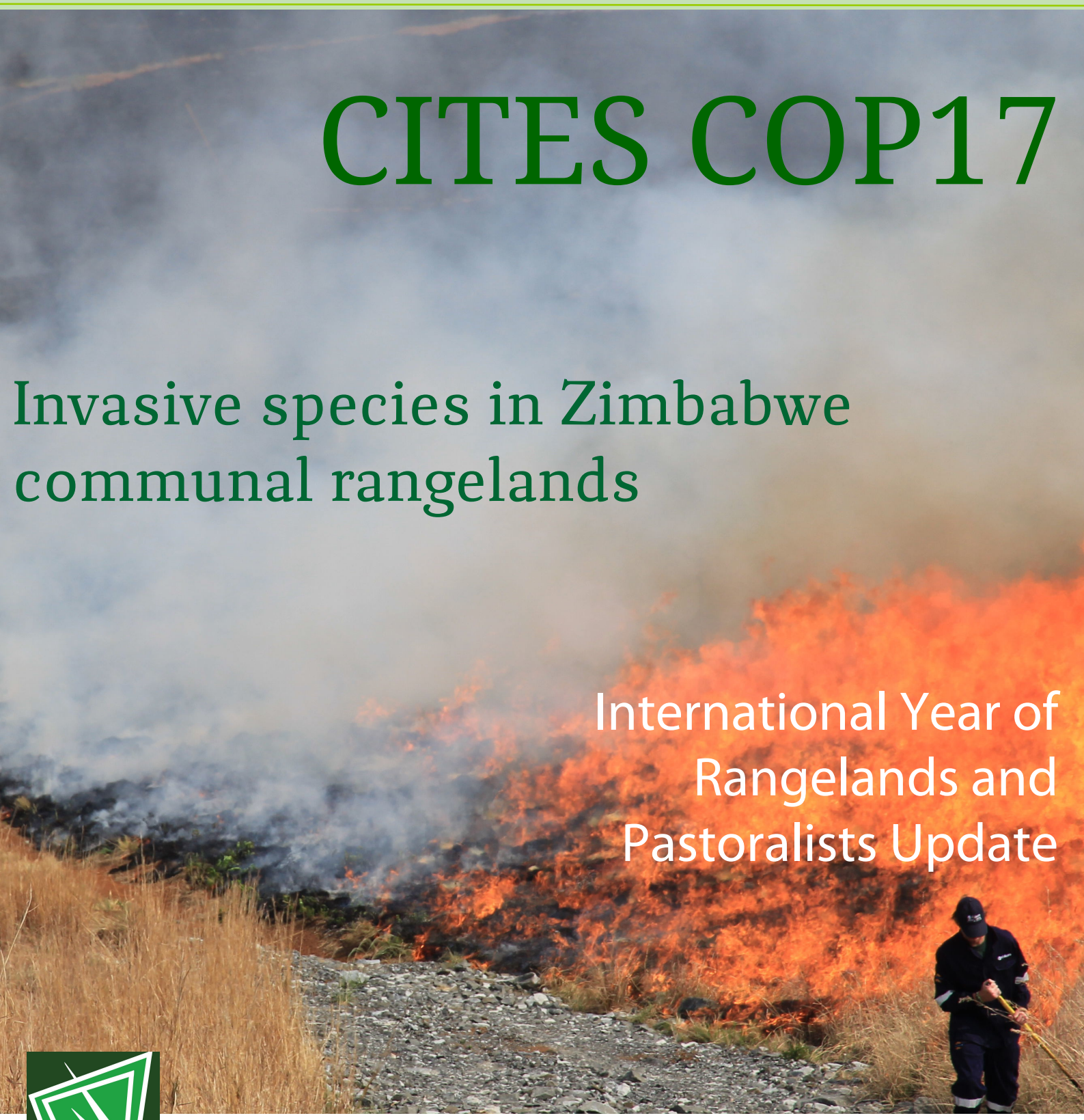

CITES COP17

Invasive species in Zimbabwe communal rangelands

International Year of Rangelands and Pastoralists Update

Advancing Rangeland and Ecology and Pasture Management in Southern Africa

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Editor's Note

It gives me great pleasure to welcome you to the fourth and final Grassroots instalment of 2016.

Some of you are already on holiday, prepping for it or just dreaming about it while standing tall during the December graveyard session up ahead. Let us not forget the real reason for this festive season and carry it close to us.

In this issue we take a look at the happenings of the CITES COP17 held at Joburg during Sep and Oct 2016. Also more CITES are put in plain words and the protected are being protected. Drought is still a hot topic and the quest for resilience is on the move. Another citizen science success story: the GROW observatory. The feature article focusses on the impact and management of invasive species in the communal rangelands of Zim.

New to Grassroots are opinion articles. The purpose of these articles is to instigate debate and to enforce follow-up articles from opposing authors. The two opinion articles in this issue involve grassland management and grasslands vs. climate change matters.

I would like to invite you to submit your knowledge on paper to Grassroots, let it be news, important dates, events, feedback, feature articles, anything - we love it. Dig out all the unpublished data, clean out the office and submit. Let's make Grassroots a hub of knowledge and excellence.

May you arrive and return safely.

Season's greetings!

Josef van Wyngaard

INTERNATIONAL YEAR OF RANGELANDS AND PASTORALISTS- SUPPORT FOR UNITED NATIONS RESOLUTION

The Society for Range Management (SRM), The Rangelands Partnership (a collaboration of 19 Land-Grant Universities in the U.S.), the International Rangelands Congress (IRC), and the International Grasslands Congress (IGC) have pledged to work together with organizations around the world to gain support for naming and implementing an International Year of Rangelands and Pastoralists (IYRP).

Rangelands are landscapes dominated by grasses and other low growing vegetation and include grasslands, savannas, shrub lands, deserts, tundra and alpine communities, marshes, and meadows often tended to by pastoralists and ranchers. Pastoralism is the branch of agriculture concerned with animal husbandry, which traditionally occurs on rangelands. Pastoralists and rangelands are intimately tied.

Pastoralism represents a lifestyle that oversees and nurtures the open spaces of our world. These lands are important for livestock production, habitat for wildlife, soil and water conservation, recreation, and conservation of biological diversity. In the face of variable climatic conditions and an increased focus on food security issues, it is essential that the value and vulnerability of pastoralism and the rangelands they sustain is recognized. A United Nations designation for an International Year of Rangelands and Pastoralism will greatly increase visibility and awareness worldwide.

Beginning in 2015, the partnering organizations began efforts to build consensus for achieving an IYRP designation. This led to the presentation and, ultimately, the approval of a resolution at the United Nations Environment Assembly (UNEA-2) meeting held in Nairobi, Kenya on May 26, 2016. Titled "Combating desertification, land degradation and drought and promoting pastoralism and rangelands", the resolution required high level support from more than 100 countries and calls for:

-raising "global awareness of sustainable pastoralism and rangelands"

-strengthening "the science-policy interface on sustainable pastoralism and rangelands"

-conducting a worldwide gap analysis "to better understand the implications for sustainable livelihoods"

To begin implementing the UNEA-2 resolution, a meeting was later held at the International Rangelands Congress on July 19, 2016, in Saskatoon, Canada. More than 50 representatives from around the world discussed and committed to an action plan of next steps in the IYRP process, including:

-raising awareness at grassroots levels in both developed and developing countries

-promoting an IYRP at the Convention on Biological Diversity Conference of the Parties, to be held in Cancun, Mexico in December 2016

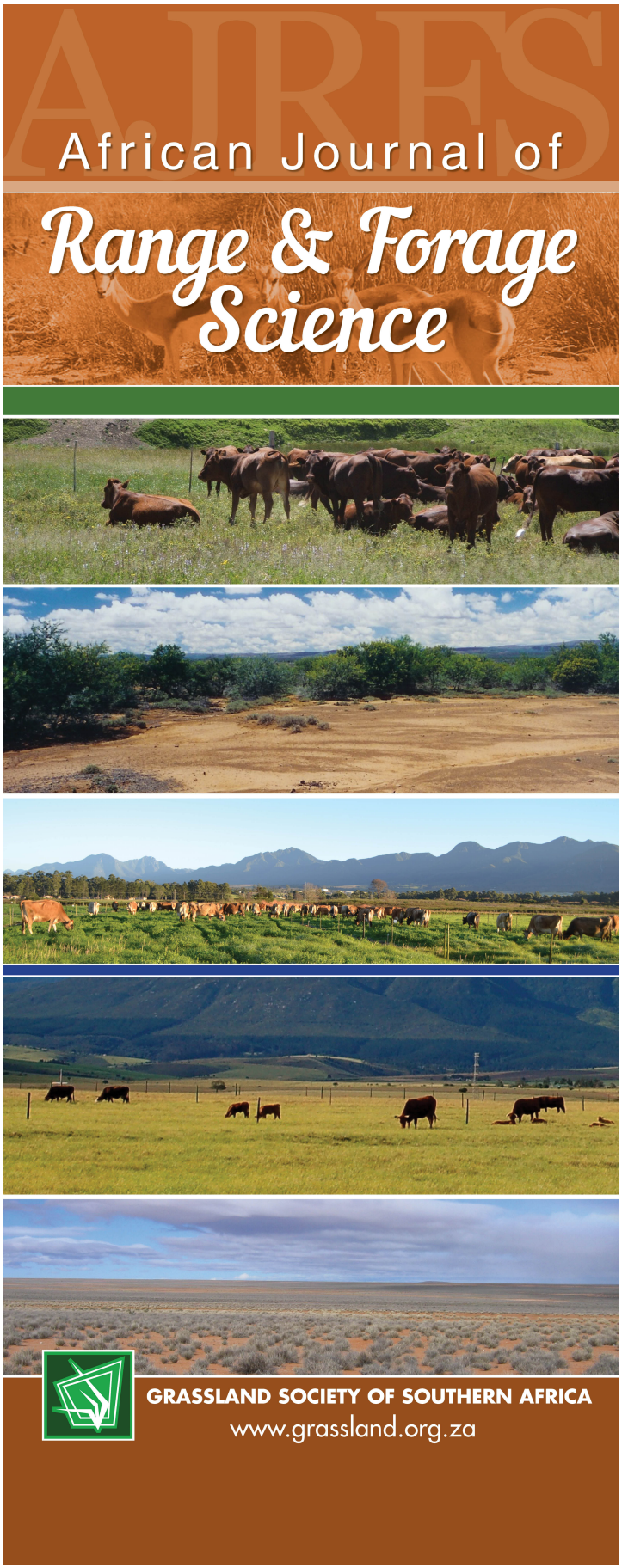
-continuing to work closely with countries willing to take forward a formal request to the

United Nations General Assembly for an IYRP

-promoting an IYRP at future UN-related events as well as at other related conferences and meetings throughout the world.

These efforts are fully underway with multi-organizational task forces organizing numerous activities to alert key stakeholders to this important opportunity. For additional information or to learn how you can help with this effort, contact Barbara Hutchinson, The Rangelands Partnership/SRM (barbarah@cals.arizona.edu) or Jim O'Rourke, IRC/SRM (jorourke@csc.edu). Also, please visit: IYRP Resources webpage (The Rangelands Partnership): http://globalrangelands.org/international-year-rangelands-and-pastoralists-initiative

Stay tuned for further updates about this ongoing process in upcoming Newsletters.



EXPLAINER: WHAT IS CITES AND WHY SHOULD WE CARE?

ROSS HARVEY

SOUTH AFRICAN INSTITUTE OF INTERNATIONAL AFFAIRS

THE CONVERSATION, https://theconversation.com/explainer-what- is-cites-and-why- should-we- care-65510

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international regulatory treaty between 182 member states. It was formed in 1973 and regulates the international trade in over 35,000 wild species of plants and animals.

The 17th Conference of the Parties to CITES (CoP17) will be hosted by South Africa running from 24 September to 5 October.

The focus of the convention is not solely on the protection of species. It also promotes controlled trade that is not detrimental to the sustainability of wild species. It has become the best-known conservation convention in the world.

Illegal wildlife trafficking is a major global problem and CITES is the premier multilateral arrangement to address the problem. The upcoming conference is therefore crucial for advancing human and environmental welfare.

The nature and size of the problem

A recent United Nations report states that the trafficking of wildlife is both a specialised area of organized crime and a significant threat to many plant and animal species.

For instance, there has been an alarming 85% increase in the number of African rhinos poached since 2009. There are only about 20,000 white rhinos left, and fewer than 6,000 black rhinos.

And the latest Great Elephant Census reveals that there are only about 375,000 savannah elephants remaining in Africa. Populations are currently shrinking by 8% per across the continent, primarily due to poaching.

Katarzyna Nowak, research associate in Zoology and Entomology at the University of the Free State, notes that illegal wildlife trade deprives nations of their biodiversity, income opportunities and natural heritage and capital.

A 2015 paper in an Oxford journal states: Most mammalian megafauna face dramatic range contractions and population declines... 60% of the world's largest herbivores are classified as threatened with extinction on the International Union for the Conservation of Nature (IUCN) Red List.

In addition to poaching and trafficking, habitat contraction and fragmentation threaten species survival. Livestock encroachment into wildlife habitats, land-use change and armed conflict combine to account for contraction. Fragmentation also threatens large migratory species, as smaller pockets of protected areas often cannot support sustainable populations of large herbivores and carnivores.

CITES can therefore only deal with one dimension of a much broader problem. But the more effective it becomes at dealing with trafficking, the more traction is likely to be gained in tackling the others.

How does CITES work?

The convention works primarily through a system of classification and licensing. Wild species are categorised in Appendices I to III. This often reflects species' threat status on the Red List of the IUCN, the International Union for Conservation of Nature's Red List of Threatened Species first created in 1964.

Appendix I prohibits trade in species classified as highly endangered. Appendix II allows trade under very specific conditions. This requires exporting countries obtain a permit, but not the importing country. Appendix III species require only a certificate of origin to be traded.

National CITES management authorities may issue permits once scientific authorities show non-detriment findings. In other words, scientific evidence must demonstrate that species sustainability will not be adversely affected by trade. Where data is lacking, the precautionary principle applies.

For instance, elephants are protected under Appendix I and II because of the geographically differentiated threats facing different populations. Either way, if countries cannot demonstrate that the trade in ivory will not result in species decline, they will not be allowed to trade.

Part of the difficulty of allowing the occasional sale of ivory is that sufficient, reliable data on how markets may respond is not available. A vast volume of ivory is sold illegally, and so scientists and statisticians cannot get good data to establish whether one-off sales of ivory exacerbate demand for ivory, or what kind of impact sales may have on speculative activity.

CITES challenges

Estimates from seizure data to make inferences about market dynamics is risky. The precautionary principle suggests that no trade in ivory should be allowed, given the current rates of elephant slaughter across central and east Africa, even though some southern populations are apparently not at risk of decline. In technical terms, there is an added difficulty of what is called the split-listing problem. Here, some elephants are listed on Appendix II - now the largest volume - and all others are listed on Appendix I. Appendix II-listed elephants were subjected to a moratorium on future trade after the 2008 one-off sale. This is due to expire in 2017, and South Africa, Namibia and Zimbabwe have submitted a proposal to be allowed to sell their naturally accruing ivory again.

Another difficulty with migratory species is establishing which member state the elephants actually belong to. If an elephant wakes up in Zimbabwe and goes to sleep in Botswana, whose elephant is she? The upcoming conference will have to deal with these kinds of questions.

The convention also requires that traded species be clearly marked and have legitimate certificates of origin. Seizures of specimens are not allowed when permits are invalid, fraudulent or dubious. Unfortunately, trafficking syndicates are particularly adept at circumventing these measures by forging permits or laundering wild-caught species through captive-breeding facilities.

The secretariat may recommend trade suspension where countries fail to comply with CITES provisions. Trade suspensions were handed to 27 countries at the recent 66th meeting of the CITES standing committee, 16 of them in Africa. For example, countries that failed to submit National Ivory Action Plans were issued with suspensions.

The World Conservation Monitoring Centre, a specialist arm of the UN Environment Programme, manages the CITES trade database and evaluates whether parties are effective at enforcing recommended suspensions.

Will CITES succeed at reducing trafficking?

The convention faces a tremendously difficult task. It was initially designed to regulate trade, not to defeat illegal wildlife trafficking. The convention in itself is relatively powerless to powerful, well-organised transnational crime syndicates. defeat illegal wildlife trafficking. The convention in itself is relatively powerless to to defeat to powerful, well-organised transnational

crime syndicates. But working in collaboration with other multilateral agencies it can ensure greater success in regulating trade in species as well as protecting irreplaceable biodiversity.

Many countries do not have the capacity to adapt their national laws to enforce CITES provisions and recommendations. For instance, the Democratic Republic of the Congo is racked by internal armed conflict and therefore lacks the capacity to do so. But enforcement is crucial to ensuring the convention's future efficacy.

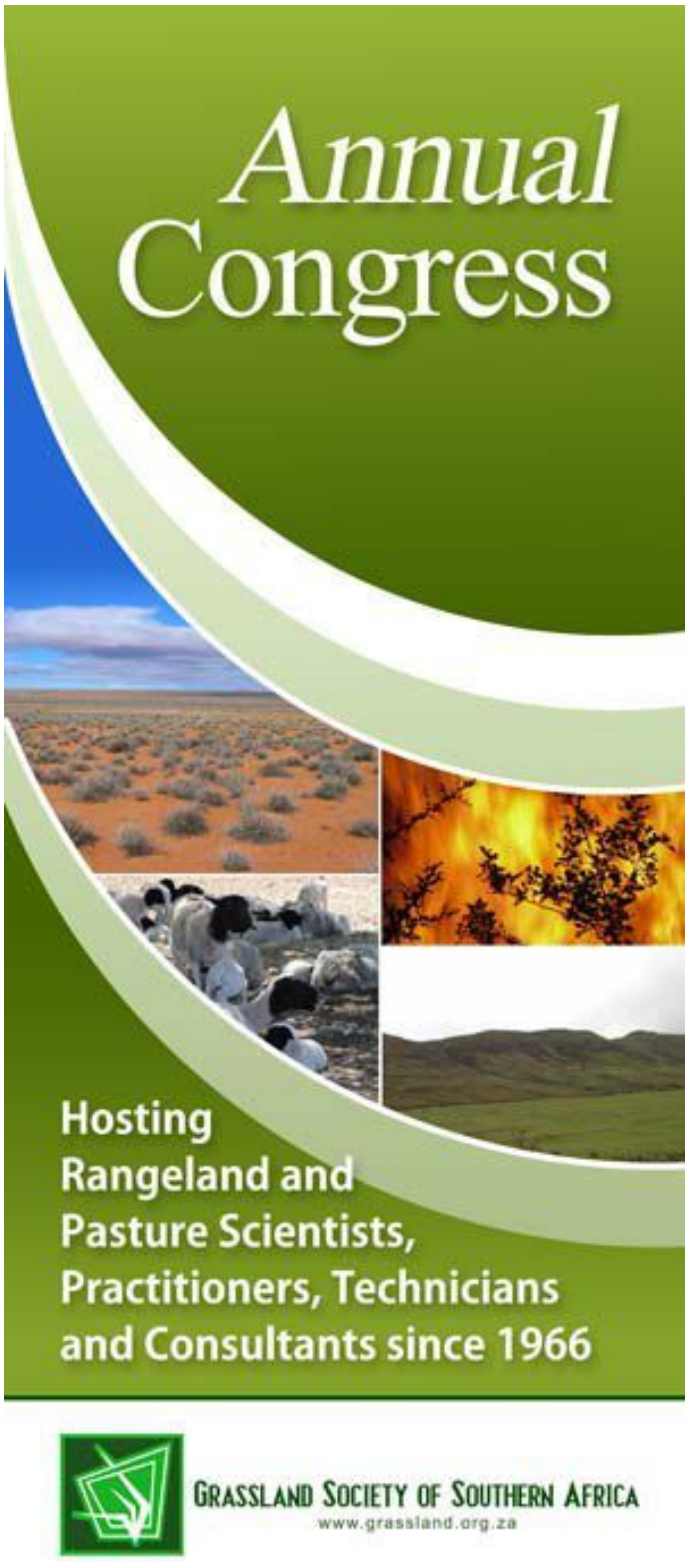
Countries with capacity should help those without. Harmonisation of legislation, and equally strong penalties between countries, is also a prerequisite for success. The more countries start to see that wildlife conservation is not the preserve of a wealthy few or some random single-issue lobby group, but rather integral to the survival of humanity, the more likely CITES is to gain real policy efficacy.

Why should you care?

CITES is a crucial instrument for ensuring that species are not traded in a way that threatens their survival. If, for instance, the world wants to secure a future with elephants, member states would do well to shut down all domestic ivory trade, and to put all stockpiles beyond commercial use. The Elephant Protection Initiative, for instance, calls on members to do this. It provides an excellent example of states adopting policies that complement CITES regulations.

Elephants and other charismatic species are important to conserve not just because they have inherent value, but also because they play a key role in ensuring the ecological integrity of their migratory habitats.

These habitats – wilderness landscapes - not only preserve wildlife species, but also operate as invaluable carbon sinks. This shows us that properly regulating trade in wild fauna and flora is one crucial component of addressing other major challenges like climate change.



LARGEST EVER WORLD WILDLIFE CONFERENCE HAILED AS A "GAME CHANGER"

VICTORIA HOLDSWORTH

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Following two weeks of marathon negotiations, world governments today adopted a suite of groundbreaking decisions on regulating legal, sustainable and traceable trade in wildlife. This included strengthened actions to combat illicit wildlife trafficking, higher protection to entire groups of species, targeted demand reduction strategies for illegally traded wildlife, and agreement on closer engagement with rural communities.

"The most critical meeting in the 43-year history of CITES has delivered for the world's wildlife. #CoP17 is a game changer for the planet's most vulnerable wild animals and plants," said John E. Scanlon, Secretary-General of CITES.

Johannesburg, 4 October 2016 – The triennial two-week summit of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) closed here today with Secretary-General John E. Scanlon describing the 17th meeting of the Conference of the Parties (#CoP17) as "a game changer that will be remembered as a point in history when the tide turned in favour of ensuring the survival of our most vulnerable wildlife."

The CITES #CoP17 was the largest ever meeting of its kind with 152 governments taking decisions on 62 species-listing proposals submitted by 64 countries. In total, over 3,500 people attended the meeting, which also recorded the highest number of side events and intense media interest from every region of the world.

The Johannesburg meeting ended a day early, with high levels of consensus and a focus on implementing decisions on the ground. The outgoing Standing Committee Chair, Øystein Størkersen described CITES as an exceptional model for how to give expression to international agreements.

John E. Scanlon, CITES Secretary-General said: "#CoP17 adopted decisions that saw wildlife firmly embedded in the agendas of global enforcement, development and financing agencies that have the capacity and technical expertise to help ensure implementation of the Convention on the front lines, where it matters most – with the CITES management and scientific authorities, as well as customs officials, rural communities, businesses, police, prosecutors and park rangers.

"Notable successes included decisions to bring new marine and timber species under CITES trade controls, continuing a trend from CoP16 where countries turned to CITES to assist them

along the path to sustainability in oceans and

that were on the agenda, the pangolin and many lesser known species also came under the spotlight."

Erik Solheim, Executive Director of the United Nations Environment Programme, who attended the opening of #CoP17, said: "Protection of endangered species is paramount when it comes to preserving our natural heritage. The CITES conference saw a strong desire from countries to ensure that we are mounting a defense for plants and animals, big and small. Illegal trade of everything from the helmeted hornbill to the hundreds of species of rosewood severely damages our planet, and it';s only through the international cooperation we've seen under CITES that we can prevent it."

The Johannesburg conference was marked by agreement on measures to improve sustainable trade in a number of species, including the queen conch, humphead wrasse, sharks, snakes and African wild dog as well as a large range of timber species, such as bubinga and rosewoods, and the African cherry and agarwood.

Parties also recognized several conservation success stories, including that of the Cape mountain zebra, several species of crocodiles and the wood bison, which were all by consensus downlisted from Appendix I under CITES to Appendix II in recognition of their improved conservation status.

There was fresh impetus to further safeguard threatened wild animals and plants with added protection for the African grey parrot, Barbary Macaque, Blaine's fishhook cactus, elephant, pangolin and saiga antelope; and well-targeted enforcement measures agreed to combat illegal trade for specific species. These included the African grey parrot, African lion, cheetah, helmeted hornbill, pangolin, rhino and totoaba.

Multiple new animals and plants were also added to CITES Appendices for the first time, and hence will come under CITES trade controls. These decisions affect a large number of mammals, marine and timber species as well as many reptiles and amphibians and include more than 350 species of rosewood, devil rays, silky sharks and thresher sharks.

"CITES is now seen as an indispensible tool for achieving the Agenda 2030 and Sustainable Development Goals," observed Scanlon who also thanked South Africa's Minister of Environmental Affairs, Dr Edna Molewa for hosting the Ministerial meeting on the topic of CITES and the Sustainable Development Goals.

#CoP17 saw a number of firsts, including, the first ever:

-Resolution on corruption and wildlife crime;

-Decisions on cybercrime and wildlife crime;

-Resolution on strategies to reduce the demand for illegally traded wildlife,

-Resolutions affecting the helmeted hornbill and snakes;

-Decisions on targeting the illegal fishing of and trade in totoaba, and the related illegal killing of the vaquita;

-Resolution and decisions on youth engagement in CITES; and

-Decisions on rural communities engagement, providing a greater voice for local people in managing wildlife.

-It was also the first meeting where the European Union was participating, and voting, as a Party to the Convention.

Some other notable outcomes include:

-The rejection of a Decision-Making Mechanism (DMM) for a future trade in ivory;

-An agreement to close domestic markets in ivory where they contribute to poaching or illegal trade;

-The rejection of all proposals to change the protection of Southern African elephant populations;

-Stricter monitoring and regulation of hunting trophies to bring them under trade control

control measures, including recommending conservation benefits and incentives for people to conserve wildlife;

-A decision to conduct a study to improve knowledge on regulation of trade in the European eel, and to look more broadly at all Anguilla eels;

-An agreement to undertake specific work on marine turtles to understand the impact of international trade on their conservation status;

-The introduction of a captive breeding compliance process to check the authenticity of specimens described as captive bred;

- Acceptance of the National Ivory Action Plans as a tool for those Parties mostly affected by illegal trade in ivory, including source, transit and destination countries, to build their capacity in addressing illegal trade and ensuring compliance with the commitments they make under the plans;

-A decision to undertake studies in legal and illegal trade in lion bones and other parts and derivatives;

-A request to review all species listed on Appendix I to identify what measures are needed to improve their conservation status;

-Improvements to processes to ensure that wildlife trade is sustainable, legal and traceable; and

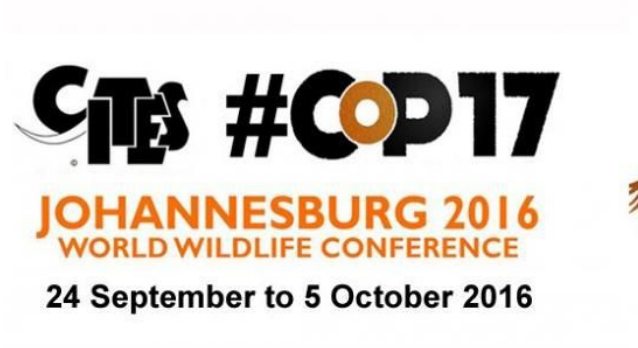
-Agreements on process to improve traceability and identification of CITES-listed species.

and Decisions enter into force 90 days after the CoP.

"It was here in Johannesburg that rural community voices and the voice of the world's youth came into the heart of the meeting room to be heard by decision makers from across the world. It has been a truly wonderful CoP from every perspective for which we extend our deepest gratitude to the Government and the people of South Africa," concluded Scanlon.

The 17th Meeting of the Conference of the Parties to the Convention was held from 24 September to 4 October 2016. It was attended by over 2,500 participants from governments and numerous observer organizations. COP18 will be held in 2019 in Sri Lanka.

All the results on the 62 proposals will be available on the CITES website (www.cites.org).



NATURE IS BEING RENAMED 'NATURAL CAPITAL' – BUT IS IT REALLY THE PLANET THAT WILL PROFIT?

SIAN SULLIVAN

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THE CONVERSATION, https://theconversation.com/nature-is- being-renamed-natural- capital-but- is-it- really-the- planet-that- will-profit- 65273

The four-yearly World Conservation Congress of the International Union for the Conservation of Nature has just taken place in Hawai'i. The congress is the largest global meeting on nature's conservation. This year a controversial motion was debated regarding incorporating the language and mechanisms of "natural capital" into IUCN policy.

But what is "natural capital"? And why use it to refer to "nature"?

Motion 63 on "Natural Capital", adopted at the congress, proposes the development of a "natural capital charter" as a framework "for the application of natural capital approaches and mechanisms". In "noting that concepts and language of natural capital are becoming\ widespread within conservation circles and IUCN", the motion reflects IUCN's adoption of "a\ substantial policy position" on natural capital. Eleven programmed sessions scheduled for the\ congress included "natural capital" in the title. Many are associated with the recent launch of\ the global Natural Capital Protocol, which brings together business leaders to create a world where business both enhances and conserves nature

At least one congress session discussed possible "unforeseen impacts of natural capital on broader issues of equitability, ethics, values, rights and social justice". This draws on widespread concerns around the metaphor that nature-is- as-capital- is. Critics worry about the emphasis on economic, as opposed to, ecological, language and models, and a corresponding marginalisation of non-economic values that elicit care for the natural world.

Naturalising "natural capital"

The use of "natural capital" as a noun is becoming increasingly normalised in environmental governance. Recent natural capital initiatives include the World Forum on Natural Capital, described as "the world's leading natural capital event", the Natural Capital Declaration, which commits the financial sector to mainstreaming "natural capital considerations" into all financial products and services, and the Natural Capital Financing Facility, a financial instrument of the European Investment Bank and the European Commission that aims "to prove to the market and to potential investors the attractiveness of biodiversity and climate adaptation operations in order to promote sustainable investments from the private sector."

All these initiatives share the UK Natural Capital Committee's view that "natural capital" onsists of "our natural assets including forests, rivers, land, minerals and oceans". People used to talk about "nature" or "the natural environment" – now they speak of "natural capital".

So what does the word "capital" do to "nature" when they are linked? And should nature be seen in terms of capital at all? One controversial aspect, backed by IUCN's Business and Biodiversity Programme, is receiving particular attention. This is the possibility of securing debt-based conservation finance from major institutions and the super-super- rich based on the value of income generated from so-called natural capital assets conserved in situ.

Capitalising natures

At the IUCN's conservation congress a Coalition for Private Investment in Conservation was launched. Led by financial services company Credit Suisse, and backed by the IUCN and the World Wide Fund for Nature, the coalition builds on a series of recent reports proposing capitalising conservation in exactly this way.

In 2016, and following a 2014 report, Credit Suisse and collaborators published two documents outlining proposals for debt-based, return-seeking conservation finance. The most recent is called Levering Ecosystems: A Business-focused Perspective on how Debt Supports nvestment in Ecosystem Services. In this, the CEO of Credit Suisse states that not only is saving ecosystems affordable, but it is also profitable, if turned "into an asset treasured by the mainstream investment market".

The report proposes a number of mechanisms whereby "businesses can utilise debt as a tool to restore, rehabilitate, and conserve the environment while creating financial value". The idea is that as "environmental footprints move closer to being recognised as assets and liabilities by companies, debt can be used to fund specific investments in ecosystems that lead to net-positive financial outcomes". Debt-based financing – for example, through tradeable securities such as bonds – is framed as attractive in part because interest received by investors is "usually tax-deductible".

The Levering Ecosystems report followed quickly from Conservation Finance: From Niche to Mainstream, steered by a small group including the director of IUCN's Global Business and Biodiversity Programme. This report estimated the investment potential for conservation finance to be roughly US$200-400 billion by 2020.

Of course, investors loaning finance to projects associated with conservation also expect market-rate returns to compensate for investments considered to conserve, restore or rehabilitate ecosystems.

In the documents above, financial returns are projected as coming in part from new markets in payments for ecosystem services and sales of carbon credits. These new markets will supply the potentially monetisable "dividends" of conserved and restored habitats as "standing natural capitals". Investor risk is proposed to be reduced through mobilising these assets, as well as the "land or usage rights" from which they derive, as underlying collateral.

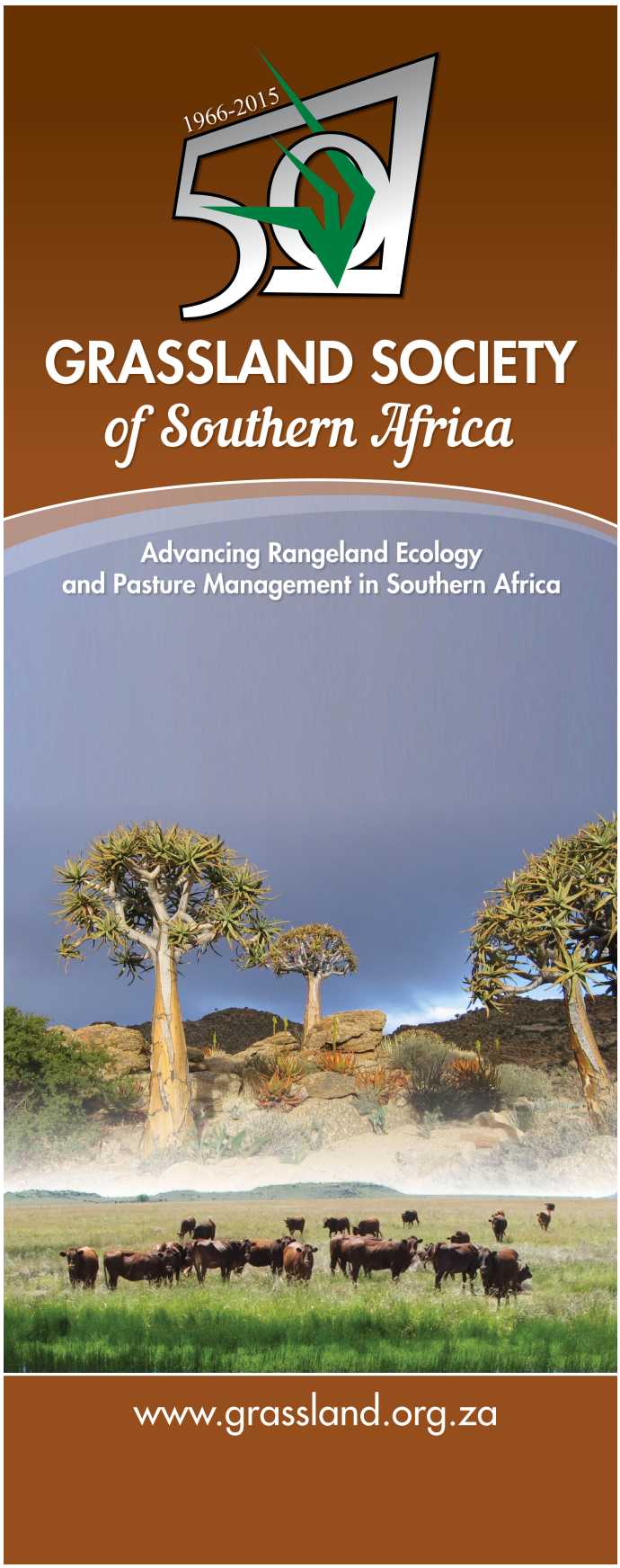
Such financialising moves, nascent and clunky as they are, may yet have significant implications if applied to countries in the global south with remaining high levels of "standing natural capital". Caution is needed regarding the possibility that forest-rich but least developed countries may become indebted to ultra-high-net-worth investors who access returns on their investments from new income streams arising from conserved tropical natures in these countries.

What's in a name?

In 1986, the central secretariat of the WWF decided to change the name of the organisation from the World Wildlife Fund to the World Wide Fund for Nature. The thinking was that an emphasis on "wildlife", borne of a concern for endangered species, no longer reflected the organisation's scope of work for the

conservation of the diversity of life on earth. It was considered that overall the organisation would be better served by the term "nature". In other words, it seems that naming and framing "nature" matters.

Given the conversations and debates at IUCN's World Conservation Congress, it seems important to ask: how exactly does the conservation of natural capital equate with the conservation of nature? Do these terms in fact invoke different things? If they do, then it is worth clarifying whether the conservation of natural capital is always good for the conservation of nature. If they don't, then it remains worth querying why exactly "nature" needs to be renamed as "natural capital".



WILDLIFE FARMING: DOES IT HELP OR HURT THREATENED SPECIES?

RICHARD CONNIFF

REPRINTED FROM YALE ENVIRONMENT 360 (HTTP://WWW.E360.YALE.EDU)

http://e360.yale.edu/feature/wildlife_farming_does_it_help_or_hurt_threatened_species/3028/

More than a decade ago, looking to slow the decimation of wildlife populations for the bushmeat trade, researchers in West Africa sought to establish an alternative protein supply. Brush-tailed porcupine was one of the most popular and high-priced meats, in rural and urban areas alike. Why not farm it? It turned out that the porcupines are generally solitary, and when put together, they tended to fight and didn't have sex. In any case, moms produce only one offspring per birth, hardly a recipe for commercial success.

Wildlife farming is like that — a tantalizing idea that is always fraught with challenges and often seriously flawed. And yet it is also growing both as a marketplace reality and in it appeal to a broad array of legitimate stakeholders as a potentially sustainable alternative to the helter-skelter exploitation of wild resources everywhere.

Food security consultants are promoting wildlife farming as a way to boost rural incomes and supply protein to a hungry world. So are public health experts who view properly managed captive breeding as a way to prevent emerging diseases in wildlife from spilling over into the human population. Even Sea World has gotten into the act, promoting captive breeding through its Rising Tide non-profit as a way to reduce the devastating harvest of fish from coral reefs for the aquarium hobbyist trade.

Conservationists have increasingly joined the debate over wildlife farming, with a view to keeping the trade in bushmeat and exotic pets from emptying forests and other habitats. Writing in the journal Conservation Letters, wildlife trade researchers Dan Challender and Douglas C. MacMillan argue that regulations and enforcement alone cannot end the current poaching crisis. "In the medium term, we should drive prices down," they write, with "sustainable off-take mechanisms" such as regulated trade, ranching, and wildlife farming. They say it has worked before. Successful introduction of carefully regulated crocodile ranching during a mid-twentieth century poaching crisis across Africa "led to reduced poaching pressure on wild populations, even in countries with weak governance," they note.

But another article, published in April in the journal Global Ecology and Conservation asks the question, "Under what circumstances can wildlife farming benefit species conservation?" Author Laura Tensen, a conservation geneticist at the University of Johannesburg, provides a broad review of wildlife farming projects worldwide and answers, in effect, "not often."

Swaziland has proposed legalizing the rhino

horn trade, in a bid to make rhino ranching a commercial enterprise. And one of the few success stories she cites might not appeal to some conservationists: The shift in the 1930s from wild-caught to farmed animals was a key to the recovery of many North American mammal species in the luxury fur trade.

The debate over the conservation potential of wildlife farming is likely to attract widespread attention next month, when the 182 member nations of the Convention on International Trade in Endangered Species (CITES) meet in Johannesburg. Neighbouring Swaziland has proposed legalizing the rhino horn trade, in a bid to make rhino ranching a commercial enterprise. That effort is almost certain to fail. But given the reality that "trade restrictions agreed through CITES are failing in many instances," as Challender and MacMillan put it, farming of other wildlife species is likely to play an increasing role in the anti-poaching debate.

Wildlife farming is of course not new. Aquaculture dates back at least 8,000 years, to small eel ponds kept by aborigines in south-eastern Australia. Farmed carp, salmon, trout, and other fish species, as well as molluscs and crustaceans, now supply more than half of all seafood produced for human consumption. With sales set to reach $203 billion a year by 2020, aquaculture is by far the biggest sector of the wildlife-farming marketplace.

Nor is the idea of wildlife farming as a conservation tool particularly new. Ranchers in parts of southern Africa that are too dry for domestic livestock began raising wildlife more than a century ago, for trophy hunting, the meat trade, and tourism. Those ranches played a critical role in the recovery of a mountain zebra subspecies, black wildebeest, white rhino, and bontebok and sable antelopes, among others, according to Andrew Taylor, co-author of a recent report on wildlife ranching for South Africa's Endangered Wildlife Trust.

What's different now is the urgency of the commercial push for wildlife farming everywhere, and the extraordinary range of species being farmed. A pilot study in Vietnam last year identified 185 farmed species in that country alone, including porcupines, flying foxes, crab-eating macaque monkeys, Asian palm civets, wildcats, and multiple rodents and reptiles. The survey, organized by the UN's Food and Agriculture Agency (FAO), urged the creation of a national wildlife farm registry, training of Vietnamese farmers in food safety and disease prevention, and development of a system of regular veterinary care.

One problem with captive breeding, Tensen points out in her review, is that it's inevitably more expensive to house, feed, and otherwise care for animals in captivity than to collect them from the wild. In parts of Asia where eating wildlife is a status symbol, people may be willing to pay that added price. But that does not appear to be the case in much of Africa, where hunters seek bushmeat for basic nutrition. Even relatively wealthy and educated consumers in the developed world are often reluctant to pay for sustainability.

For instance, people who keep saltwater aquariums prize brightly colored mandarinfish. According to a website for hobbyists, fishermen in the Philippines catch them "with a mini-spear gun," which fires "long, double pronged sewing needles into the side of the fish." Many fish die, and targeting large, showy males also skews the reproductive behavior of the survivors in the wild. Hence mandarins are already commercially extinct in many areas.

But captive breeding of mandarins failed in the marketplace, according to Scott Fellman, a supplier to the trade, because "the mass market didn't want to pay $40 for a captive-bred fish they could get for $12 from wild-caught sources". Fellman called it "extreme hypocrisy." But the mandarin story was hardly unusual. Researchers have managed to breed about 15 percent of marine aquarium species in captivity. But only about six percent are available at the retail level.

Because wild species can be so difficult to breed in captivity, farmers of terrestrial species also routinely re-stock from the wild. Studies have shown that 90 percent of cane rat farms in Ghana, half of porcupine farms in Vietnam, and up to three-quarters of green python farms in Indonesia still take animals from the wild. At one

Indonesia still take animals from the wild. At one point, even the FAO appeared to be arguing that farming of musk deer in Asia could be good for conservation – while it simultaneously provided instructions for capturing musk deer from the wild. Instead of preventing poaching, this continued reliance on wild stock serves, according to Tensen, simply to launder illegal bushmeat.

If you ban wildlife farming, people are just going to go around it,' says Peter Daszak, of EcoHealth Alliance. "There's been a lot of money squandered on trying to raise wildlife as a way of reducing the unsustainable harvest for food," said David Wilkie, director of conservation measures and communities for the Wildlife Conservation Society (WCS). Among other problems, the feed conversion ratio — how many pounds of feed an animal consumes to yield a pound of meat — "is terrible, especially versus things like pigs and chickens that we have raised for 10,000 years. We know how to raise chicken really well," he said, and poultry is thus more practical than wildlife farming as a protein source for weaning communities away from bushmeat. Newcastle virus, the most common killer of chickens, used to be an impediment to rearing poultry in remote areas, he said, because the only vaccine required refrigeration. But a WCS study in Zambia recently demonstrated that a new thermostable version of the vaccine can help boost poultry production at the village level by four- to seven-fold.

Juan Lubroth, chief veterinarian for the FAO, echoed this call for "sustainable intensification" of livestock farming. "We have come a long way from what we were promoting ten or 20 years ago," he said, in understanding the dynamics — and the difficulties — of wildlife farming.

How to identify the exceptional cases where wildlife farming might actually benefit conservation? Tensen outlined five essential criteria:

1. The farmed product must provide an adequate substitute, meaning potential buyers do not prefer the wild counterpart.

2. It must supply a substantial portion of the market, and not increase demand by making the product more popular or legitimate.

3. It must be more cost efficient, to avoid being undersold on the black market. (This means the animals must be predisposed to thrive in artificial environments, have a high rate of reproduction, and require relatively little feed for the protein produced, among other things.)

4. Farmers cannot rely on restocking from the wild.

5. Farmed wildlife cannot serve to launder the illegal product.

"If you ban wildlife farming, people are just going to go around it," says Peter Daszak, of EcoHealth Alliance

After reading Tensen's paper, Peter Daszak, president of EcoHealth Alliance, gave the equivalent of a long, slow whistle of dismay at the work ahead. Through its EcoHealthy Pets site, his organization advocates captive-reared animals for the pet trade, as both a conservation and public health measure. "Anyone working in this field knows there are arguments for and against whether you should encourage wildlife farming," he said in an interview with Yale Environment 360. "What Tensen has done, to my mind for the first time, is try to objectively assess the reality of wildlife farming, and it really does reveal some interesting stuff. I agree with her – in the majority of cases, it's not good conservation. It's unfortunate, but true".

"The bigger problem," Daszak continued, "is what is the alternative? If you ban wildlife farming, people are just going to go around it." The answer, he suggested, for both the pet and food trades is to focus on "a limited range" of farmed species that meet the criteria for sustainability, as EcoHealthy Pets now does.

The challenge is to persuade people accustomed to exploiting an entire planet's species to get by with perhaps a few hundred. But the danger otherwise is that we will end up on a planet with no wildlife at all.

DRIVING CHANGE: PROTECTING THE PROTECTED

WENDY COLLINSON, CONSTANT HOOGSTAD AND BELINDA GLENN

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South Africa currently has a serious problem with regards to road-related fatalities, and this epidemic is relevant to wildlife too. Insurance claims suggest that approximately R82.5 million is paid each year against collisions with wild animals, though the costs to wildlife of these collisions are never calculated. So what are the consequences for animals? The Endangered Wildlife Trust (EWT) is tackling this question and working to find solutions to the problems associated with wildlife and transport infrastructure.

Perhaps the most obvious concern is the direct and negative consequences of vehicle-wildlife collisions, more commonly known as "roadkill". Reports via social media platforms from members of the public show a high level of public disquiet and emotional concern about the rate of road deaths in parks, including issues related to speeding and careless driving, and the conservation impacts and wildlife welfare risks such driving poses. To take a closer look into the problem the EWT launched a new project in 2014 aimed specifically at wildlife and road issues in nature reserves and parks.

In 2014, Pilanesberg National Park was the first reserve to support the initiative, where many wildlife species including leopard and zebra have been killed on the roads. Following this, research continued in Addo Elephant National Park in 2015. The research team set out to monitor driver behaviour through placing a fake snake on the road, and recording how many times it was "hit" and the speed at which the vehicle was travelling. We found that approximately 50% of drivers hit the fake snake. "From our survey, it seems that observation levels of the driver, rather than the speed of the vehicle, is the key factor in causing roadkill," explains Wendy Collinson, the Project Executant of the EWT's Wildlife and Roads Project.

Armed with a better understanding of the reasons why roadkill may be happening in national parks, the research team have returned to Pilanesberg National Park to undertake follow-up work. "A driver awareness campaign is to be launched in parks to make drivers more aware of animals on the roads themselves," Collinson commented. "We plan to test a number of awareness-measures with visitors to the park and to assess which method works best. This will guide us on future decisions in other parks that will improve the quality of the experience of park visitors and safeguard the animals in these protected areas," she concluded.

The EWT is also excited to announce that the project has expanded to Hluhluwe-iMfolozi Park through a joint collaboration with the University of KwaZulu-Natal and Ezemvelo KZN Wildlife, as well as Table Mountain National Park, where preliminary roadkill surveys have begun. "We are also eagerly awaiting the start of some surveys to begin in Kruger National Park, with support from the University of Mpumalanga and SANParks," stated Collinson. "There is an urgent need to better quantify and understand the impacts of roads on wildlife in protected areas and to develop and test methods to manage these. Ultimately, through understanding the causes of roadkill, this project will guide further research, specifically for recommended roadkill-reduction measures in other protected areas in

South Africa."

The project is novel, unique and innovative in its design since it also uses volunteers or citizen scientists to assist with data collection. Citizen scientists are becoming more recognised by wildlife researchers as a support to expert data collection. To galvanise public participation to this process, the EWT has taken to the internet to get people to report wildlife fatalities. The EWT has a Smartphone app, Road Watch, which allows data to be quickly and accurately captured, assisting people to easily submit their information. Other social media platforms include Facebook and LinkedIn.

The EWT's Wildlife and Roads Project in Protected Areas is supported by Bridgestone SA, Copenhagen Zoo and Mikros Traffic Monitoring. Collaborations include: Mpumalanga University, University of KZN, North West Parks and Tourism Board, South African National Parks and Africa: Live.

Credit: Wilke Strydom

MEETING SUMMARY OF DAFF ON FIRST QUARTER 2016/17 PERFORMANCE

CHAIRPERSON – MS M SEMENYA (ANC)

PARLIAMENTARY MONITORING GROUP

The current drought was the worst since 1904 and had had a devastating effect on the sector and agricultural value chain. The Department of Agriculture, Forestry and Fisheries (DAFF) reported this when briefing the Portfolio Committee on its first quarter performance. About Forestry and Natural Resources Management (FNRM), provinces had used R188m from their equitable share to assist smallholders, and the DAFF had provided interim feed aid for the livestock of smallholders. R263m had been spent on drilling and equipping boreholes.

Domestic production of staple foods like maize and beans had been reduced by at least 30%, leading to price increases. About 189 750 livestock producers, including approximately 3,6 million livestock units, had also been affected by the drought. To mitigate the impact, just under R1.0 billion had been set aside to procure feed for livestock, establish fodder banks and drill boreholes.

The vacancy rate in the Department had increased from 10% to 10.4%, mainly due to budget constraints on the compensation of employees, delays as a result of grievances, as well as delays in the verification of citizenship and criminal checks by the State Security Agency. The plan to procure 32 light delivery vehicles (LDVs) as primary animal health care clinics was progressing well, although the project had been severely affected by budget cuts. It had received 124 applications from final-year veterinary students of the University of Pretoria who wished to participate in the 2017 Community Compulsory Service programme.

Prices for a basic food basket had increased by 16,4 %, from R516 to R601, between April 2015 and April 2016; by 16,0%, from R519 to R602, from May 2015 to May 2016; and by 15,6%, from R516 to R597, from June 2015 to June 2016. Three new cooperatives had been established, two to support collective marketing and bulk buying of inputs, and one to support access to processing facilities. Members of 18 existing cooperatives had been trained on the "FARMtogether" programme and business planning guidelines.

Nine new business proposals to the value of R169m had been received for consideration, but only two had been submitted for due diligence assessment. The main challenge with the proposals was the status of the businesses requiring funding, because many of the proposals were for bail-out funds for bankrupt businesses, which was not the objective of the fund.

The DAFF said it had not met its target of finalising the permit conditions for the fishing rights allocated in nine commercial fishing sectors. The Minister had agreed to a request from stakeholders to extend the period for the collection of application forms to allow potential applicants more time to complete them and collect the additional information that needed to be submitted.

Members wanted clarity on why the LDV

programme on Animal Health Care had been severely affected by budget cuts; wanted to know if the DAFF had facilitated the transfer of R500m from the Industrial Development Corporation to the Land Bank for lending to all producers; asked the Department to clarify the 2016/17 planned deliverables on the programmes of the Office of the Director-General and Trade Promotion and Market Access, because they did not understand those areas; asked how many jobs had been created, because what had been presented in the document was not clear; wanted to establish if the employment equity figures presented by the Department were proportionate to the population of the country; and asked what the time frames for the completion of the borehole jobs were, and why the targets had not been met.

DROUGHT 2016 – THE NEED FOR RESILIENCE

BRIDGET CORRIGAN

ENDANGERED WILDLIFE TRUST – SOURCE TO SEA PROGRAMME

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EWT - Source to Sea Programme Newsletter September 2016

Last year, South Africa began to feel the impact of one of the worst drought events in living memory. Dam levels fell dangerously low, groundwater tables dropped and water restrictions tightened the noose on food production and domestic water provisioning. Images of dried mielie husks blowing around bare fields and dehydrated and bony livestock collapsed in the dust were all over the media. The severity of the drought has been largely attributed to an acute El Niño weather pattern - a natural phenomenon that leads to the surface warming of the eastern and central Pacific Basin, creating knock-on effects across much of the world. And we are by no means out of the woods yet. Heavy water restrictions implemented in Gauteng during September, largely because the Vaal Dam is sitting at around 30% capacity, have raised awareness of water security issues and pushed city-dwellers to drastically reduce their water footprint. But together with water-saving measures, it is also vital that we protect and restore the ecological functioning of the rivers, wetlands and groundwater resources that store, transport and clean our water. Resilient ecosystems help buffer us against drought, climate change and floods and that is what we need to keep in mind when we talk about sustainable development. For up-to- date information on the current drought situation check out the Water Research Commission's Drought SA website (http://www.droughtsa.org.za/) and to see the current status of surface water storage across the country, go to the Department of Water and Sanitation's National Integrated Water Information System website (http://niwis.dwa.gov.za/niwis2/SurfaceWaterStorage) which is particularly useful.

THE GROW OBSERVATORY: A CITIZEN SCIENCE PROJECT FOR GROWERS, GARDENERS, FARMERS AND SPACE SCIENTISTS

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The James Hutton Institute, http://www.hutton.ac.uk/news/grow-observatory-citizen- science-project- growers-gardeners- farmers-and- space-scientists

The launch of a massive, European-wide project aiming to involve tens of thousands of 'citizen scientists' in a drive to empower growers with knowledge on sustainable practices and make a vital contribution to global environmental monitoring has been announced today.

Led by the University of Dundee and supported by partners across Europe including the James Hutton Institute, the GROW Observatory (GROW; http://growobservatory.org/) intends to solve a key challenge for environmental monitoring – the ability to measure soil moisture at high spatial resolution over large geographical areas – whilst sharing knowledge on growing in different regions. The aim will be to increase small-scale food production and preserve the soil quality for future generations, whilst improving forecasting of extreme climate events, such as heatwaves and floods.

GROW has received funding of €5million over the next three years through the European Commission's Horizon 2020 programme. The project starts on 1st November 2016, and will engage growers and citizen scientists to help co-create the experiments during the 2017 growing season.

GROW aims to underpin smart and sustainable custodianship of land and soil, with a view to meeting the future demands of food production. It also aims to answer a long-standing challenge for space science - by helping to validate the detection of soil moisture from satellites. GROW will look at how this data can contribute to services and applications that help forecast and prepare for extreme climate events, such as heatwaves and floods.

"This is citizen science on an unprecedented scale," said Dr Drew Hemment, who is leading the project from Duncan of Jordanstone College of Art & Design, part of the University of Dundee. "People taking part will collaborate to create and share information on soil, the land, on crops - what to plant, when to plant them and

To achieve this GROW will combine low-cost sensing technology combined with citizens own devices, a simple soil test, innovative data handling and an online education platform to mobilise large numbers of citizens across Europe.

"The vision is to support the emergence of amovement of citizens sharing data and knowledge on growing and the land, to increase access to affordable food, preserve the soil for future generations, and solve a major challenge for science," said Dr Hemment. "GROW will build a community of thousands of growers, gardeners, smallholders and citizen scientists across Europe to harness the collective power of shared and open data and knowledge.

"Do you grow your own food? Do you have an allotment? Own a small farm? Or have a community or school garden? Do you want to develop your knowledge and skills on soil and growing for food, and take practical steps to preserve the soil for future generations? Or collaborate with thousands of people to solve a longstanding challenge for space science? If the answer to any of these questions is `yes' then GROW is a project we hope people will really engage with. This will be a platform and community for large-scale citizen science that aims to empower growers with knowledge on sustainable practices and make a vital contribution to global environmental monitoring.

"The outcome will be a hub of open knowledge and data created and maintained by growers that will be of value to the citizens themselves as well as specialist communities in science, policy and industry. GROW will generate, share and utilise information on land, soil and water resource at a resolution hitherto not previously considered. By providing our community with simple testing kits and technology, we can gather information across the continent on a range of parameters relevant to growing. So we will have a Europe-wide network with citizen scientists at the heart of it, working alongside policymakers and scientists. We can then share knowledge and advice across our community, as well as using it to inform wider science and research."

Dr Roy Neilson, a senior scientist at the James Hutton Institute, commented: "Our contribution to GROW will be very varied. The Institute will be involved in the co-design, co-creation and delivery of citizen science experiments, and we will also contribute to GROW&'s Massive Open Online Course (MOOC) covering soils, plants and production. Along with partners, we will be involved in analysing experimental data generated by the GROW community."

GROW presents its first public event on 10th September near Rome, running a workshop at a gathering of committed growers from across European to discover the challenges it can help them to address. Details of related upcoming job opportunities can be found in the GROW Observatory website.

Notes to editors

The European Commission through Horizon 2020 is supporting the development of an ecosystem of Citizen Observatories. The vision is to create a movement around environmental observations to inform and empower citizens to participate in environmental decision-making, leading towards more inclusive, sustainable and smart economic development.

Citizen science has a long history, and the increasing availability of smartphones and low-cost sensing technologies have opened up new possibilities for collaborative data collection and sense making.

The world faces the challenge of producing sufficient high-quality food while reducing carbon emissions and preserving the quality of land and soil resources.

AT LAST, EVIDENCE THAT AFRICAN AGRICULTURE IS POWERING ECONOMIC TRANSFORMATION

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THE CONVERSATION, https://theconversation.com/at-last- evidence-that-african-agriculture- is-powering- economic-transformation- 65656

The evidence is now in and the verdict is that Africa´s agriculture is powering economic transformation in the region African agriculture has shown remarkable improvement compared to its precarious state 15 years ago.

However, progress is uneven across the region. Governments that have invested in their agricultural sectors, such as in Ethiopia, Rwanda and Burkina Faso, are reaping the benefits – stronger economic growth, declining poverty rates, better nutritional status and a more rapid shift of the labour force out of farming.

But there is still much to do. This is especially true for countries that have not adequately promoted their smallholder farmers. And this is not rocket science. The actions that governments need to take are well understood and backed by strong evidence. Implementation is now the priority.

These are the main messages of the Africa Agriculture Status Report 2016: Progress towards Agricultural Transformation in Africa, published by the Alliance for a Green Revolution in Agriculture. The report provides an in-depth and unsparing review of the drivers of this dynamic period in African agriculture – one that the authors see as a prelude of bigger things to come.

Improving at last

Along with other co-authors of the report, I was pleased to note that after decades of stagnation, much of Africa has enjoyed sustained agriculture productivity growth since 2005. Agriculture has done especially well where governments quickly embraced the African Union's Comprehensive African Agriculture Development Programme created in 2003. A key component was the programme's call for African governments to allocate 10% of their budgets to agriculture.

Early adopters of these goals, like Ghana and Rwanda – even if they didn't hit the 10% target – saw farm productivity rise by an average of 6.01% per year as opposed to late adopters (4.51%) and non-adopters (0.18%). This, in turn, helped spur a 6.07% average annual increase in overall GDP per capita.

Meanwhile, countries that turned a blind eye saw farm productivity rise by less than 3% and GDP rise by only 2.2% The trend is similar for declines in malnutrition. Countries that largely adhered to

Meanwhile, countries that turned a blind eye saw farm productivity rise by less than 3% and GDP rise by only 2.2% The trend is similar for declines in malnutrition. Countries that largely adhered to their targets experienced annual reductions in malnutrition of 2.4-5.7%, compared to just 1.2%, on average, for other countries.

Not out of the woods

But we also make clear in the report that not all the signs are good. We note that Africa remains the world's most food-insecure continent, with relatively low levels of agricultural productivity, low rural incomes, high rates of malnutrition, and a worsening food trade balance. And the region's agricultural performance has tapered off somewhat in the past couple years. We also note that agricultural development is uneven across the continent. Countries that have put the right mix of agricultural investments in place have reached or come much closer to reaching key development milestones. They have also enjoyed the benefits of rapidly rising private investment in African agriculture. But where farming has been neglected, it has failed to generate sustainable and equitable economic growth.

Other trends, while not all rosy, point to opportunities for progress. They include:

Public investment in agriculture: Investment has risen appreciably across Africa, from an average per country of $186.4 million in 1995-2003 to $219.6 million in 2008-2014. But only 13 African countries have met their pledge to invest at least 10% of public funds in agriculture. If all were to do so, public funding for agriculture across Africa would be $40 billion instead of the $12 billion that it is currently.

Also, the composition of public investment in agriculture matters greatly. The evidence shows that investments in roads, rails and ports; agricultural research and development, and effective extension systems powers agricultural growth and poverty reduction much more effectively than investments that crowd out the private sector like input subsidy programs.

Agricultural growth for broad-based benefits: Farming will be a major source of employment in Africa for another decade or more. But to provide a long-term economic lift, agricultural growth must be broadly based so that it promotes spending by millions of farmers and so spurs the demand for jobs in the broader economy. This is not achieved by mega-farms. Transformation is most rapidly achieved if policy actions can promote inclusive forms of agricultural growth.

Bridging yield gaps: On some 65% of Africa's arable land, farmers lack the necessary inputs and ability to restore and maintain soil fertility. As a result, those growing improved varieties of maize and other crops see only a 28% bump in yields, on average, while farmers in Asia gain an 88% increase. Clearly, a major challenge is to make fertilisers, improved seeds and improved soil management practices more readily available, especially to smallholders.

*Town and country: * Urban consumers are driving a lucrative market for food products that could be worth $1 trillion by 2030. This would generate significant income and employment for African farmers and food companies. Currently, however, this demand is met through a hefty serving of food imports.

Investing in African smallholders will not only help feed the region. It will create jobs for the rapidly rising youth labour force both in agriculture and the broader economy.

*Tight money: * Only about 10% of rural households in Africa are linked to any formal financial institution such as a bank. This situation is poised to change because of innovations such as farm loan programmes that share risk among many participants, new approaches to microfinance, and mobile banking services.

*Unleashing the power of youth: * Africa's youthful workforce could open up a wide range of economic opportunities with the right mix of policy and public investments. Conversely, if governments do not pursue policies that make agriculture attractive to youth, the result will be widespread youth unemployment and disillusionment. Government policies and public

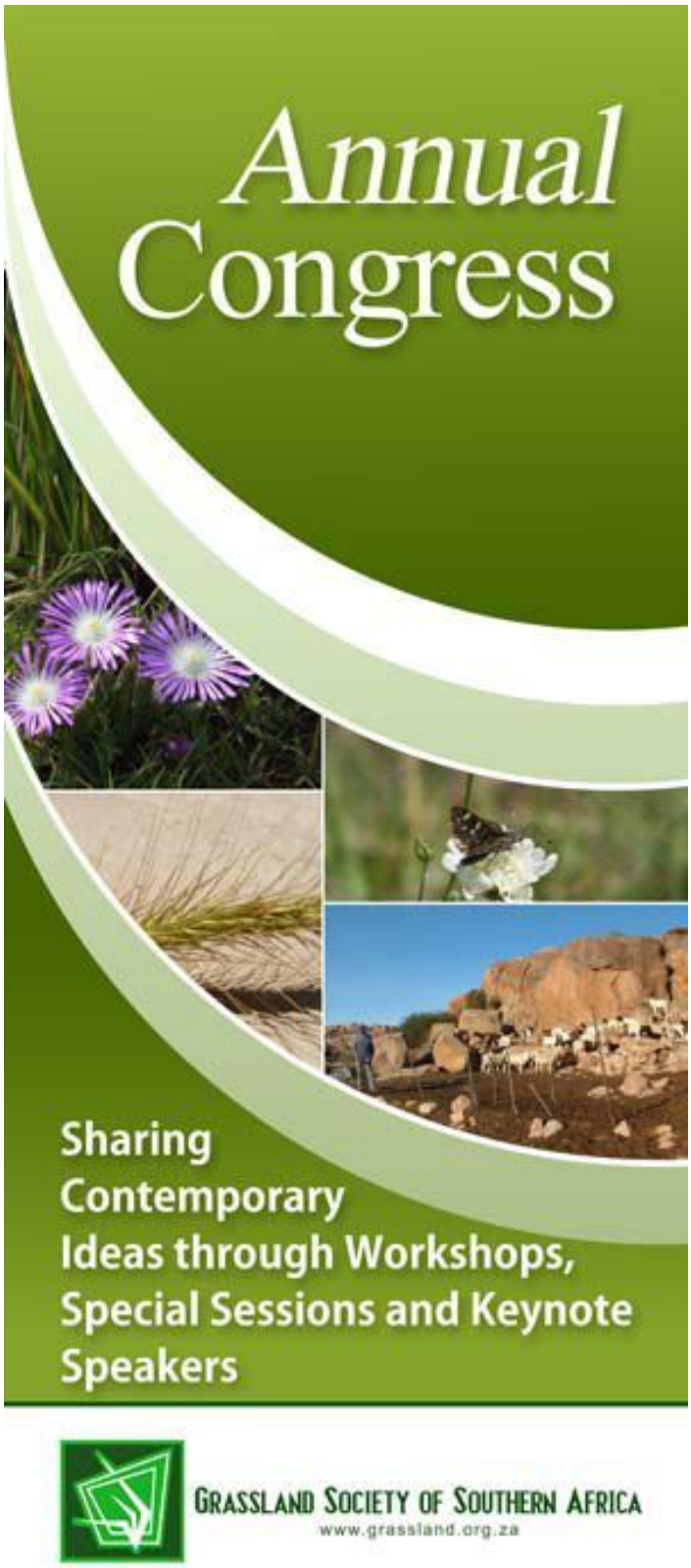
and public investment can make agriculture much more attractive to young people.

What can be achieved in the next two years

In 2016, Africa can look back on a decade of notable progress toward realising its agricultural potential. But it has a long way to go before farming and the wider economy become healthy and robust.

Much depends on strong political leadership, backed by solid commitments from donor countries. Governments often exhort the private sector to invest more in African agriculture, but it is government actions in the first place that influence the scope for private investment. In these ways, governments hold the key to determining whether the region's economic transformation will be a relatively smooth, robust and peaceful process or a painful and protracted one.

This article is based on the Africa Agriculture Status Report 2016 (http://agrinatura- eu. eu/2016/09/2016-african- agriculture-status-report-aasr/): Progress towards Agricultural Transformation in Africa, published by the Alliance for a Green Revolution in Agriculture http://agrinatura-eu.eu/2016/09/2016- african-agriculture- status-report- aasr/).



HOW THE FUNDING OF SCIENCE RESEARCH IN SOUTH AFRICA CAN BE OVERHAULED

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THE CONVERSATION, HTTPS://THECONVERSATION.COM/HOW-THE-FUNDING-OF-SCIENCE-RESEARCH-IN-SOUTH-AFRICA-CAN-BE-OVERHAULED-65272

South Africa's universities are bracing themselves for a tough 2017. The country's National Treasury has warned that there's simply not enough money to make up the shortfall created by a freeze on fees during 2016.

At the same time, the country's universities are slipping down global ranking tables. Their wor sening performance suggests less investment in research and postg raduate output, factors which heavily influence how rankings are calculated.

And yet research, development, science and technology are all recognised as crucial growth factors - both for the country's economy and for individual universities. The National Development Plan, considered a blueprint for the country's growth until 2030, states:

Science and technology continue to revolutionise the way goods and services are produced and traded. South Africa needs to sharpen its innovative edge and continue contributing to global scientific and technological advancement. This requires greater investment in research and development, better use of existing resources ...

That "greater investment" hasn't materialised yet. South Africa, with a population of 52 million, spends 0.73% of its Gross Domestic Product on research and development. Australia, home to 24 million people, spends 2.1%. South Korea, home to 50 million people, spends 4.3%. These two nations' investments have paid dividends: they are considered world leaders in the fields of science, technology, engineering and maths.

It's time for South Africa to put its money where its mouth is. I propose a total overhaul of how science funding is allocated. This should be done on the premise that not all universities should be focusing on research and development. Some should be funded only as teaching institutions; others with proven track records should concentrate on research and scientific output. This will save billions that can be redirected to improve the quality of science teaching and the country's research output more broadly.

A new structure is needed

There are 26 universities in South Africa. All of these teach the "hard sciences" – such as chemistry, physics and mathematics – up to the 4th year Honours degree. They receive funds towards this work from the Department of Higher Education and Training.

Beyond Honours, at the levels of Masters and Doctoral studies, the focus switches sharply to research. Research enterprises in the sciences are far more expensive to run than teaching programmes. For research you need laboratories, instruments, increased access to expensive online journals and more.

But more than half of the country's 26 universities are simply not producing enough good quality research. The QS World rankings for 2016/17 feature only nine South Africa universities. These tend to be institutions that were well resourced during the apartheid era. Their previously disadvantaged counterparts – which largely catered for black students – have less research infrastructure and so struggle more to attract top researchers. This affects their performance when it comes to output.

Perhaps it is time to rethink how academic research is structured in the costly sciences. Masters and Doctoral research students are serious about their work. They want to publish in top journals. They want to perform research at well-equipped laboratories. They want to work with the best professors in the field, at universities with a solid research reputation.

Research students know it is the combined quality of these factors that determines the next step in their careers. I'd argue that it's necessary to focus and consolidate science research endeavours across the country at institutions with a proven track record of research output. And its time to stop giving research-linked funding to institutions that don't perform.

Savings put to good use

Given South Africa's history, this suggestion might seem controversial. It implies that formerly black and disadvantaged universities won't ever be able to become proper research institutions and ought to be used solely for teaching. Some would argue that this perpetuates the inequalities left by apartheid. I can accept this. But the reality is that South Africa cannot become a world leader in the sciences using the current system.

And the money that is saved by not unnecessarily funding research at some institutions can be ploughed back into the country more broadly. There are three areas where these savings could be used:

1. Funding worthy students from all socio-economic backgrounds to attend top research institutions;

2. Bolstering the activities that are already underway at research-active universities. South Africa has a proud history of scientific discovery and innovation. In recent times, paleontologists have discovered a new human-like species; the country will soon host the largest radio telescope in the world, the Square Kilometre Array (SKA). There's also great work being done towards vaccines and disease cures.

3. Launching more desperately needed science, technology, engineering and maths teacher training colleges. South Africa simply doesn't have enough science and maths teachers in its schools at the moment. These colleges could be based at teaching universities that have basic infrastructure.

This approach is not without precedent.

International examples

Consider Australia's Group of Eight (or Go8) university model. Australia has 43 universities and, until 1999, the government funded all these institutions' research more or less equally. Then the formula was changed and the Go8 was born.

This is a coalition of eight research-intensive universities, all of which are consistently ranked in the world's top 200 institutions. The Go8 receive about 75% of Australian competitive grant funding. They spend some $AU 6 billion (about R64.2 billion) on research annually and award 53% of all doctorates in the country.

In the US, research universities have emerged in the years after World War II as a global role model. Having studied there, I know that almost all these institutions' students earn their undergraduate degrees elsewhere, then relocate to research-intensive spaces for their postgraduate work. It is also well established that those looking for academic careers had better earn their doctorates at top research universities.

Yet in South Africa it is quite common to get one's undergraduate and postgraduate degrees at the same institution. What is so wrong with pursuing your undergraduate degree at a university that's geared for great teaching, then relocating to a research institution for postgraduate study?

Getting serious

South Africa needs to prove that it's serious about investing in research and development to benefit all its citizens. To do so, it must consolidate and focus research quality and expenditure in the right places. It must use its limited resources as carefully as possible. This means scrapping financially draining, unproductive postgraduate degrees and research activities at many universities. This will boost the whole nation in the long term.

UNLOCKING THE MYSTERIES OF PLANT ROOT FUNCTION, FROM ALASKA TO SOUTH AFRICA

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http://news.nau.edu/unlocking-mysteries-plant-root-function-alaska-south-africa

It is easy to study what you can see. Researchers know a lot about how plants work aboveground, but what happens out of sight under the surface may control more than we once thought.

Ecoss researchers in the Plant and Ecosystem Ecology—PEER—Lab at Northern Arizona University are digging into the soils of South Africa and Alaska to shed light on a poorly understood topic: how plant roots function. A $300,000 Mellon Foundation grant funds the South Africa study, and a $1.6 million National Science Foundation grant funds the Alaska study. Their findings will help model the effects of climate change on those ecosystems.

Roots feed water and nutrients to plants. The roots of most land plants are entwined with filamentous organisms, called mycorrhizal fungi. These fungi break down complex organic matter in the soil into nutrients more easily absorbed by the plant. Researchers know more about the shape of roots than how they actually function, or how this functioning is affected by fungi.

"For the last 100 years, people have been measuring root biomass and root profiles, but very few studies look at the function of those roots in those profiles," said Michelle Mack, professor of ecosystem ecology, and director of the PEER Lab.

In South Africa, land managers want to know how climate change may affect the current spread of woodland into grassland habitats. PEER Lab researchers spent spring break in Kruger National Park studying the growth rate of trees, with an eye on the influence of grass and tree roots. Grass roots are using water from shallower layers of soil than tree roots, avoiding direct competition, yet grasses appear to inhibit tree growth more strongly than vice versa. Are the nuances of belowground competition—such as who gets first crack at surface precipitation as it filters into the soil—more important drivers of plant growth than previously thought?

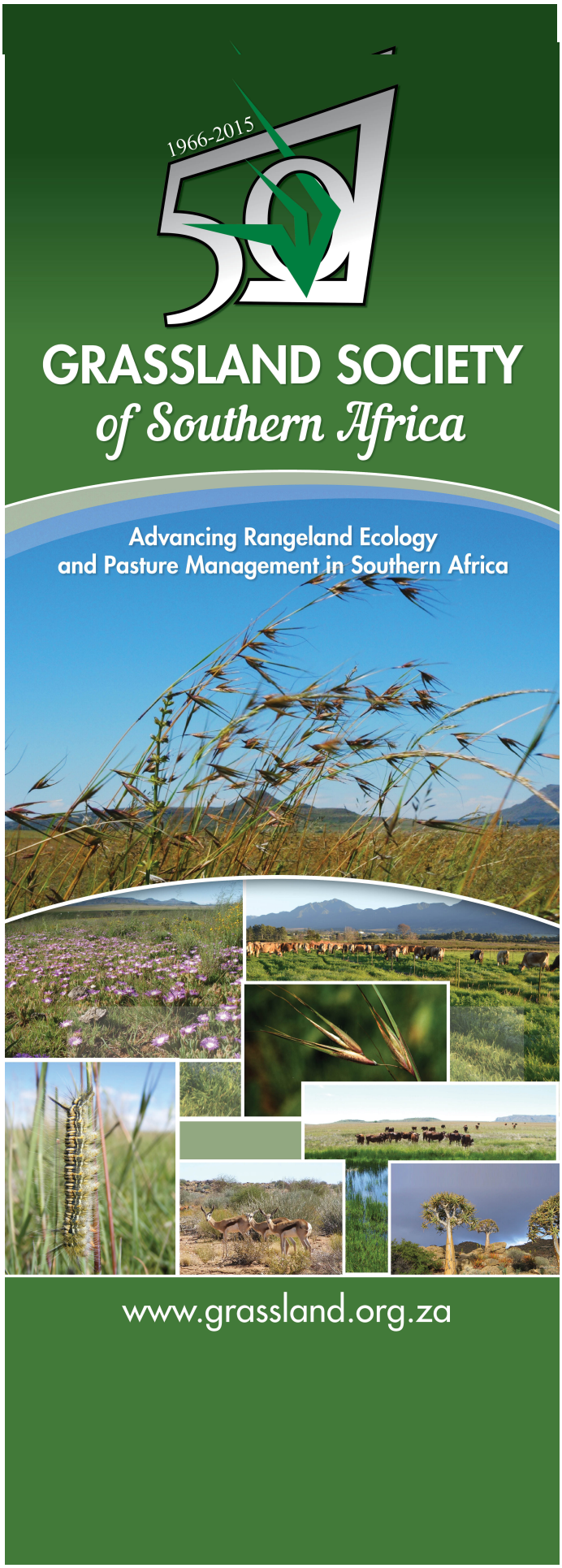
In the Alaskan Arctic, warming temperatures are thawing the layer of frozen ground known as permafrost, unlocking an essential ingredient of plant growth—nitrogen. For the same reason we buy nitrogen fertilizer for our crops, this nutrient is typically in short supply and naturally limits plant growth. PEER Lab researchers will spend the summer at their study sites in Healy, near Denali National Park, and the Toolik Field Station on the North Slope of Alaska, where they have been injecting a uniquely labelled form of nitrogen deep into the soil. Can plants access that newly available nitrogen at the deepening thaw boundary? Can mycorrhizal fungi extend the reach of shallower roots?

Answering these questions is important because both carbon dioxide, which is a greenhouse gas, and nitrogen are being released by thawing permafrost at the same time. Nitrogen fuels plant growth, meaning more photosynthesis, which pulls carbon dioxide out of the atmosphere. If plants can access that new source of nitrogen, they may partially offset the release of carbon dioxide into the atmosphere.

What both studies have in common is a focus on function over form.

"Just like rooting depth for these tundra species might not be as important as mycorrhizal depth," says Mack, "In South Africa, rooting depth might not be as important as who's in line ahead of you."

Plant growth is a key component of carbon cycling models, which have only recently begun accounting for a plant's ability to absorb nutrients. Mack's research can improve the accuracy of these models by looking under the surface for a more robust understanding of what drives plant growth.



GRASSLAND MANAGEMENT – MY EXPERIENCE

RICHARD PURCHASE
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Richard Fynn in his excellent article in "Grassroots" of March 2016 entitled "Applying key concepts" etc. states in Concept 3 that optimal cattle production is achieved by ensuring that grass height/maturity is kept at an optimum to maximize quality and intake rate. Rotational grazing violates this principle by providing long recovery periods between grazing events which allows to mature beyond the optimum stage for grazing. Although I agree with the research finding mentioned, later the conclusions are not always correct because if you have sufficient camps, a sufficiently short recovery period can be obtained and good gains can, and have been, achieved. This is my story.

After failing my engineering course in 1952, I had to come back to the farm which is in probably the sour end of the Sourveld with rainfall averaging 955mm yearly, area 2980 acres. The only improvements were a brick garage big enough for one tractor and one fence dividing the grazing in two. The arable area of about 350 acres was also divided in two. I lived in two rondavels of thatch and sods.

The wool price peaked out in 1958 and then dropped with the result that I faced the prospect of selling shoes behind a counter due to the bond interest having to be paid. The cartage costs on lime were prohibitive so crops were not an option, but there was plenty of grass.

The government was offering attractive subsidies on fencing, enabling me to make about 25 camps. A four block system was implemented with four camps in each block making 16 camps for the mature females, the remaining nine being for the eighteen month tollies and heifers. One block, quarter of the farm, was rested a full year.

Putting this into effect I was astonished to find out that the weight gains peaked out at christmas and showed zero gains right into the winter. Three grass scientists came and had a look and said this was due to the natural metabolism of the plants. I then weighed the animals to see if the weight gains were related to the period of absence (PA) and found good gains could be made right through summer – providing a PA of not more than four weeks.

A simple calculation will show the dramatic effect this has on profitability and I was able to pay off the bond on the property as well as that on my brother's farm plus making improvements, like a very effective flood irrigation system and sheds as well as buying the adjoining farm. So a quick rotation system can work. But there are certain provisos: 1) the farm must be big enough to warrant the capital outlay on fencing; 2) suitable watering points and 3) rainfall must be adequate. I feel that a proper assessment of the possibilities of the system when properly implemented has not been made.

Much is made at present about the importance of diversity in the sward. An attempt seems to be made to show that this benefits the livestock as well. I have read that a balance must be made between the flora versus profitability, BUT what about ploughed land where the biodiversity is destroyed in one bit, and THEN is not conserved by irresponsible farmers (compare this with a properly implemented quick rotation system where at least the soil is not lost).

where at least the soil is not lost).

Some remarks on implementation.

When first putting the animals out onto green grass in the spring one cannot wait until the grass is optimally grown out because, by doing so, by the time one comes to the last camp in the cycle the grass will be unpalatable and lacking nutrients with obvious results. I have not seen a similar problem mentioned in the literature.

The way I ran it, virtually all the difficulties, except for the necessity for PA and PS (period of stay) records fell away. I did not check the grass at all, except for interest's sake, because what can you do about the situation – what can you alter? Your records will tell you when to shift a camp or two, maybe three, due to the lengthening period of absence.

I did not calculate the carrying capacity because the number of camps to be skipped out of rotation soon tells you if you are trying to carry to many animals. Those camps to be skipped can be rotated yearly in turn, used as drought insurance, and to increase the vigour of the grass generally.

The stage at which to move the stock to the next camp was never decided by myself. The PS at the first cycle was as little as three days, maybe two. As soon as the herdsman saw the animals were no longer getting their bellies full and were feeling the need to move, the gate was opened even though the grass was not even grazed short. The word short can be subject to interpretation. It is very difficult to judge this stage. See Mentis' remarks in Grassroots Vol .14, No 3 of August 2014 – "Grass cover ..... is notoriously difficult to measure".

I ran only cattle having replaced the sheep and was able run the mature cows in one herd due to the use of artificial insemination.

A veld assessment is available on request.

What puzzles me is if you do not employ a quick rotation system then what do you do? In any other system the increaser grasses get left while the decreaser grasses get re-grazed, at least while the season advances.

I have been looking at systems recommended in the past by the Department of Agriculture, but fail to see how a system having as many as eight camps, as listed, can work well because this would result in a PA of only 26.2 days. Other systems – how? I found that after a PA of one month the weight gains would drop, apparently due to poor palatability and nutritive value. This period was increased to 37 days in mid- summer with the addition of 2 oz. (50 g) per animal per day of urea to the benefit of both animals and grass and probably also the general vigour of the sward.

In chapter three of Venter Drewes system it is stated "the major shortcoming of most management systems are that the PS is too long and the PA is too short" and "In this system both these principles and the PA in particular are manipulated according to the growth patterns which may vary through the season with fluctuations in temperature and moisture". Added to this one has to attend to the vigour of decreaser grass species and "utilization of homogenous areas" and "growth of patterns and needing". As I see it you only have two options, either introducing or removing animals from any particular camp/s. How can you move more animals around without upsetting things further? Having removed them where do you put them? Sell them when others are in the same predicament?

A lot more can be said about implementation such as that than the various problems don't arise and ways in which management becomes a pleasure instead of a drag. Weighing with reference to PA seems never to have been done. On enquiries, researchers seem to give evasive answers.

I have sympathy for the idea that some parts of the Sourveld should simply be kept for wildlife.

Richard Fynn's plan of resting half of the farm seems good and can simply be plugged into the above procedure.

How to do it:

The area to be used is divided into two blocks and both are divided into camps. One block is rested

rested the whole growing season while the other

the whole growing season while the other is simply grazed in rotation.

Practical details:

One cannot wait until the camps are "ready" for introduction, as described by the old Department of Agriculture because by doing so the camps are at the end of the cycle, particularly the end of the second cycle, will be far too harsh and lacking nutrients. I cannot remember a rule of thumb for the time for introduction but it must be early and therefore detrimental to those camps at the beginning. This has an advantage, though, in that the increaser grasses, even *Eragrostis plana*, are at first taken readily.

As the season progresses and the days warm up the PS (period of stay) and the PA (period of absence) lengthens until some camps are taken out of the system. Your record will soon show when. These camps can later be used in the autumn.

Size of camps:

Extrapolating from the Department of Agriculture recommendations, a 33-day cycle with a 12 camp system will provide a 30.25 day PA and a 2.75 day PS, so 12 camps are indicated.

Requirements:

- Sufficient rain
- Adequate watering points
- Fencing
- PA and PS recording
- Herdsman constantly in touch with animals

Advantages:

- No problems of seeding, growth patterns, fluctuations in temperature/moisture etc.
- Fauna and flora nicely catered for
- Probably maximum weight gains per ha achievable
- Except for tapeworm, no internal parasite control needed due to break in breeding cycle as was established by veterinarians
- Can be implemented on relatively small farms if spare capital is available
- No juggling of groups of camps according to some predetermined plan
- Necessity to assess carrying capacity eliminated (start off conservatively)
- Constant checking of veld eliminated but herdsman must constantly watch animals as described earlier

More can be said about practical details. Some will say it is too good to be true only this time it is true. A small farmer with some grass and capital is already interested. A farm can initially be run as a two camp system and later subdivided.

A simple two camp system is no doubt best under drier conditions. The big mistake is to try to carry too many animals. One needs not to elaborate.

THE BATTLE FOR OUR GRASSLANDS AND LIVESTOCK

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Dr Albrecht Glatzle (Agronomist and grazier, Paraguay)

Summary

Grasslands, arable lands and the oceans provide all mankind with food and fibre. But the productivity and health of our farms and livestock are under threat from global warming alarmists and green preservationists. It is poor public policy that condones restrictions on grazing operations, or taxes on grazing animals, based on disputed theories that claim that bodily emissions from farm animals will cause dangerous global warming. Ruminants such as sheep, cattle and goats cannot make long-term additions to the gases in the atmosphere - they just recycle atmospheric carbon and nitrogen nutrients in a cycle-of-life that has operated for millennia. Grazing ruminants with their emission products have always been part of healthy grasslands. Only when large numbers of animals are confined on the one patch of land do pollution problems appear.

Many otherwise genuine environmentalists are assisting the destruction of grasslands with their native pastures and endangered grass birds. Blinded by their love for the trees, they neglect the grasses, legumes, herbs and livestock that provide their food. In Australia they pass laws to protect weedy eucalypts invading the grasslands but ignore the valuable and declining Mitchell grass that once dominated Australia's treeless plains. Grasslands are also under threat from cultivation for biofuel crops, from subsidised carbon credit forests and from the remorseless encroachment of fire-prone government reserves and pest havens. Trying to control atmospheric gases with taxes is futile and anti-life. Even if carbon dioxide (CO2) levels in the atmosphere doubled, or more, the climate effect if any, is probably beneficial (warmer at night and near the poles and with more moisture in the atmosphere). More importantly, all life on Earth already benefits from the additional CO2 plant nutrient in the atmosphere, and would benefit even more were CO2 to double.

Nitrogen is the most abundant natural gas in the atmosphere, inhaled in every breath and an essential component of all protein. Grazing livestock merely recycle a few compounds of nitrogen, all of which either return to the atmosphere or provide valuable nitrogen fertilisers for the plants they graze on.

It is a foolish and costly fantasy to believe that Earth's climate can be controlled by passing laws, imposing taxes, attempting to manipulate the bodily emissions of farm animals or trying to prevent farmers from clearing woody weeds invading their pastures.

Keywords: Trees, grass, grazing, ruminants, methane, nitrogen, emissions, wetlands, weeds, cattle, sheep, feedlot, pollution, biofuels, ethanol, carbon credits, forestry, fire, sequestration, food, fart tax, Mitchell grass.

Our farms and grasslands are precious

Seventy percent of our blue planet is covered by oceans. Grasslands and arable land cover just 10% of Earth's surface but produce most of our food and fibre. The remaining 20% is land covered by desert, ice, mountains, forests, cities, roads, quarries, swimming pools and mines which

roads, quarries, swimming pools and mines which together produce almost no food for humans.

"I saw very few tree species, but every place was covered with vast quantities of grass."

Sir Joseph Banks, 1770 (The first great English botanist to visit Australia)

Plains, prairies, veld and savannas with good soil and rainfall tend to be cultivated for domesticated grasses and legumes such as wheat, corn, rice, barley, oats, rye, lucerne and soy beans plus the giant grasses like sugar cane and the fibre crop, cotton. Grasses and legumes, not trees, are the key food resources for the world. (Even the lovable pandas rely on another giant grass, bamboo.)

"Farmers and pastoralists have delivered incredible animal efficiency gain. That is, producing more with less inputs. This achievement should be applauded, but is at risk because of misguided green policies, and that's a travesty."

Don Nicolson (Former President Federated Farmers of New Zealand)

However, the poorer grasslands are best utilised by grazing animals - cattle, sheep, goats, deer and llamas. No other method can economically harvest sparse grassland vegetation and convert it on site (using green energy) into edible protein and fats, with by-products of wool, leather and fertiliser.

Mankind relies far more on native and cultivated grasslands and grazing ruminants than on the trees, forests, wetlands and bio-fuel crops worshipped by green urbanites.

The destructive war on carbon dioxide

Farm animals are blamed for causing an increase in CO2 levels in the atmosphere. If CO2 levels in the atmosphere were to double (as has happened in the past) two things are certain:

"The whole purpose of farming is to convert carbon dioxide from the atmosphere into useful products."

Vincent Gray (New Zealand Scientist and IPCC Reviewer)

First, there would still be argument as to whether the increased CO2 had caused any harmful effect on climate. If there was any detectable increase in average world temperature, it would be experienced as benign changes such as warmer nights and more temperate climate near the poles – both probably beneficial.

And second, there would be obvious other benefits for all life on Earth – more growth of all plants and more food for all animals.

Already we can see that higher levels of CO2 in the atmosphere are encouraging plant growth and vegetation cover, making our grasses, pastures and orchards more drought-tolerant, producing more food per unit of land and allowing plants to gradually recolonise the deserts. Both CSIRO (Australia) and NASA (USA) have testified to this greening and the production of wheat, corn and soybeans are at near record levels[1].

The war on livestock

A report in "The World Watch Institute" (WWI) claims that livestock account for "at least 51%" of annual worldwide "greenhouse gas" emissions. The authors conclude that replacing livestock products with soy and other products would be the best strategy for reversing climate change.

They claim that this approach would even be better than trying to replace carbon energy with "renewable energy"[2].

There are big problems with these assumptions[3].

"The notion that half of our emissions come from livestock occurs only by using accounting methods that would see the directors in jail if these methods were employed in a capital-raising prospectus."

Neil Henderson (Sheep and Cattle Breeder, New Zealand)

more far-out – he thinks Aussies should graze kangaroos, not cattle and sheep4. (He has not heard that kangaroos, like cattle and sheep, use bacteria to digest fibrous plant material by fermentation, chew their cud, and probably create similar gaseous emissions.).

Moreover, the WWI figures are wrong and ignore ecosystem functions and nutrient cycling. And even the more moderate Food and Agriculture Organization (FAO) and the Intergovernmental Panel on Climate Change (IPCC) systematically overstate the man-made part of the emissions because they omit to subtract the sometimes considerable baseline emissions from the pre-agricultural native ecosystems.

If Green Politicians had their way, sheep, cattle and introduced grasses would be removed from the grasslands and replaced by kangaroos and dingos, bison and wolves, wildebeests and lions, scrubby forest and feral animals. They would lock up grazing lands, ban the occasional fires that cleanse weeds and rejuvenate grass, and outlaw attempts to control invasive woody weeds. This would have two effects: first, to slash food production and depopulate rural areas; second, to increase wildfire risk and encourage the spread of feral animals and weeds.

Livestock and methane

Methane (CH_4) is a natural gas produced by many life forms and it also seeps naturally from marshes, oceans, tundras, oil seeps and coal seams. None of these natural sources can be measured, but livestock are wrongfully singled out as the main offenders. Unmeasured CH 4 also seeps out of the growing city landfills and from leaky natural gas pipelines.

"High CH_4 content in the atmosphere does not correlate with high livestock concentrations. Strong emitters seem to be wetlands in Siberia, humid tropical forests and rice paddy fields in China. Livestock emissions are totally dwarfed by CH_4 leaching from the massive clathrate deposits below the permafrost in Siberia, on continental shelves and in the deep ocean. Earthquakes and submarine volcanism can disturb and suddenly release CH_4, from clathrates."
Dr Albrecht Glatzle (Agronomist and Cattle Rancher, Paraguay)

Paradoxically, Greens also want to protect, enhance and enlarge wetlands that generate copious quantities of marsh gas, otherwise known as CH_4 - that dreaded gas that attracts condemnation when emitted by ruminants.

Methane is supposedly far more effective than CO_2 as a "greenhouse gas" (between 20 and 100 times, depending what you read). But CH_4 can absorb incoming solar radiation as well as outgoing IR from Earth, thus reducing its claimed warming effect by day. Moreover, the radiative

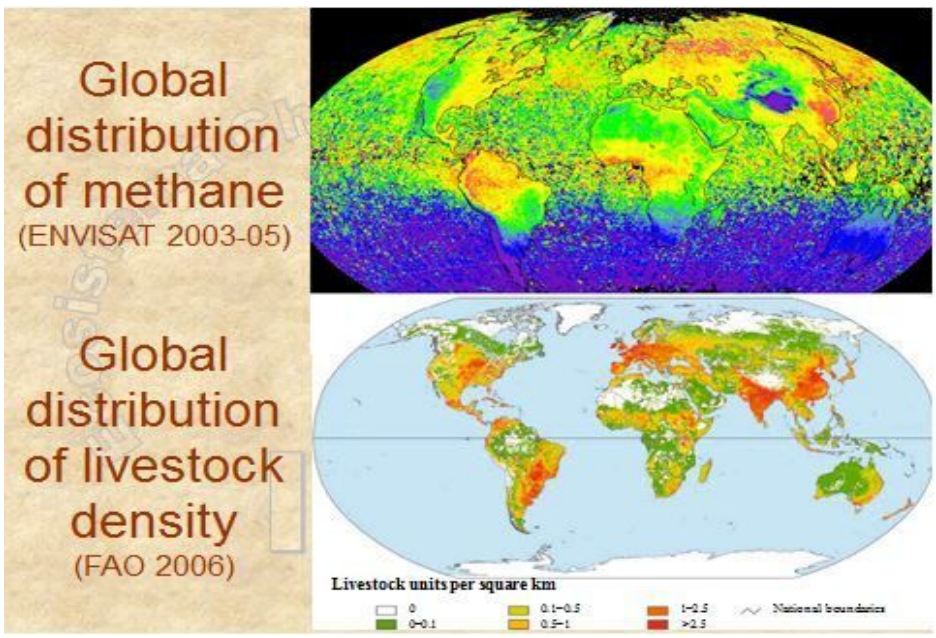


Figure 1: Top – Global atmospheric CH4 distribution as measured by the ENVISAT satellite over three complete years, 2003-2005; Bottom – Global total livestock distribution of both ruminants and monogastrics.

warming potential of CH_4 is largely masked by water vapour. Also, CH_4 is lighter than air and it rises quickly, thus transporting and radiating much of its heat to space. It soon oxidises harmlessly in the upper atmosphere where each molecule of CH_4 produces JUST ONE molecule of CO_2 (not 20-100), and two molecules of that other dreadful "greenhouse gas", water vapour. Volcanic eruptions can have a large effect on CH_4 in the atmosphere. There were four large eruptions in the 20th century. "Analysis shows that Mt Pinatubo created a pulse of some 26Mt of CH_4 in 1991" (Tom Quirk, 2010).

Livestock, nitrogen and pollution

As Green activists lose the livestock battles on CO_2 and CH_4, a new livestock "problem" arrives - "nitrogen".

Nitrogen is the most abundant atmospheric gas, making up 78% of the atmosphere. It is true that ruminant (and human) urine and faeces contain compounds of nitrogen, and in another bit of nature's serendipity, most soils contain less nitrogen than plants would like, so the foraging ruminants fertilise the pasture as they pass. Any nitrous oxide gas that directly enters the atmosphere gets oxidised by ozone to form water-soluble nitrogen dioxide which is washed out by rain to spread valuable fertiliser over large areas of land.

All livestock "waste" is plant food. However, there can always be too much of a good thing. If animals (or humans) are confined in feedlots producing large amounts of waste on a small area of land there will be pollution unless these "wastes" are treated to produce valuable fertiliser and applied lightly and sensibly to the land. City pollution has certainly killed people, but no one has been killed by emissions from freely grazing ruminants.

Natural grasslands and well-run grass farms try to mimic the operations of the massive herds of wild ruminants. The concentrated herds are used in rotation to prune the grass, spread fertiliser and seeds, break any hard soil crusts with animal impact, and then move on, allowing the grass to recover.

Trees are invading our grasslands

Most natural grasslands were treeless or nearly so. However, some landowners have been bribed to encumber their land with a growing green liability – the carbon credit forests. They have signed contracts with carbon farming entrepreneurs to plant and maintain forests of trees on the promise of generous "carbon credit" payments for the carbon being stored in the trees as they grow. But they can never clear these trees without triggering a liability.

All such schemes, being supported only by the promises of politicians, are doomed to failure. Some have already collapsed, leaving the gullible landowners with another liability – a thicket of woody weeds filled with wild dogs, wild pigs and feral cattle too smart to be mustered out of the thickening scrub. Farmers who choose to integrate a forestry enterprise with their grazing activities (without subsidies or mandates), should be free to do so – such activities can profitably benefit the health of the trees, grasses and animals. But the pointless and costly mandating or subsidising of carbon forests must stop.

Greens have also ensured that the ever-expanding national parks and reserves have become a danger and liability to their grazing neighbours. The lock-out of grazing animals, the slaughter of wild brumbies, buffalo and camels, the fire restrictions, and the banning of sporting shooters have filled many national parks with feral pests and a tinder-box of weedy rubbish just waiting for a lightning strike, a bonfire or an arsonist to start an un-controllable wild-fire.

Should carbon dioxide be buried?

Livestock capture carbon

There are some extremists with such a morbid fear of CO_2 in the atmosphere that they want to extract it and bury it deep in the Earth, as if it were radioactive waste. For example: "Carbon dioxide capture and storage (CCS) is considered a crucial strategy for meeting CO_2 emission reduction targets"[7].

Most of the grass in grasslands is either eaten by grazing animals or removed by fire - some decays and becomes humus. Fire immediately pours the CO_2 from burning plants (plus smoke, ash, soot and charcoal) back to the atmosphere and soil whereas cattle and sheep capture and store much of it.

"Cows are nature's carbon capture technology as well as a cheap source of protein for the world."
See: https://youtu.be/q_BD5FApHKc - (NB Watch this short clip)
Geoff Maynard (Australian cattleman & Director of MLA (Meat and Livestock Australia))

Greens promote trees over grasslands and grazing animals as a method of "sequestering carbon". However, unless mature trees are continually logged and turned into long-life timber or furniture, they eventually die, decay or are burnt, thus returning their carbon to the atmosphere. The forest inevitably reaches a state where there is zero net capture and storage of carbon from the atmosphere.

In grassland grazing, mature grazing animals are methodically mustered and removed from the land, to be turned into food supplies for expanding populations. Much of this carbon in cattle and sheep ends up in long-life repositories like leather, bones, humus or in the bodies of humans who eat the meat and then, in the long run, are sealed in coffins and buried.

The great Australian bush singer, Tex Morton, says it all: "Wrap me up with my stockwhip and blanket. And bury me deep down below. Where the dingos and crows can't molest me. In the shade where the coolibahs grow" Once again greens have got it "Bass Ackwards" (to steal a phrase from the great Dr Howard Hayden) – grazed grasslands are more sustainable than unlogged forests if you want to sequester carbon.

The carbon cycle of life

Carbon dioxide in the atmosphere is the ultimate source for the carbon in all plants and animals. Every blade of native pasture and every ear of cultivated corn are composed of various compounds of carbon, hydrogen, oxygen, nitrogen and minerals, all extracted from air, soil and water. In the long run, every atom of carbon in these plants originates from CO_2 in the atmosphere. Because it is only present in trace quantities, CO_2 is often the limiting plant growth factor (at mid-day over a field of growing corn, CO_2 is so reduced in the air above the crop that plant life starts starving)[8].

Every landscape, natural or managed, is subject to digestion and decomposition processes which result in returning carbon (usually CO_2 with some CH_4) and nitrogen to the atmosphere. Grazing livestock have always been part of this natural cycle.

"Cows and caribou, sheep and springboks are not alchemists – they cannot create carbon or nitrogen out of nothing. Every atom of these elements in livestock emissions can only have come from the grass they eat or the air they breathe. This natural cycle of life is a zero sum game."
Viv Forbes (Earth Scientist, Grass Farmer, Sheep and Cattle Breeder, Australia)

When native grasses, legumes, herbs and their seeds are eaten by grazing ruminants every atom of carbon and nitrogen they absorb from the fodder goes to build meat, milk, fat, hair, wool, leather, horns and bone, or it is returned to the biosphere via emissions such as respiration, and digestive functions that produce burps, farts, urine or manure.

This carbon/nitrogen extraction process starts the day the animal is conceived and ceases on the day it dies. It is the cycle of life.

Ethanol roulette – food or fuel?

When a cultivated grass like corn is harvested and fermented to create ethyl alcohol, this is either consumed as an alcoholic drink or burnt as motor fuel. Eventually every atom of carbon is returned to the atmosphere in emission products via the production and consumption of the alcohol, or via the burning or natural decomposition of waste products.

In both cases the agricultural part of the carbon cycle is a zero sum game. Plants grow by harvesting carbon, nitrogen, moisture and minerals using solar energy. Seeds and plants are then consumed by animals, humans or motor vehicles, and sooner or later, the carbon returns to the atmosphere via emissions. If cattle and sheep are to be taxed, so should motor vehicles running on ethanol.

The laughable livestock fart tax

New Zealand was the first country to propose a "livestock fart tax". Kiwi farmers organised a petition of objectors which attracted 64 000 signatures. Four hundred farmers then drove 20 tractors to the Parliament in Wellington waving placards and banners saying "STOP THE FART TAX". The proposal was laughed out of Parliament[9].

Grassland grazing operations using stockmen, drovers and dogs for mustering and moving animals produce a ZERO net increase in CO2 in the atmosphere. In fact all farm animals merit a carbon credit, because they provide medium to long-term sequestration of part of the carbon extracted from the air in bones, meat, milk, wool, leather and humus.

Naturally, where quad bikes, utilities, helicopters, road trains and diesel-driven water pumps have replaced horses and wind mills, the mustering, transport and processing needed to put grassland meat onto the plates of city consumers use hydrocarbon fuels. But the grazing animals still use grass power.

Source: www.clexit.net.

Changing landscapes

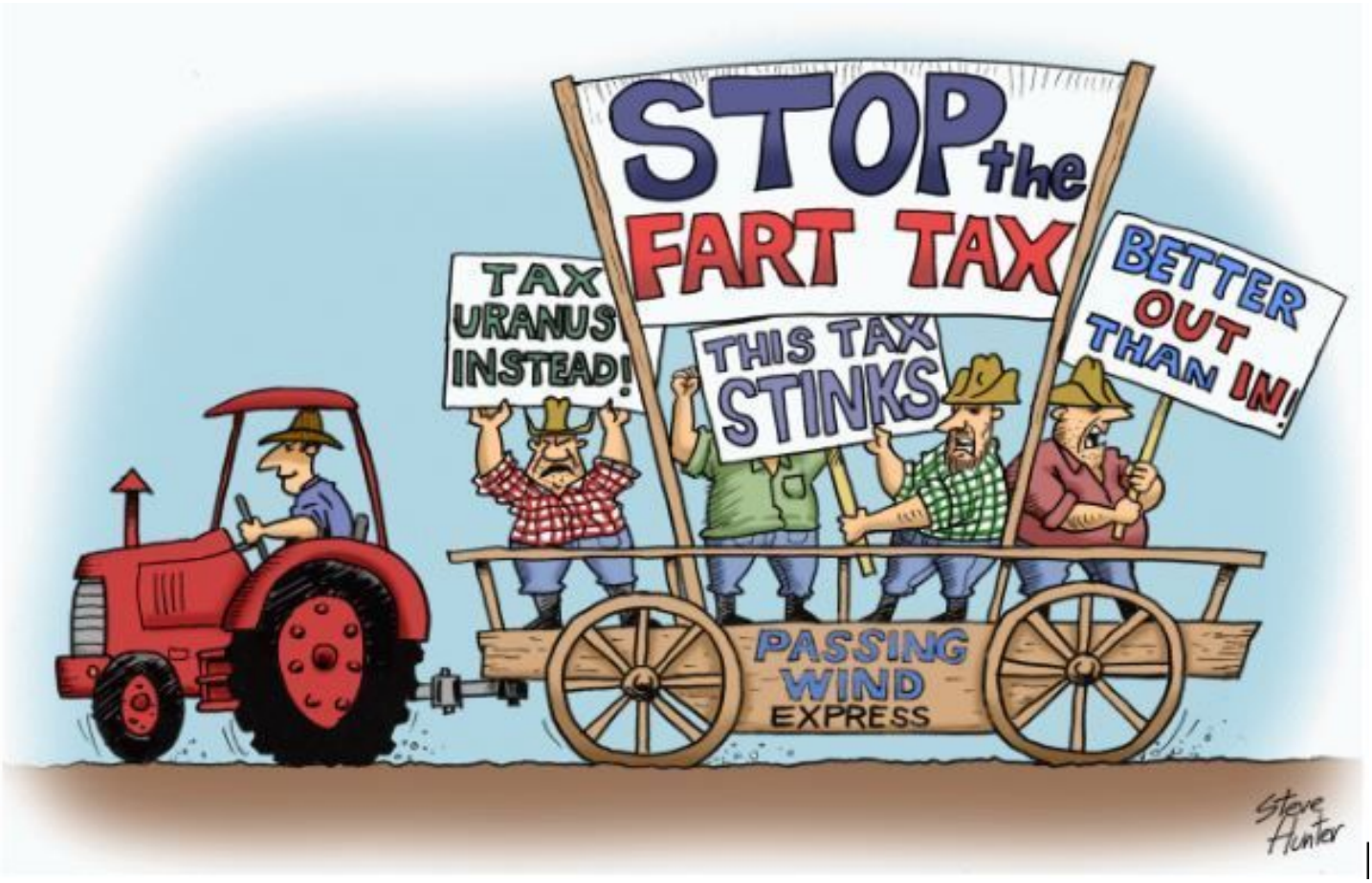
The type and quantity of vegetation covering any area of land depends on the geology, topography, climate, soil, fire regime and grazing pressure. Plains and gentle hills, in climates with a pronounced wet and dry season, and subject to nomadic grazing and periodic patchwork fires produced the grasslands. But nature never stands still. A change in any of these factors will cause the vegetation to change.

Pioneer graziers recognised these factors, and their fire and grazing management reflected them.

The unnatural suppression of periodic fires and the exclusion of grazing animals will destroy the grasslands while encouraging woodlands, scrub and weeds, which can then only be controlled by dozers and blade ploughs or herbicides[10]. Of course, poor grazing managers who overstock their land, have insufficient water points, poorly designed fences, clear steep slopes, burn off too often and do not spell their pastures will cause land degradation and erosion.

But to crucify grazing animals on the spurious grounds that their bodily emissions will cause dangerous global warming is ludicrous[11].

It is amazing that most organisations supposedly representing farmers and graziers cannot



acknowledge the beneficial effect of grazing livestock on the biosphere.

"Twenty years ago I opposed the idea that a levy on livestock emissions may help the climate. I also opposed the preservation of useless native vegetation at the expense of grazing cattle and sheep. Unfortunately, this long battle continues."
Howard Crozier (OAM, Australia. Retired from: CSIRO Admin, Farmer, Local Government & Executive Councillor NSW Farmers Association)

All attempts to tax and penalise domestic ruminants for their natural emissions must be exposed as fraud and opposed, especially when emissions from forests, termites, wetlands, wild ruminant herds and mega-cities are persistently disregarded.

"Man-made global warming resulting in climate change is the hoax to end all hoaxes."
Jim Lents (Stud Hereford Breeder, Oklahoma, USA)

Time to protect the grasslands

Grasslands have been a natural feature of every continent (except Antarctica) for thousands of years, existing in harmony with grazing ruminants (often in massive herds), predators, indigenous hunters and the periodic bushfires.
Now we have Green armies "protecting" trees and forests, pandas and polar bears, wolves and dingoes, but who is looking after the native grasses and legumes of the grasslands, the Prairies, the Pampas and the Veld? And who is conserving the valuable genes of ancient breeds of cattle, sheep, goats, pigs, poultry, wild horses and camels?

Note: Petra Scholtz, from South Africa, who signed this report, is an active member of WRSA (Wildlife Ranching SA) and breeds and conserves exotic wildlife including sable and roan antelope and white rhinos. He also promotes Damara sheep (one of the oldest sheep breeds in existence); the chief author of this report, Viv Forbes of Australia, with his wife Judy, manage Australia's oldest Damara stud on natural pastures; and Jim Lents, along with his late father Joe from Oklahoma USA, have for the past 73 years conserved and perpetuated the pure genetics of British Hereford cattle which were imported to USA via Canada in 1876 and 1877, and from Britain in 1880, 1881 and 1882.

The Grassy Plains of Queensland, Australia, in the 1860's

Richard Daintree was a, scientist, explorer, pastoralist, miner and historian. He spent much time in the years 1860 – 1876 exploring, photographing and promoting Queensland. A large collection of Daintree's photographs is held in the Queensland Museum, and some were published by the Queensland Museum in 1977 in "Queensland in the 1860's – the Photography of Richard Daintree", by Ian G Sanker.

Here is a picture taken by Daintree, in the Richmond area - not a tree to be seen. Daintree wrote about the vast soil-covered plains: "The resulting physical aspect is that of vast plains which form the principal feature of Queensland scenery west of the main dividing range". He described them as first class pastoral country totalling about one third of the area of Queensland.

"Having destroyed much of the coastal forests and scrubs, coastal dwellers are now destroying the open forests and grasslands by locking up the land or preventing any form of regrowth control."

But grasslands are now threatened by government bans on clearing woody weeds, by the cultivation of grasslands for biofuel mono-culture and by the remorseless encroachment of government reserves and pest havens[12].

The Clexit (Climate Exit) Coalition has formed a "Grasslands Protection Group" to contest the baseless attacks by UN-supported climate alarmists, livestock critics and tree worshippers on grazing ruminants and the grasslands that support them. Clexit recognises that this war on livestock and farming is just part of the UN war on western capitalism and the green war on the human race.

We cannot rely on individual governments or politicians to fight this battle – they are so intimidated or corrupted by the giant dollar power of things like the UN's $10 billion (and

rising) Green Climate Fund. They will never bite the hand that feeds them. And the drumbeat never ceases:

"Time is running out for agriculture to contribute to meeting global climate targets."

Juergen Voegele (World Bank Director of Agriculture and Environmental Services)

The Clexit Grasslands Protection Group will work with other rational organisations to combat and oppose the destruction of our grasslands and the livelihood of the pastoralists, graziers and ranchers harvesting them.

"The optimal way to deal with potential climate change is not to strive to prevent it (a useless activity in any case) but to promote growth and prosperity so that the people will have the resources to deal with any shift".

Thomas G Moore, 1995. "Global Warming – a Boon to Humans and other animals" (Hoover Institution, Stanford University)

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INVASIVE SPECIES IMPACTS AND MANAGEMENT IN COMMUNAL RANGELANDS IN ZIMBABWE

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Abstract

Unpalatable species are on the increase in most rangelands and very little is being done currently in Zimbabwe to address that. In order to understand and appreciate the condition and status of rangelands, formal interviews, administered via questionnaires, were conducted along with a botanical survey to assess the effects of farming systems on rangelands. The results showed an increased rate of rangeland degradation and bush encroachment in communally managed rangelands. The most striking result was the increase of *Lantana camara* and *Helichrysum kraussi*i in most rangelands with sandy soils. There was severe decrease in rangeland carrying capacity with an increase in *Helichrysum kraussi*i species observed in communally managed rangelands. This implies that communally owned rangelands affects rangeland productivity compared to self-contained rangelands managed by a single individual. For farmers in communally owned rangelands more supplements are to be bought if sustainable and profitable beef farming is to be practised.

Introduction

There is a reported widespread increase in invasive plant species (Milton 2004; Davies & Johnson 2011;Macdougall et al. 2014)and other woody species in the rangelands in southern Africa(Ward 2005;Dalle et al. 2006). Very little investigations to identify invasive plants species and shrubs that are on the increase in communal rangelands of Zimbabwe have been done. However, degradation of communal rangelands has been cited as causing low animal productivity in communal beef farming(Munyati et al. 2011). The grazing areas are communally shared and used by all farmers in a community with no deliberate interventions on rangeland management. The stocking rates are not regulated in communal areas and the rangelands are grazed with no rest periods except in the dry season when grazing animals use both arable lands crop residues and grazing areas. Communal rangelands are also characterised by the absence of deliberate efforts to improve the rangeland through introduction of more productive pasture species and rotational grazing. Brooks et al. (2004) and Hiremath & Sundaram (2014) reported that there is an increase in Lantanacamara dominance in most rangelands **resulting in** high intensity veld fire

and reduced biodiversity. The perceptions of the affected farmers have not been reported and the widespread woody species have not been identified. For these reasons, the study objectives were to identify the most common invasive species and shrubs on communal rangelands of Zimbabwe and to interrogate farmers about the threat posed by such invasions and bush encroachment. The information obtained will be important in formulating the intervention and sustainable control of bush encroachment and invasive plants.

Results and discussion

Notable changes observed by respondents were on vegetation cover, dwindling of grazing area, soil erosion, water shortage and smaller sized animals (Figure 1). All these changes could be a result of over exploitation of resources with no adequate time for vegetation to recover leading to an increase in the rate of soil erosion and siltation and subsequent drying up of water sources.

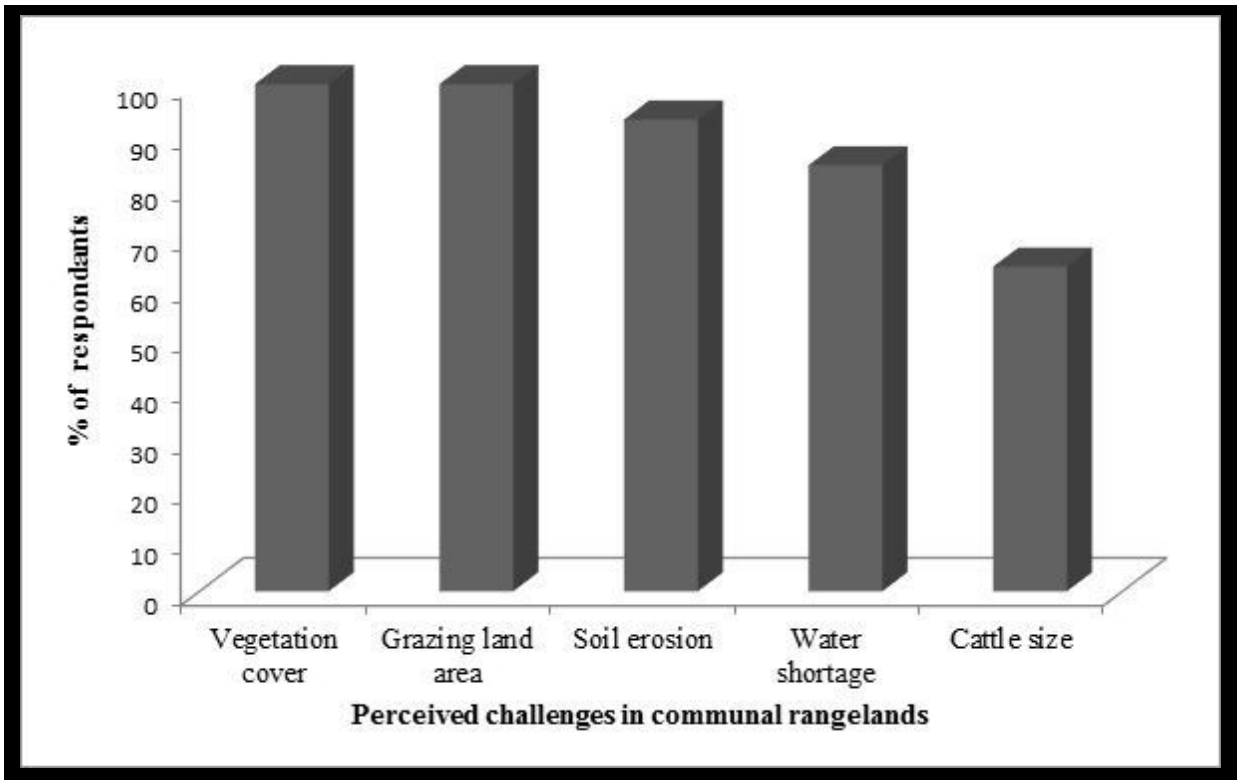

Figure 1: Perceived resources that are declining in the study sites.

Materials and methods

A pretested questionnaire was administered in three districts in Masvingo and Midlands provinces of Zimbabwe. The districts were Masvingo, Gutu and Chirumanzu. A total of 105 farmers were interviewed with 35 from each district. Data collected from the questionnaire was analysed using PROC FREQ procedure of SAS 9.3 (SAS Institute, 2010). Using the Modified-Whittaker plot design(Stohlgren et al. 2012), 18 sites, six from each district, with 27 plots per site was used to harvest standing grass biomass. The standing biomass was used to calculate the carrying capacity. Data was analysed using SAS to determine the effects of proportion of woody species to livestock units per hectare.

Furthermore, due to changes in vegetation cover, cattle are no longer harvesting adequate biomass resulting in stunted growth which respondents observed as changes in animal size. Shrubs and invasive plants species perceived to be on the increase were *Lantana camara, Helichrysum kraussii, Acacia species, Dichrostachys cinerea, Aristida species, Terminalia sericea, Sporobolus speciesandHyparrhenia filipendula* (Figure 2. The results obtained are supported by work of Spottiswoode et al. (2009) and Sheuyange et al. (2005), where they reported an increase in woody species in most rangelands affecting rangeland productivity and fire regime. The woody species were reported to harbour wild pigs with some forming thickets that impede both animal and human movement. Also, respondents reported a change in floristic

Also, respondents reported a change in floristic composition, where they perceived an increase in wiry and unpalatable grasses such as *Hyparrhenia filipendulaand Sporobolus pyramidalis*, which do not offer much nutritionally to livestock. The biomass harvested from the worst affected to moderately affected sites showed a negative linear relationship between *H. kraussii* and standing biomass (Table 1). This implies that livestock carrying capacity has gone down linearly with the increase ofH. *kraussii*. The results concur with the findings obtained by several authors (Richter et al.2001; Walker & Janssen2002; Tefera et al. 2008andO'Connor 2015) where an increase in tree equivalents in rangelands caused a decrease in herbaceous yield.

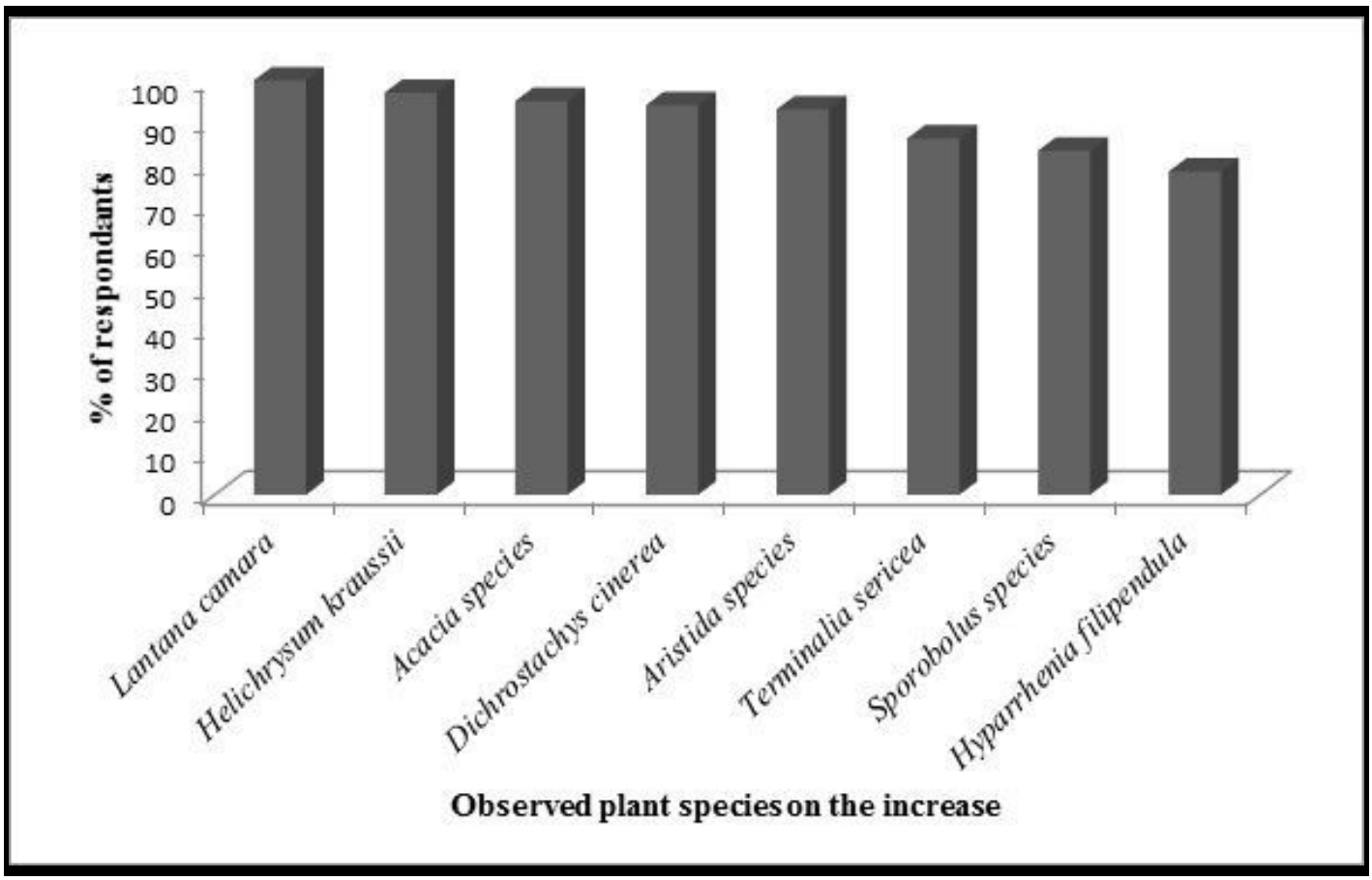

Figure 2: The figure shows dominant plant species on the increase in communal rangelands.

Conclusion and implications

Most communal rangelands have been degraded by invasive plant species and some unpalatable shrubs. More hectares of land are required per livestock unit or more feed supplements are required in order to maximise livestock output in most communal rangelands. Adaptation and mitigation strategies to minimise the spread of invasive plant species and bush encroachment should be introduced such as annual stamping out invasive plants species and introducing smaller animals like goats in all degraded rangelands. These interventions should aim to reduce loses in animal productivity and thus enhancing the poverty alleviation programs.

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IMPORTANT DATES & DEADLINES

Workshop and special session proposals	20 JAN'17	C52 & RSW2017 registration closes	7 JUL'17
Early bird payments	3 MAR'17	C52 & RSW2017 payments due	12 JUL'17
Abstracts (platforms and standard posters)	10 MAR'17	Regional Workshop registration closes	17 JUL'17
Student sponsorship applications	10 MAR'17	Regional Workshop payments due	19JUL'17
Abstracts (research proposal posters)	12 MAY'17	Late payments	4 AUG'17

REGISTRATION open Sunday, 09h00-10h30, 23 July, Monday, 14h00-17h30, 24 July, Tuesday to Friday, 07h30-08h30
RESEARCH SKILLS WORKSHOP, Sunday 10h00-18h00, 23 July and Monday, 08h00-17h00, 24 July
ANNUAL CONGRESS opens Monday, 18h00, 24 July, then Tuesday to Thursday, 08h00-17h00
MID-CONGRESS TOURS will be on Wednesday 26 July (Pastures is full day, other tours will be half-day)
REGIONAL WORKSHOP (theme tbc), Friday, 08h00-17h00, 28 July