A life of global impact on environmental science

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Professor Robert Scholes is one of the top 1 % of environmental scientists in the world. He is recognised globally as a leading researcher within environmental science, systems ecology, savannah ecology and global change. His A-rating by the National Research Foundation provides a starting point in understanding the immense global impact that Scholes has had.

Systems ecology, the approach that underpins the majority of Scholes' work, takes a holistic approach to the study of ecological systems. Most ecologists study individual organisms in relation to the environment, whereas systems ecology addresses large-scale environmental problems and relates them to human needs.

Unravelling savannah ecosystems

The professor's doctoral and post-doctoral work looked at tree-grass interactions in savannahs; it was followed by a book that integrated two decades of savannah research, co-written with Brian Walker. It is still considered a foundational text in savannah ecology.

Savannahs, which dominate Africa, are one of the world's biggest and most important ecosystems. "However, they have posed a problem for ecologists — while trees and grass displace each other in most ecosystems, why do they coexist in savannahs?" says Scholes.

In 1997, Scholes and Steve Archer wrote the seminal review on this issue, which proposed a hybrid equilibrium and disturbance theory. Further to that, Scholes' novel research on the influence of nutrients revealed nutrients to be as important as water in determining savannah function. As part of his work on savannahs, in 1996 Scholes conducted the first elevated carbon dioxide experiment in Africa. Carbon dioxide concentration was artificially boosted to the levels it may reach laterthis century. In 2000, he established the first eddy covariance tower in savannahs. "It measures the 'breathing in' of carbon dioxide by the Earth's surface during the day and the 'breathing out' at night," explains Scholes. The research around this work has revealed the finer details of savannah ecosystems. Scholes' work on savannah dynamics has significantly influenced the management of ecosystems in South Africa (including national parks), with particular respect to bush encroachment, bush clearing and fire management.

Addressing global change

Scholes was one of the first scientists in Africa to address the issue of global change, starting in 1990. Since then he has published extensively in this field, is considered a leading expert, and has had a key role in drafting national policies, communications and research plans in relation to climate change.

His expertise is also acknowledged globally concerning the impacts of the terrestrial carbon cycle, biodiversity change and impacts on ecosystem services.

"Global change can be thought of as a symptom of disturbance to the carbon metabolism of the world, resulting from massive injections of carbon dioxide from the burning of fossil fuels," says Scholes. Land ecosystems take up about a quarter of this excess carbon dioxide and oceans take up another quarter, both playing a critical role incontrolling climate change. But the question remains — how long can they continue to do so, and at what cost to their normal function?

Scholes co-led the highly influential study of the generation of soot and gases by fires in southern Africa (SAFARI 2000). As a result, he received the NASA group achievement award. He also conducted the first inventories of greenhouse gas emissions from South Africa and Africa.

Scientific assessments for effective environmental decision-making

Among other work for the organisation, Scholes has been a lead author and convening lead author on numerous assessments by the Intergovernmental Panel on Climate Change (IPCC). The IPCC is an international body for the assessment of climate change. It was established in 1988 to provide the world, especially decision-makers, with a clear scientific view on the current state of knowledge in climate change, as well as the potential environmental and socioeconomic impacts. Following on from his experience in assessment processes with the IPCC, in 2004 Scholes co-chaired the working group on State and Conditions in the groundbreaking Millennium Ecosystem Assessment (MA).

"The MA did for the rest of the global environmental issues — such as biodiversity loss, overfishing the oceans and desertification — what the IPCC does for climate change," says Scholes. This has led to a permanent assessment body. The study shows that people's wellbeing depends on functioning ecosystems. This changed mind-sets worldwide. Further to this, Scholes' research with student Reinette Biggs provide a new measure called the Biodiversity Intactness Index. This has been adopted as one of the metrics used globally. "It monitors biodiversity change and the research showed that measuring biodiversity loss, which had previously been thought to be impossibly complicated, could be made simple in a rigorous way," says Scholes.

Scholes' work has helped position natural capital globally. He says that natural capital shows that the economic benefits which people derive from ecosystems amounts to trillions of dollars worldwide, arguably equal to or greater than the financial capital usually considered as a metric of wellbeing. The concept allows for better informed decision-making — for example that development pathways, which disproportionately impair natural capital, are ill-advised and unsustainable. The advantage of this methodology is that ecosystem services can now compete when economic decisions are made.

Earth observing systems

Scholes has worked for two decades on the design and implementation of Earth observing systems, which monitor the health of the planet. He was chair of the Global Terrestrial Observing System and served on the Global Climate Observing System. He was one of four scientists worldwide appointed to draft the implementation plan for the Global Earth Observation System of Systems (GEOSS) in 2004.

He is part of the team drafting the implementation plan for the second decade of the Group on Earth Observation (GEO). Considered a "system of systems" and one of the early applications of Big Data, the aim of GEOSS is to link Earth observation resources worldwide across nine societal benefit areas (such as biodiversity). The intention is to make the data available for informed decision-making.

As part of the work done with GEOSS, Scholes founded and, until recently, chaired the GEO Biodiversity Observation Network. He wrote the plan for the South African Earth Observation System, served on the founding steering committee of the South African Environmental Observation Network, and was on the inaugural board of the South African Space Agency.

Beyond the work mentioned above, Scholes is or has been a member of the steering committee of several International Council of Scientific Unions research programmes. He is also a fellow of the Council for Scientific and Industrial Research (CSIR), fellow of the Royal Society of South Africa, member of the South African Academy, and a foreign associate of the US National Academy of Sciences. Having left his previous position as a CSIR research group leader at the end of 2014, Scholes is currently a distinguished professor of systems ecology at the University of the Witwatersrand. He says he intends to spend the last decade of his formal working career dedicating more time to training the next generation of systems ecologists. Scholes is also currently working on food security in relation to global change, as well as the problem of detecting, understanding, avoiding and fixing land degradation worldwide. With the upcoming United Nations Climate Change Conference, Scholes says that it is now "crunch time" and that substantial action needs to be taken. "If this is not done, it will be hard to avoid substantial warming," he notes.

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Ecosystem Management Understanding

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Unlike the large flightless bird this EMU had its origins in South Africa. Elder/founder Ken Tinley was born and brought up on a farm in Zululand and later became a game ranger in the Zululand parks. During these years he developed a deep respect for the tribal people's knowledge of their land and natural resources. Ken went on to become a proficient landscape ecologist, later with a DSc in ecology and natural resource management based on his surveys and research of the Gorongosa National Park system in Mozambique.

After 24 years of experience working in big game national parks and game ranches, coasts, lakes and river systems across Southern Africa, Ken and his family migrated to Western Australia. Here initially as head of Land Resources Branch in the Dept of Conservation & Environment he was involved in the ecological assessment and management required of the coasts, drainage systems and rangelands. Later in 2000 he met up with an ex-Zimbabwean, Dr Hugh Pringle, whose family is originally from the Eastern Cape's Tarkastad area in South Africa. Hugh was a bright, enthusiastic young man – about 30 years Ken's junior - with a background in geomorphology, biogeography as well as many years as an ecologist surveying and assessing ecological conditions of the rangelands in Western Australia involving plant collections, mapping of land systems and refining grazing management strategies.

In the year 2000, as part of a Federally funded rural reconstruction program Ken and Hugh formed an ecological extension process working together with pastoralists on their vast stock stations to (a) entrain ecologically sustainable management practices, that (b) included biodiversity conservation. They named the process Ecosystem Management Understanding – and the acronym EMU fitted in very well in celebrating the bird's ecological role of seed dispersal over the vast landscapes of Australia.

EMU is active in commercial and communal lands across Australia and in Namibia. Hugh is currently busy working with Herero and Himba rural communities in Kunene, alongside Namibian colleagues from Conservation, Agriculture, and the Polytechnic of Namibia. This is yet another example of how EMU returns to its roots as Ken was one of the first ecologists in what was then South West Africa.

EMU is essentially a land management extension program for pastoralists and other land users to enhance the health and productivity of their land. Land users are introduced to the ecological management of landscapes and habitats by learning to recognize and read landscape processes, condition and trend, and to capture rainwater onsite.

EMU workshops bring together communities or landcare groups who share the same catchment areas. Participants initially record their knowledge of their own land in an overlay mapping exercise, pinpointing water points, eroded areas, best grazing etc. This is followed by an aerial overview from a light aircraft and/ or Google Earth and the key areas and issues identified by the mapping process and the flight are visited on the ground to identify the best management strategy to fit the particularities of place.

Rainwater capture, erosion control, monitoring strategies, grazing management and fire are issues frequently discussed in the workshops and out in the field, and knowledge is shared by participants and facilitators.

The EMU workshops are held on pastoral stations/ranches or rural land-use areas where participants attend voluntarily and are facilitated by trained EMU members. The facilitators visit the same areas for follow-up sessions and further training if needed.

EMU's main goal is to build socio-ecological resilience in land users (individually and as local communities) through the use of their knowledge of their land, their capacity to adapt, and their willingness to work with the natural processes towards recovery of habitats and biodiversity.

The program's ultimate success occurs when pastoralists/managers rarely require extension help and instead help guide other managers in mapping their knowledge and learning how to recognize and interpret the signs of their land for recovery and maintenance purposes towards attaining a viable Triple Bottom Line.

The website for EMU has recently been revised and redesigned by Lynne Tinley. Pdfs of the Rangeland Rehydration Manual and Field Guide plus other relevant articles are available for downloading free from the website.

See our website:
www.emulandrecovery.org.au

What South African farmers can do to protect endangered grassland birds

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Current livestock farming practices in South Africa threaten endangered birds. South Africa is not unique. Globally, the intensification and expansion of agriculture has led to the reduction of bird communities. These farming practices centre around the annual burning of grasslands, which are one of the most diverse ecosystems in South Africa. They support 12 of the 40 endemic birds, five of which are globally threatened. South Africa's grasslands host five RAMSAR wetland sites. RAMSAR is the convention on wetlands. It is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources.

These grasslands, including the wetlands, comprise around 16.5 % of South Africa's land surface. They are one of the most threatened ecosystems. More than 60 % of the grasslands have been irreversibly transformed by agricultural cultivation and forestry and only 2.8 % are formally protected. Moist highland grasslands in South Africa, of which only 1.5 % are conserved, were historically maintained by winter and spring fires. This was probably done at intervals of four years or more, and by summer grazing by migratory, medium-sized antelope. Today these grasslands are managed by livestock farmers, who in most areas burn annually at the start of the rainy season, in early summer. This coincides with the onset of the breeding season for birds. The two major drivers of grassland disturbance, fire and grazing, have therefore been altered dramatically.

All is not lost. Changes to agricultural practices can provide surrogate habitats for certain bird species without compromising the economics of livestock farming. Simple changes to current management could translate into immediate biodiversity benefits without compromising the economics of livestock farming. If managers burn biennially or every three years in a patchwork – so that their farms contain grasslands of different ages – biodiversity benefits will be demonstrable and immediate.

The effects of fire

Research set out to understand how fire and grazing interact to influence communities of plants, invertebrates and ultimately birds. The project included a nature reserve, various farming practices and communal lands that lack a managed fire regime. In terms of vegetation quality, burn frequency has an overriding effect. Both plant species diversity and vegetation structure are negatively impacted by annual burning. Also, a combination of frequent fires and heavy grazing can result in a low, lawn-like sward.

Communal lands look much the same, even though fires are not managed, simply because grazing pressure is so high. Frequent burning also affects the diversity of invertebrates, with diversity being lowest in annually burned areas. However, in terms of food for birds, the pattern is somewhat different. Grasshoppers, which are the favoured food for many insectivorous birds, dominate the invertebrate fauna. They also respond positively to burning, and are most abundant at sites that have been burned in early summer, reaching peak abundance towards late summer.

The conundrum for birds

The different responses of vegetation and invertebrates to management practices create a conundrum for birds. Food is most abundant in areas burned in that breeding season, yet the short grass sward provides little concealment for nests. Most birds who feed in these areas nest there as well. If birds aggregate where food is abundant, then bird density may not mirror reproductive success, because nests in these sites are easily located by predators. In other words, bird density may not send an honest signal of bird performance. These grasslands are rich in predators, with snakes being the main predators of eggs and chicks.

Following more than 400 nests of grassland birds, we found that nest-site selection and nest success are driven by vegetation structure, which itself is driven by management. For birds that build cup nests on the ground, nest success rates increase through the season. This is because predation rates fall as vegetation grows. Incorporating plant, insect and bird diversity data in analyses, we confirmed the importance of conserved areas for birds in moist highland grasslands.

We showed unequivocally that current farm management practices have significant negative repercussions for bird abundance, species richness, nest density and fledgling output. We can further confirm that the increasingly popular use of "holistic" grazing practices in intact high altitude grassland systems has a significant detrimental effect on all grassland biodiversity.

Stop bugging the bugs: the world as we know it would fall apart without them

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Just under one million insect species have been identified on the planet. Global insect species diversity makes up more than half of all other species diversity on earth. Estimates of actual species richness range from a realistic four to six million to an extravagant 80 million species. But insects are continuously evolving, so we will never really know.

Insects are characterised by having three pairs of legs, two pairs of wings – which are sometimes reduced or absent – and three body segments: the head, thorax and abdomen. And they change their appearance during development in a process known as metamorphosis.

If all the insects on the planet were put together they would weigh more than humans put together. It is estimated that total insect biomass is 300 times greater than total human biomass. Ants and termites alone are estimated to weigh more than humans. These are estimates – insect biomass measures can be contentious because solid data are scarce.

There are many things that humans take for granted that would be affected if there were no insects.

Bugs hold the food chain together

Our total food supply would be severely restricted without insects. We would suffer from a variety of deficiencies as we would have very little fresh fruit and vegetables to eat. Insects are pollinators and many crop yields would suffer if they didn't exist. Certain products like silk and honey would simply not exist.

The food chain would diminish. There would be no birds, or any other animals that rely on insects as food. The world would be littered with decomposing organic material. The consequence would be complete degradation of our soils. All remaining life would subsequently disappear. If that was not enough and if we were still alive, creativity would suffer. Insects are an inspiration for artists, for movies and documentaries. They are studied by engineers and scientists to find out how we can be more sustainable and efficient in our everyday lives.

Survival mechanisms

The smallest insect is a parasitic wasp, measuring in at a staggering 139 micrometres. Like so many insects it is not visible to the naked eye. Insects can be found in seeds, grasses, flowering plants or soil, or they could be parasitising the insects that feed on the plants. You would then find other insects parasitising the insects that parasitise the plant eaters.

Insects are highly adaptable to environmental change and have well-structured sensory systems, comparable to vertebrates. Due to their short life cycles vinegar flies, aphids and mosquitoes can complete their entire life cycle, from egg to adult, in less than seven days. They are able to respond to change much faster than animals with longer life stages. That is why insects can become resistant to insecticides so quickly. The housefly developed resistance to the insecticide DDT in 1947 eight years after it was developed for the first time. Today, insecticide resistance is developing much faster due to the large variety of chemistry that insects are exposed to providing increasing selection pressures.

The cleverest trick of them all

Insects are well known for having intricate relationships with plants and with other insects. As the plants change, so do they. This co-evolution has been going on for about 360 million years when the first insects evolved. This is considerably longer than the first humans Homo erectus evolved, some two million years ago. That many insects can fly is a major asset. They can disperse quicker, get out of danger faster and reach food sources more efficiently. The fastest wing beat in an insect – a midge – has been recorded at 1046 beats persecond, attributed to asynchronous muscle contractions.

In comparison, the fastest wing beat of a bird (the hummingbird) is 55 beats per second. The fastest flier is a horsefly, clocking 145km/hour. Insects have external not internal skeletons. Their hard armour serves as a point for muscle attachment, protects them from drying out and from toxins getting into their systems. For heavily sclerotised insects – like beetles, which are among the most successful insects – the external skeleton also protects them from predation.

Beetles exhibit probably the highest diversity of all insects, the reason for which still remains a riddle. Spines and other strange designs offer defence mechanisms and camouflage. Lastly insects are able to drastically change their appearance during their development. Immature stages of butterflies look like worms. They then become a pupae, while the adult is winged. Adult butterflies and moths rarely feed, often only taking in small amounts of water or nectar.

Many adult insects do not possess mouth parts at all. The evolutionary advantage of this is that adults do not compete with their offspring for food and therefore exploit different habitats, providing a reproductive advantage.

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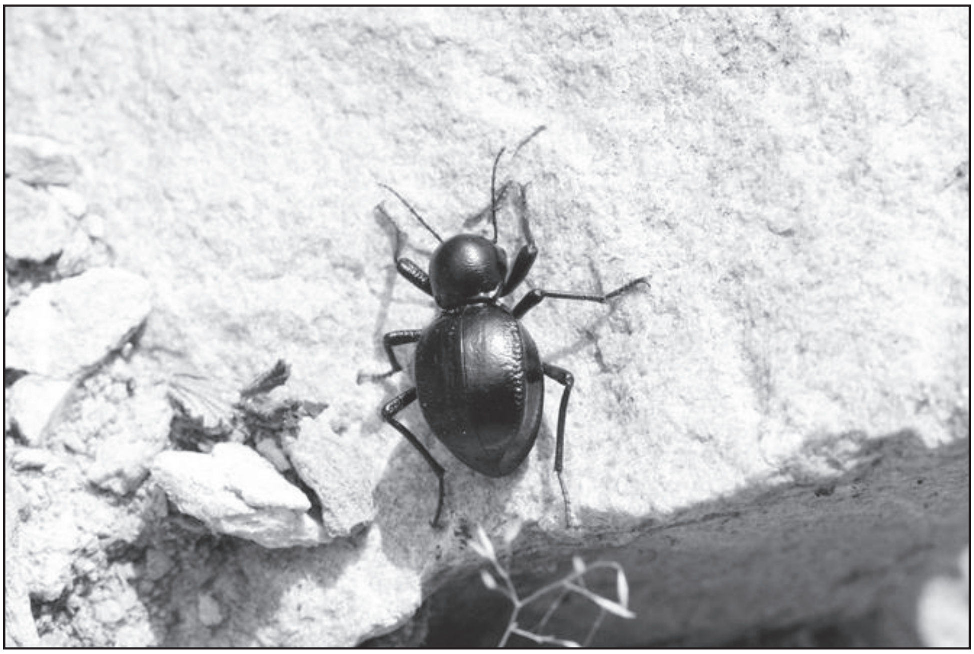
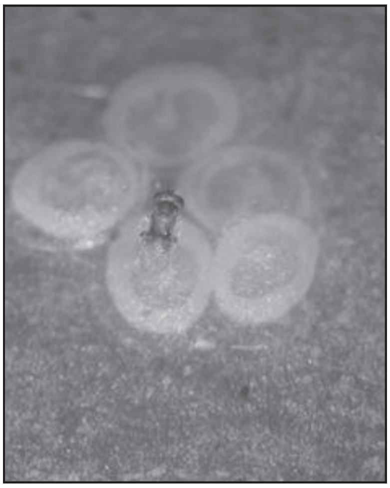


Insects are key to holding the food chain together. Without them, much of what we eat today would not exist. Photo credit: Pia Addison

Ants and termites play a key role in the world we live in.
Photo credit: Pia Addison



Parasitic wasp sitting on a codling moth egg (which measures about 1mm across). Photo credit: Nadine Wahner

Havoc among bee pollinators - effects on agriculture and conservation

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Understanding the threat to bee pollinators requires a brief look backwards to the origins of bees and flowering plants. The insects that we now call bees started to diverge from their wasp ancestors about 100 Ma (million years ago) at the same time (123 Ma) that the flowering plants were diversifying. The key characteristic that drove the emergence of a diversity of bees from their wasp ancestors was the switch from a carnivorous diet (characteristic of most wasps) to a strictly vegan diet that consists exclusively of the nectar and pollen supplied by the flowering plants.

The intersection of plant diversification and bee diversification has produced a world in which flowering plants dominate landscapes with some 325 000 species and the bees that contribute to their pollination are a very diverse group of insects with some > 20 000 species present on all continents except Antarctica. Of this vast array of bee species only some 300 are social and only 9 - 10 species are honey bees.

The world in which humans evolved has been one in which flowering plants dominated landscapes and the most abundant bee was the western honey bee, a highly social species with relatively large colonies (> 20 000 workers). So our interest in bees tends to focus on the western honey bee with its large colonies and its recognised importance for agriculture.

We seldom recognise that the wonderful landscapes that we delight in, such as the fynbos of the Western Cape, with high diversity of flowering plants also have a high diversity of bee species. In the case of agriculture, it is primarily the western honey bee that provides the pollination services on which much of our agricultural production depends.

Given that bees have played a major role in structuring landscapes for more than 100 Ma, what has happened in the last 100 years that has given rise to our anxiety about the health of bee populations and the realisation of our dependence on their wellbeing? The large-scale modification of landscapes as a result of human population growth has resulted in the destruction of the areas that support flowering plants and their associated bees.

Furthermore, the intensification of agricultural production, besides contributing to landscape modification, has resulted in the industrialisation of both agricultural and the management of honey bee colonies in apiaries.

This combination has produced a world in which the populations of unmanaged bee species are being affected by agriculture through the disruption of their natural landscapes and through the negative effects of pesticides on these populations. Although we know that these effects are real, our difficulty is that there is very little data about the distribution and density of all these bee species and their ability to withstand the changes that they experience as a result of human activities. In the case of honey bees, their management on a large scale has resulted in providing ideal conditions for the spread of diseases and their intensive use in agriculture has resulted in increased exposure to pesticides.

The honey bees have become a component of agricultural production on which human populations depend for their food security. It is not so much the bee products of honey and wax that are important, but the pollination services that the bees provide. Globally, the value of this pollination service is estimated at R 7 080 billion, while in South Africa it is estimated at a more modest R 20 billion. The pollination service provided by the bees is not just a significant industry, but our wellbeing depends on it.

Given this scenario about bees, what should we be doing? We should be undertaking surveys of the all bee species in order to determine how they are responding to the challenges of human development; we should be surveying the South African honey bee population to determine whether it is able to sustain the current beekeeping industry; and we should be characterising the diseases of bees and the effects of pesticides on our bees so that we can ensure that we maintain healthy populations for sustainable agriculture and for thriving natural landscapes.

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Bees used in the pollination of canola (Photo credit: Jaco Wolfaard)

A honey bee on a flower (Photo credit: Robin Crewe)

SAEON launches Karoo Shale Gas Ecology Project

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With the prospect of shale gas development looming across large parts of the country, the potential environmental costs are high on many people's mind, with all manner of environmental disaster being associated with 'fracking'. Ultimately, the controversy around shale gas development stems from the extremely rapid growth of the industry, which has outpaced both research and legislation across the world. As a result, shale gas development impacts are not well known, with well-researched studies only starting to emerge now.

Urgent research is required

Our current poor understanding limits our ability to manage shale gas impacts effectively, or even predict what these are likely to be, and urgent research into the impacts of shale gas development on the Karoo is required. In South Africa we are fortunate to have an opportunity to establish a research and monitoring programme for shale gas impacts before development commences in order to address these needs. With this in mind, SAEON has launched the Karoo Shale Gas Ecology Project out of the Arid Lands Node, with seed funding from the National Research Foundation (NRF). The timing of this has been ideal as the project has been able to link up with a number of other initiatives currently happening in the Karoo, including the Strategic Environmental Assessment (SEA) for Shale Gas Development. SAEON's Karoo Shale Gas Ecology Project will be participating with the Council for Scientific and Industrial Research (CSIR) and the South African National Biodiversity Institute (SANBI) on the SEA, providing a variety of inputs for the process including training and vegetation mapping. The project will also be operating independently, developing a baseline of the Karoo environment, ecosystem structure, function and process with an eye to predicting sensitive receiving habitats and species likely to be most vulnerable to shale gas development impacts.

Long-term monitoring protocol

Ultimately the project aims to develop a long-term monitoring protocol for shale gas impacts that can be rolled out across the Karoo as the zones where wells will be developed become clear. We anticipate that we will also be using conservation areas and protected environments such as the SKA to develop control and benchmarks sites.

Although the monitoring sites will be aimed at assessing shale gas development impacts, this will involve a lot of baseline data collection, which will help address the paucity of biological data collection prevalent across most of the Karoo, as well as address many other potential questions.

The project will develop a baseline of the Karoo environment, ecosystem structure and function with an eye to predicting sensitive species and habitats likely to be most vulnerable to shale gas development impacts. (photo credit: Simon Todd)

SAEON scientists anticipate that they will use conservation areas and protected environments such as the SKA to develop control and benchmarks sites. (photo credit: Simon Todd)

Farmers hold the key to nature conservation: let's treat them that way

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The town of Bethlehem in the Free State Province, South Africa, gets its name from the Hebrew words "Beit lechem" - house of bread. It is a fitting name for a town nestled within a patchwork of privately-owned commercial farmland. Much can be learnt here about the challenges farmers face when conserving nature.

Although renowned for producing wheat, Bethlehem is also an important habitat for hundreds of bird species, some of which are threatened by extinction. Bird watchers have spotted 257 different species in a 9 km by 9 km area just south of the town. This is only eight species fewer than on the entire island of Madagascar. BirdLife International even recognises the region as the Rooiberge-Riemland Important Bird and Biodiversity Area.

Exposing nature to agriculture

This small corner of Africa typifies what is happening worldwide. Agriculture is the single largest user of land globally, with cultivated land and permanent pasture already covering 38 % of the ice-free parts of our planet. In South Africa, farmers are responsible for 80 % of the total surface area, of which 11 % has arable potential and the rest is used for grazing. As these percentages increase, so too will the number of species living in or around agricultural landscapes. To have any chance of coaxing these species back from the brink of extinction we must reconcile the pressures of food production with the need for nature conservation.

What are the options?

Farmers can potentially reduce their impact on nature by using wildlife-friendly farming methods. Such methods attempt to maintain natural habitat across the cultivated landscape, plant a variety of crops in smaller patches and minimise the use of chemical pesticides and fertilisers. This strategy is known as land-sharing because it assumes that agriculture and conservation share the land for their separate purposes. The downside of land-sharing is that it tends to reduce agricultural yields per unit area. To compensate for such reductions, farmers need to increase the area under cultivation to meet the demand for food. Thus, land-sharing generally exposes more species to agricultural activities.

A second strategy

Farmers can increase their yield per unit area by producing monocultures on larger individual fields and liberally applying pesticides and fertilisers. In doing so, they can produce more food while maintaining, or even reducing, the area under cultivation. This limits the number of species exposed to agricultural impacts. This strategy is called land-sparing because it aims to prevent conversion of natural habitat by increasing yields on existing farmland.

A delicate trade-off

Land-sparing and land-sharing are two extremes of a continuum, so it is possible to use a mixture of both approaches. For instance, large monoculture fields (a feature of land-sparing), can be separated by corridors of natural grassland (a feature of land-sharing). The contrast between land-sparing and land-sharing creates an easy-to-understand starting point for discussing the trade-off between food production and nature conservation.

Are we getting it right?

Unfortunately, if we consider a recent policy proposal, South Africa seems to be ignoring these potential trade-offs. The draft Preservation and Development of Agricultural Land Framework Bill effectively commits farmers to the land-sparing approach. Even though the draft bill states that sustainable agriculture must complement ecological and biodiversity conservation, it also promises to entangle farmers in new regulations.

Sending the wrong message

To illustrate the suffocating nature of these proposed regulations, imagine a farm near Bethlehem that happens to be a breeding site for the endangered grey crowned crane. This bird regularly forages in agricultural land. The bill does not provide farmers with the correct incentives to conserve these birds. Agriculturally there is no benefit for them. Section 7 of the draft bill states that farmers will have to apply, at their own expense, to use high potential cropping land for conservation. Such an application requires an agro-ecosystem report compiled by a registered agricultural specialist. Moreover, according to section 54(3) of the draft bill, if farmers ignore these regulations and fail to use the land "for active agricultural production on a continuous basis over a period of at least 3 years" they risk having their land expropriated "at a lower price than would be paid for similar land in the same geographical area which is used optimally".

No farmer would risk their livelihood in this scenario for the sake of conservation. Such policies ultimately consign species, like the grey crowned crane, to formally-protected areas. This is particularly concerning for the Rooiberge-Riemland Important Bird and Biodiversity Area near Bethlehem – and for other areas like it – which relies completely on conservation in agricultural landscapes. Whether the bill will be accepted by parliament remains to be seen. Nevertheless, the situation in Bethlehem illustrates the important role agriculture plays in conserving nature. By ignoring this role, we risk creating one-sided policies that jeopardise our constitutional right to prevent ecological degradation and promote conservation.

UKZN Hosts second PMA agri-food career fair

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On the 26th of August, UKZN's Life Science and Agriculture campus in Pietermaritzburg saw the second installment of the annual Agri-Food Career Fair organised by the Produce Marketing Association (PMA Foundation for Industry Talent. The Fair provided a unique opportunity for high school learners and University students to get a look into what a career in agriculture will actually entail, from production of food and agricultural products to supply chain management and marketing. The Fair has been instituted in response to recognition by industry that agriculture is regarded as an unpopular career choice due to misconceptions about what a career in agriculture would involve. Many young people who would thrive in the agri-food industry are not being informed of their prospects in the field because of these misconceptions about the industry, creating a gap in this sector. Together with leading agricultural and life science departments at universities across the country, the Produce Marketing Association (PMA) Foundation hopes to challenge this trend by presenting a professional, realistic view of careers in agriculture. This Fair is one of only three held annually at universities in South Africa, and included a Teachers' Lunch where high school teachers were encouraged to promote careers in agriculture to their students.

At the Lunch, Ms Tracey Campbell of Subtrop and Ms Rechi Dlamini of the Agribusiness Development Agency gave insightful presentations about the career options in agriculture to high school teachers. The Lunch also included the showing of a very useful video made by the PMA Foundation in South Africa with support from AgriSETA about careers in the agri-food supply chain, from seed to plate. More than 300 high school learners attended the Fair, with schools like Silver Heights Secondary, Northbury Park Secondary, Siyanda High School, Phayiphini High School, Nyonithwele High School, Emzamweni High School, Makholwa High School and Willowfontein High School represented. Teachers from all of these schools as well as from Maritzburg College, Pietermaritzburg Girls' High School and Epworth School joined th Teachers' Lunch.

A number of companies, institutions and organisations lent their support to ensure that the Fair was a success. The Fair included displays by Fruit South Africa, SANSOR, Cedara College of Agriculture, ZZ2, the South African Institute of Agricultural Engineers (SAIAE), RCL Foods, Syngenta, South African Sugarcane Research Institute (SASRI), Potatoes SA, the Seedling Growers' Association of South Africa, the Agricultural Research Council and the University of KwaZulu-Natal.

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Christine Cuenod

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