African WILDLIFE & ENVIRONMENT

ISSUE 70

ANIMAL ENCOUNTERS IN PARKS

A tool for science CONSERVATION OUTREACH

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WESSA'S NORTHERN REGION

THE MAGAZINE OF THE WILDLIFE AND ENVIRONMENT SOCIETY OF SOUTH AFRICA

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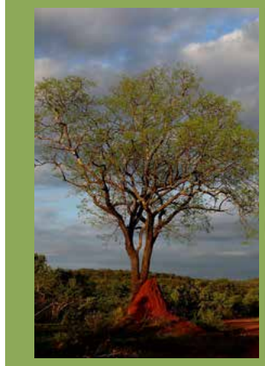

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EDITORIAL

Dr John Ledger

I recently enjoyed the privilege of attending the Ninth Annual Oppenheimer-De Beers Group Research Conference in Johannesburg. These two-day meetings have gained a reputation for being extremely diverse and interesting, and the 2018 gathering was no exception.

The first objective is to provide a platform for researchers to share the outcomes of a range of projects supported by Oppenheimer Generations and De Beers group and mainly conducted on their properties. The second is to provide an opportunity for students and researchers to present their findings to a diverse audience of academics, students and environmental managers, as well as members of the media.

Properties include the Tswalu Kalahari Reserve, Telperion and Ezemvelo Nature Reserves in Mpumalanga, Venetia Game Reserve in Limpopo, Benfontein in the Northern Cape, Orapa Game Park in Botswana, Debshan Ranch in Zimbabwe and several others. Projects reported on included Pygmy Falcons, branchiopod crustaceans in the Kalahari after rain, ants and termites, the African Grass Owl, butterfly fauna, pangolins, Sociable Weavers, frog biodiversity, monkey beetles, Tiger fish and numerous other subjects.

The presentation that really grabbed my attention was the opening Keynote Address by Peter Fearnhead, CEO of African Parks, *Perspectives on Conservation in Africa*.

Peter, a graduate of Natal and Oxford Universities, worked at South Africa's National Parks Board (now SANParks) along with the late Dr Anthony Hall-Martin, one of South Africa's most distinguished conservationists.

Anthony had the foresight to realise that a pragmatic new model was required to address the looming conservation crisis in many parts of Africa. Together with several others, Anthony founded the African Parks Management and Finance Company in 2000. They approached the government of Malawi and offered to run the Liwonde National Park, but were turned down. However, three years later, they were offered Majete Nature Reserve, a state-owned protected area that had been allowed to run down completely to a wasteland without wildlife. African Parks signed a 25 year agreement with government to take full responsibility for the management of Majete, and over 15 years a miraculous recovery has been achieved:

- More than 2 500 animals have been reintroduced including Black Rhino, elephant, lion, leopard, Sable Antelope, impala and buffalo. Majete is now a 'Big Five' reserve, and a premier wildlife destination.
- By 2017, the elephant population had grown to over 430 individuals resulting in the translocation of 200 individuals to Nkhotakota to help repopulate that reserve.
- Effective law enforcement and close community engagement have resulted in a significant decline in poaching. Not one rhino or elephant was poached since 2003.
- Employment has risen more than ten-fold at Majete since African Parks assumed management.
- The local economy has been transformed by creating economic opportunities and provisioning of services through the construction of infrastructure, including schools, clinics and safe roads.
- Over 9 000 tourists visiting the park in 2017, a 14% increase from 2016, generating more than US$550 000 in revenue in 2017.
- In 2014 a state-of-the-art malaria research and prevention centre was constructed in Majete with the goal of reducing malaria by 80% in surrounding communities by 2018.
- A scholarship programme has been set up to provide school fees for local children who otherwise may not have had the opportunity to attend school.

Since this historic success, African Parks has grown steadily and today manages 10.5 million hectares, comprising 15 parks in nine countries and employs 2 500 members of staff. Readers should visit their excellent web site at https://www.africanparks.org to find out more about this remarkable organisation, based in Johannesburg.

In his inspiring presentation, Peter stressed that governments are responsible for creating policies and regulations, while African Parks establishes a Board of Directors for each park and signs a 25 year lease agreement. Each protected area depends on five pillars for its ultimate success:

1. Law enforcement; 2. Biodiversity conservation; 3. Community development; 4. Tourism and enterprise; and 5. Management and infrastructure.

There are more than 1 200 protected areas in Africa, but Peter told us that they face a conservation crisis, driven by the following: 1. High value of wild commodities (ivory, rhino horn); 2. Need for protein; 3. Need for energy; 4. Need for alternative land; 5. Expanding populations; and 6. Poor governance. He predicts that perhaps 100 to 200 protected areas greater than 100 000 hectares will survive, while the smaller areas will disappear. The African Parks model will be crucial for the continued existence of many wild places on the continent.

Dr John Ledger
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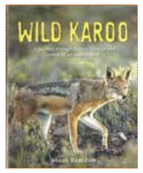
GOOD READS

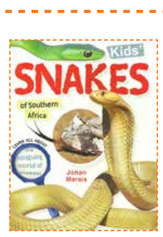
Book reviews by Dr John Ledger



An Ancient Land

Reardon, Mitch. (2018). Wild Karoo. *Struik Nature, an imprint of Penguin Random House South Africa (Pty) Ltd, Cape Town. Soft cover, 18x23 cm, 224 pp, illustrated in colour throughout with photographs and a map of the region. ISBN 978-1-7758-4352-5.* **R270**.

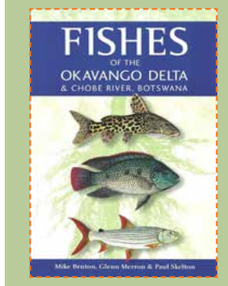
I read this excellent book from start to finish, and learned something from every page. The cover picture is of a wily black-backed jackal, but it could just as well have been of a springbok, to which iconic Karoo species the author devotes a whole chapter. I was very impressed by the words and photographs that Mitch Reardon has stitched together to make this such an excellent book. Above all, it is scientifically sound; we encounter real biologists and conservationists who share their knowledge with the author and his readers. This book is not only a wonderful source of information about the Karoo, its history and its fauna and flora, but it is also a travel guide to places to visit and where to stay. There are many looming threats to the Karoo and its 'sense of place', but these are understated in this book. The threat of 'fracking' gets a short uncomplimentary mention, but nothing is said about the massive radio telescope projects (Meerkat and SKA) that are impacting the Karoo, nor the possibility that thousands of huge wind turbines will be planted there in the coming years, ostensibly to save the world from climate change, but actually to industrialise the Karoo to make big profits for a few developers.



Snakes for young and old

Marais, Johan. (2018). Kids' Snakes of Southern Africa. *Struik Nature, an imprint of Penguin Random House South Africa (Pty) Ltd, Cape Town. Soft cover, 21x28 cm, 152 pp, illustrated in colour throughout with photographs and sketches. ISBN 978-1-7758-4508-9.* **R130**

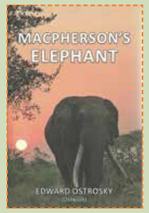
The 'Recommended Reading Age' for this excellent book is given as '9-12', but I can assuredly recommend it for older people too! Most books on snakes are rather confusing, with no less than 173 species found in southern Africa. Johan Marais' book deals with just 36 species, but these include all the big bad ones that keep us alert in the bush, as well as some harmless and tiny ones as well. The book is in large format, and the photographs are quite superb. The Introduction tells us about interesting aspects of reptilian life such as behaviour, reproduction, movement and 'snake-bite'. Sixteen short chapters then follow, dealing with a selection of species. For each, there is a box giving a distribution map, a silhouette of an average human alongside the outline of the snake to judge the size, and a 'venometer' with an arrow to indicate if the species is 'harmless', 'semi-venomous', 'dangerous' or 'very dangerous'. Of the latter there are twelve in our region, called 'the deadly dozen'. This is a wonderful introduction to snakes for young people (and old!) – a real winner!



A feast of freshwater fish

Bruton, Mike, Glenn Merron & Paul Skelton. (2018). Fishes of the Okavango Delta & Chobe River, Botswana. *Struik Nature, an imprint of Penguin Random House South Africa (Pty) Ltd, Cape Town. Hard cover, 15x21 cm, 336 pp, illustrated in colour throughout with photographs, sketches and illustrations. ISBN 978-1-7758-4505-8. .* **R450**.

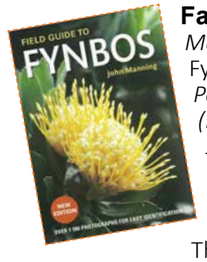
The three authors have worked extensively in northern Botswana and bring their expertise together to compile the only guide to the fish of the Okavango Delta and Chobe River. They were all at one time or another associated with the JLB Smith Institute of Ichthyology in Grahamstown (now the South African Institute for Aquatic Biodiversity - SAIAB), and I paused for a moment to reflect how much institutions like this produce cohorts of young biodiversity specialists who Go Forth and do Great Things in Africa. Think of the Mammal Research Institute at the University of Pretoria, the Percy FitzPatrick Institute at the University of Cape Town, and others. But I digress; this is an excellent contribution to the natural history of Africa that will delight biologists, conservationists and fishermen who live in, work in or visit northern Botswana. The fish are a varied visual delight, by courtesy of the illustrations by artists at SAIAB, and their names will dazzle you: we have 'stonebashers', 'bulldogs', 'churchills', 'robbers', 'grunters' and 'squeakers,' along with the barbs, breams, catfish and tilapias. There is a good section on conservation at the end of the book. Introduction of alien fish, and overfishing of the resources, are the greatest threats. Commercial fishing by foreign nationals using monofilament gill nets sets alarm bells ringing, and Botswana now prohibits the export of dried fish. Good!



Satanic elephant

Ostrosky, Edward (2018). Macpherson's Elephant. *Published by Edward W. Ostrosky using Reach Publishers' services, Howick, South Africa. Soft cover, 15x23 cm, 435 pp, B/W map. ISBN 978-0-6207-8275-3. Price and orders at the following website: https://www.edwardostrosky.co.za.*

Subtitled 'A novel of Africa', this book has a strongly autobiographic flavour and the fictitious game ranger Stuart Macpherson's background and experiences are very similar to those of Edward Ostrosky. The latter was an American infantryman in the Vietnam War before moving to then Rhodesia to pursue his boyhood dream of becoming a game ranger. In 1982 he moved to South Africa and managed the Tembe Elephant Park for 17 years. His experiences in Maputaland set the scene for this very readable and gripping novel. Macpherson has to deal with numerous problems and issues typical of life for rangers in the conservation field in the late 1980s, with tensions inside and outside South Africa around 'The Struggle' and the distaste of the world for the country and its 'Bantustans', in one of which Tembe was located. On top of everything, he has to deal with a crazed killer elephant, named by the Zulu rangers as uSathane, 'the devil'. Ed obviously immersed himself completely in the region and its people; isiZulu words and phrases slip easily into descriptions and conversations. I thoroughly enjoyed this book and found it hard to put down. Highly recommended for the Christmas stocking!



Fabulous fynbos

Manning, John (2018). Field Guide to Fynbos. *Struik Nature, an imprint of Penguin Random House South Africa (Pty) Ltd, Cape Town. Soft cover, 15x21 cm, 508 pp, illustrated in colour throughout with photographs, maps and sketches. ISBN 978-1-7758-44590-7.* **R310**.

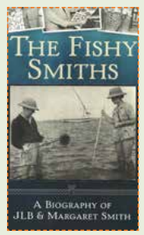
This is the revised and improved second edition of a book first published in 2007. It is a 'blockbuster' of note, with 508 pages of text and over 1 100 excellent photographs by the author and Colin Paterson-Jones.

The book features over 1 000 species, and is the definitive and indispensable guide to South Africa most renowned and celebrated flora – the Cape Floristic Region. As before, this book focuses on the most common and spectacular plants. The introduction unpacks the origins, diversity, climate and adaptations of the fynbos. This is followed by a photographic key and descriptions of the fynbos families. The bulk of the book comprises species descriptions, accompanied by photographs, distribution maps, comparisons with similar species, and notes on traditional uses. This is an outstanding book, and anyone with an interest in the flora of the Cape will want to own one.

Quirky creatures

Muirhead, David. (2018). Cat Among the Pigeons. *Animal myths, musings and matters of fact. Struik Nature, an imprint of Penguin Random House South Africa (Pty) Ltd, Cape Town. Soft cover, 15x22 cm, 152 pp, illustrated with BW sketches. ISBN 978-1-7758-4513-3.* **R180**.

This is another very readable, amusing and educational little book from the author of *The Bedside Ark*. A total of 38 animals appear in the new title, each of them making up a short essay of around three to five pages. This publication offers a wealth of accurate information on each of the profiled animals, as well as the threats they face from dubious human beings, while revealing their softer sides and their eccentricities. David's mix of humour, mythology, anecdotal tales and folklore builds quirky and captivating portraits of animals, and makes for a light-hearted and illuminating read. Here's a sample: "The bat-eared fox only made it into the exclusive Canidae by a whisker. It mainly eats termites and that's a bit like being a vegetarian at a Blou Bulle braai. To add to the confusion, it often sports a black bandit mask, a bit like a racoon. Nevertheless, a fox it is indeed, even if it has been partly named after an aerial rodent." Charming pen and ink drawings by Cape Town artist Patricia de Villiers add a satirical slant to many of the creatures. A great bedside companion for anyone who loves animals.



Fish Folk

Bruton, Mike. (2018). The Fishy Smiths. *Penguin Random House South Africa (Pty) Ltd, Cape Town. Soft cover, 15x23 cm, 344 pp, illustrated in B/W in text with 16 page colour section. ISBN 978-1-7758-46 46-8.* **R290**.

The author knew JLB Smith for two years before his death in January 1968, but worked closely with Margaret Smith for 20 years and succeeded her as Director of the Institute of Ichthyology in Grahamstown. There can therefore be no better person to compile the biography of these two remarkable people, in an absorbing and richly referenced scholarly work that is a major contribution to South African science and history. This is indeed a very fine book that is the first comprehensive biography of the Smiths; it traces their formative years and serendipitous meeting, leading up to the discovery of the coelacanth, and the tumultuous years that followed; and it details their punitive work ethic, eccentric and rugged lifestyle, and their astonishingly productive lives. There is an excellent index at the back of the book. Thank you, Mike Bruton.

Making a difference
THE SAFE RANGER PROJECT

Judy Mann

How often have you seen a photo of a dead rhino, read an article about a ranger injured or killed and thought to yourself, "I wish I could make a difference". Many of us have these thoughts but few of us find a way to really make a difference.

A team of Safe Rangers

Douglas Lang, Director of MedWise Safety Services, wanted to contribute to conservation, but how could he do this while still trying to keep his fledgling business alive? Douglas realised that, without rangers, there is no conservation. He also realised that most rangers were woefully unequipped to handle a medical emergency in the field. So he founded the 'Safe Ranger Project' – where he could combine his skills in First Aid and Emergency care training with the needs of rangers in the field. Through this unique project he has been able to make a difference in the lives of rangers around South Africa, and contribute to conservation.

Initially MedWise Safety Services was born out of two passions, one for emergency medical and safety training and the second for conservation. MedWise was started in 2009 with the goal of making a difference to the First Aid and Safety training standards offered to people working in the conservation field. Starting with training nature guides and lodge staff, in 2012 specialist training for Game Guards, Field Rangers and Anti-Poaching Units was started. Because many rangers and their employers could not afford the specialised training that they knew they needed, Douglas decided to establish the Safe Ranger Project, whereby he could do training for the rangers at a vastly subsidised rate. Many courses are sponsored by Douglas himself, some by outside donors while some have been sponsored through a relationship with the Game Rangers Association of Africa (GRAA). The GRAA adopted the Safe Ranger Project and has helped to ensure that training is undertaken where it is most needed.

Game rangers and especially those in anti-poaching units throughout Africa were initially employed as Field Rangers. Their duties were to patrol reserves; as the eyes and ears of the Section Ranger. They collected biological information and served as a deterrent to stop subsistence poachers. These same field rangers now find themselves in a high-risk anti-poaching environment. Their duties have changed, and the risks have increased dramatically, but their first aid training has often stayed the same – a city-based first aid course - barely enough to cover the basic treatment of minor injuries. These courses are also usually conducted by people with no knowledge of what a ranger does. The Safe Ranger Project recognises that Field Rangers and Anti-Poaching unit members have a real need for a first aid course that is practical and involves simulated training in the field. No armed ranger would go into the field without plenty of practice shooting on the range, so too should first aid theory be backed up by realistic simulations – after all – someone's life may be at stake.

Using a unique combination of practical 'Reality Based Training' with a strong emphasis on taking students out of the classroom and into the field, this training provides rangers with the type of first aid that they need in the field. The practical simulations provide the rangers with close to real-life training in how to handle the different trauma and medical emergencies that may arise in their working environments. Over the six years the Safe Ranger Project team has spent a great deal of time with rangers and has developed a deep understanding of rangers' needs and of the risks, challenges and difficulties they face. The training has been structured to meet the needs of the rangers on the ground. The training also extends to community members surrounding protected areas, thereby helping to build positive relationships with neighbouring people.

A Cadet Ranger in Northern KZN provides an insight into the type of training undertaken: *Awesome training thanks a lot Safe Ranger Project. You take hard things to do and simplify them so our brains can always remember. And the fake wounds, wow, they were like a bonus and so realistic, introducing the brain to reality and showing us how messy a wound can be when someone is hurt and we will have to deal with that. We were so lucky to have you. And as a Cadet... that was surely an experience of a life time. Thanks.*

Please consider supporting this project!

Email: saferanger@medwisesafety.co.za
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Game Rangers Association of Africa
www.gameranger.org/what-we-do/projects/169-safe-ranger-project.html

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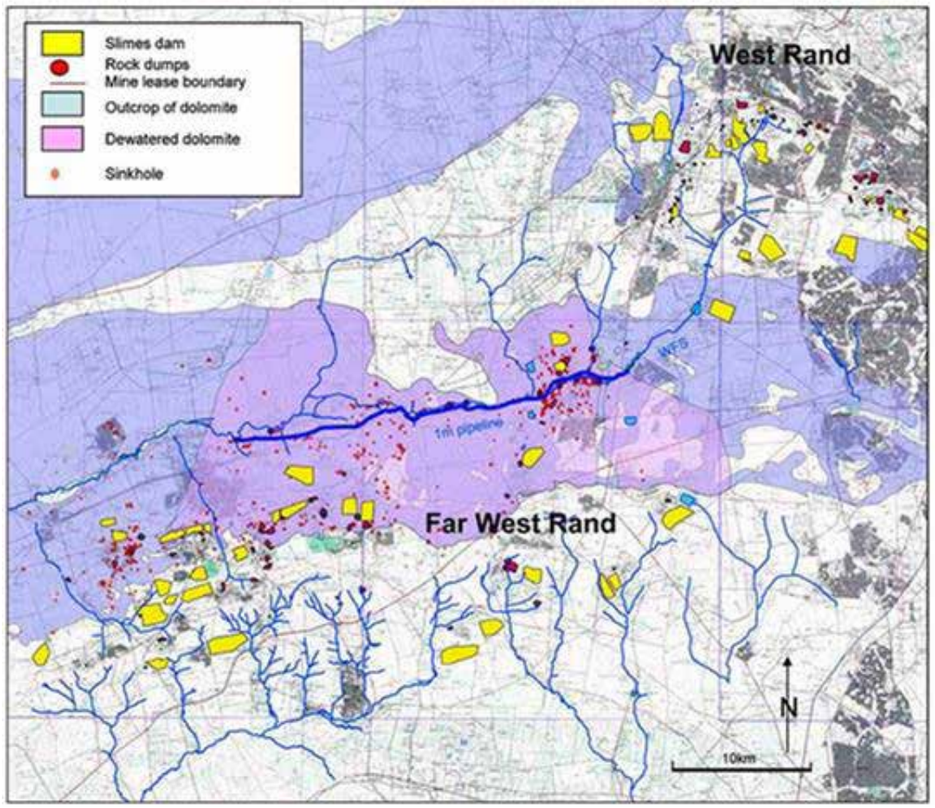
Wetlands and THE LEGACY OF MINING

Anthony Turton

Mining has shaped the South African economy, with both good and bad outcomes. The good outcome has been the creation of a sovereign state with laws and infrastructure, but the bad news is a festering legacy of waste that will plague the next generations. The Witwatersrand Goldfields, once the richest in the world, is now a wasteland pockmarked by abandoned shafts and a lunar landscape of tailings dams.

The real environmental legacy of gold mining centers on uranium, because for every ton of gold that was mined for over a century, between ten and a hundred tons of uranium was also brought to surface. This variability depended on the reef package being mined. Most of the uranium now lies tied up in mine dumps. Of the total known quantum of 600 kilotons across the entire Witwatersrand Goldfields, 400 kilotons of uranium is locked up in the Western Basin, with the Wonderfontein Spruit being the most significant surface drainage system. The name derives from the apparent miracle that was used to explain why the stream appeared on surface, only to disappear again until it popped up elsewhere.

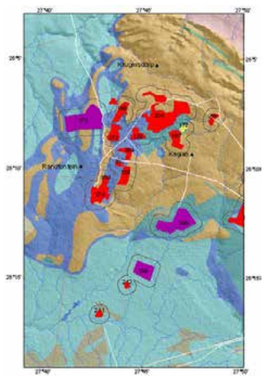


Wonderfontein Spruit map

The reason for this is the existence of dolomite that overlays the gold bearing reef, so whenever a dolerite dyke intersected the flow, the water naturally ponded on the surface. This created a linear wetland system stretching from Krugersdorp to Potchefstroom past Randfontein and Carletonville.

For decades the gold could not be extracted from the deep level reef because of the danger of the massive volumes of water lying in the dolomite compartments above. Dewatering of those compartments in the 1950s eventually made it safe enough to mine at deep levels, and the Western Basin came into its own as a significant locus of activity. However, once mining stopped, the void flooded, and acidic mine water began to flow back into a long wetland system that accompanied the Wonderfontein Spruit on its journey to the Mooi River and ultimately into the Vaal. When this happened, a study was conducted to quantify the risk arising from each tailings dam across the entire Witwatersrand Goldfields to assign a hazard rating. Each dump was characterised by multiple criteria including size, underlying geology, proximity to a wetland, age and material content. Three dumps stood out from the rest, identified as MRAs 172, 188 and 189, all located in the Wonderfontein Spruit. Significantly these three dumps also contained the highest levels of uranium.

We now know, with a high level of confidence,



MRA ID	Severity	Probability	Hazard (S+P)
[illegible]	2.0	5	3.5
[illegible]	2.2	5	3.6
[illegible]	2.3	5	3.6
[illegible]	2.0	5	3.5
[illegible]	2.3	5	3.6
[illegible]	2.6	5	3.8
[illegible]	4.3	5	4.7
[illegible]	2.7	5	3.8
[illegible]	2.7	5	3.8
[illegible]	1.8	5	3.4
[illegible]	2.3	5	3.6
[illegible]	2.1	5	3.5
[illegible]	3.6	5	4.3
[illegible]	4.3	5	4.7
[illegible]	3.3	5	4.2
[illegible]	2.6	5	3.8
[illegible]	2.5	5	3.8

that wetlands are useful things. The East Kolkata Wetland has shown us the value of biota living in the rhizosphere of wetland plants. This is the area surrounding the root and sustained by oxygen pumped down from the leaves of the plants above water. We also know that the wetland systems along the Wonderfontein Spruit are heavily contaminated by metals contained in plumes of sediment arising from the mine dumps. Work conducted by the Council for Geosciences (Coetzee *et al*., 2002) has identified the role of wetlands, most notably for the sequestering of uranium under defined redox conditions. Redox refers to the propensity to either gain or lose an electron within an oxidizing or reducing environment. Most wetlands are anoxic, so they provide ideal conditions for a sequestering environment. Uranium speciates at specific redox values under different pH conditions, so wetlands offer a highly desirable sink because such conditions are typical. More importantly, the elevated levels of radionuclides have also been identified in the same system (Coetzee *et al*., 2006).

The origin of the Wonderfontein Spruit is a spring underneath the solid waste dump at Mogale City. Over a century the dump has slowly engulfed the spring. The water now flows through a mountain of waste into a small pollution control dam immediately upstream from Lancaster Dam. But that same dam is also fed by an ephemeral and episodic system through what used to be called Tudor Dam. That specific dam used to capture sump water from Tudor Shaft, but that specific reef package was rich in uranium, so the sediment in that old dam is now a declared radiological hazard (van Veelen, 2011). However, over time the various tailings dams around that general site have been removed for reprocessing and finally disposed of underground. This means that it is now a realistic possibility to systematically rehabilitate the two radiologically hazardous sites in the very headwaters of the Wonderfontein Spruit. This is of obvious benefit to society because it means that the system can be cleaned out from the top down. The impact of contaminated plumes on groundwater, specifically in the dolomitic compartments of the Far Western Basin, is being investigated (Swart *et al*., 2003), but attention has also been given to the Wonderfontein Spruit in particular (Winde & van der Walt, 2004).

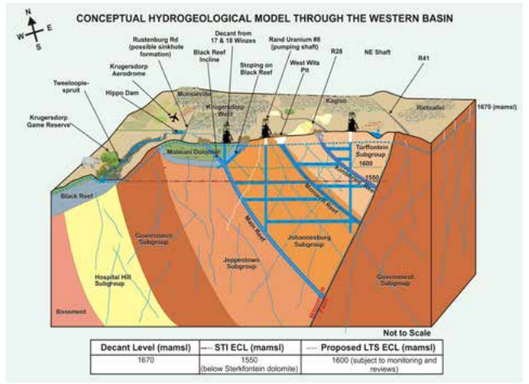
This is where it becomes interesting however, because the mining operations are at best marginal, literally teetering on the very brink of bankruptcy. The reason for this is a century of regulation that has not accumulated sufficient capital for rehabilitation. The cumulative liability thus exceeds the available capital, and this destroys the business case for mining brownfields sites. But it need not be that way, because the benefit of rehabilitation can be quantified and used to offset current liabilities. We know that the source of hazard is the tailings dumps, and we can mathematically quantify the loads of uranium and other metals in them. From this we can derive a specific value used as an offset benefit. However, we also know that water drives pollution plumes downstream, so by logical implication the removal of a persistent source of pollution at source also has a benefit that flows downstream. If we can get consensus on this benefit, then we can calculate a multiplier. If we then multiply the benefit at source by the cumulative benefit along the entire reach of river, then we have sufficient net benefit to offset a portion of historic liability. The marginal nature of such mining means that this small change to the balance sheet can make the rehabilitation of Brownfields sites viable (Turton, 2015).

Referring to the three dumps with the known highest hazard rating, we collectively need to engage our minds in an appropriate solution-seeking framework. For reasons that today seem obscure, those three dumps, known as MRAs 172, 188 and 189, are all built on dolomite. This means that a significant pollution plume, rich in uranium, is emanating from this epicenter. We cannot blame the miners, because the positioning of those dumps was done decades ago before the uranium hazard was known about, so we need to accept that the problem is there and needs to be dealt with. An ideal solution would be to reprocess the tailings to remove residual gold and other metals, before being placed back into the void once again. This would certainly be in the best interest of society, but the economics don't stack up. We might be forced to accept that the wetlands are the most viable sink and elevate their management to one of greater strategic importance. This means that the illegal mining of gold, from the peat in the wetlands, must be stopped. Such mining is hazardous to the Zama Zama operators, because of direct exposure to uranium and the mercury they use to extract the gold, but it also releases both uranium and mercury back into the environment. This has obvious health implications, most notably to the residents of communities that derive their drinking water from rivers flowing through contaminated wetlands.

The known presence of an isolated population of African Bullfrog, eking out a precarious existence in one of the wetlands in the upper Wonderfontein Spruit, shows that some species are resilient. With just a little help they can make a comeback and we can see the return of some biodiversity.

We need a robust debate, driven by the conservation community, with a view to reaching consensus about the best way forward. In this debate we need to also create a more profound understanding of the Zama Zama problem. All indications are that as legal mining ceases, there is still enough gold to sustain illegal mining for at least a century. Pillars left underground, to protect haulages and shafts, are easily accessible and rich in gold, but they also hold the roof up. These are being systematically removed in the Western Basin, with known extraction of the pillars holding up the R28 between Krugersdorp and Randfontein, as well as the adjacent railway line. Collapse of these major pieces of infrastructure is inevitable. Once consensus has been reached, we have a realistic chance to drive policy reform that encourages the rehabilitation of highly contaminated wetland systems. Without this policy debate, the likelihood of rehabilitation remans slim and future generations will continue to bear the cost of wealth wrestled from the bowels of the earth by the past generations.

Photograph: By Steven G. Johnson (http://www.gnu.org/copyleft/fdl.html)



Hydrogeological profile Western Basin

Closure mining

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CONSERVATION

A tool for science

CONSERVATION OUTREACH

Eugene Balt

Andre Botha (second from left), former chairperson of the Game Rangers Association (GRA) with outreach members and SA Wildlife College alumni in Gorongoza, Mozambique

Safaris and outdoor living, participating in 4 X 4 adventures; nature lovers are enthusiastic about the attraction of being able to travel, visit remote places and go off the beaten track. It is when one combines these adventures with eco friendly 4X4 approaches and habits and do it to support scientific research that one can do so much more; exploration and travel with a purpose. This was the dream of the Klipbokkop team when they founded the 4X4 Eco-challenge some 17 years ago, which evolved to become the Toyota Enviro Outreach from 2009 to 2013. This activity continues with international scientists still visiting the Klipbokkop Mountain Reserve, near Worcester regularly.

The Klipbokkop team with biological scientists from various backgrounds travelled far and wide- an estimated 100 000 kms were travelled in convoy which criss-crossed southern Africa (more than a million vehicle kms), specifically targeting sensitive areas where the scientific knowledge would make a difference. Scientists from all over the world participated; Canada (University of Guelph), The United Kingdom (Imperial College) with some local universities such as the University of Johannesburg, University of Cape Town, and local research institutions, implementing projects with international stature and impact.

One can only touch on some of the highlights in this article. It will be of interest to assess what difference was made in the body of knowledge from this *purpose driven safari* approach in support of conservation and science.

'Citizen Science' was also promoted. Citizen Science is a term given to describe the collection and analysis of data relating to the natural world by members of the public who have a specific interest and subject knowledge and following a defined protocol. Data gathered in this defined process is then part of a collaborative project with professional scientists. Sometimes this is referred to as 'crowd sourcing'; a fast growing and accepted way for data gathering, otherwise unaffordable.

When the Eco-challenge team invited the Namibian Fisheries on a 4X4 eco-challenge in 2002 and offered to support them to tag Copper sharks on the west coast for scientific research, they did not know how far-reaching this idea to support scientific research in this way would reach. Biological Scientists are challenged to get funding to reach remote areas in southern Africa for research linked to biodiversity.

Bronze Whaler (Copper) Shark being tagged

This is where the eco-challenge and subsequent Enviro Outreach initiatives made a difference.
Here are some highlights over the years.

Bronze Whaler (Copper Shark) project
Tagging Bronze Whaler sharks on the Skeleton Coast and in Angola
The project was supported for two years (2002 and 2003) on the Namibian Skeleton Coast and continued along the Angolan coastline. It aimed to provide valuable data about the migratory route of this species. Several nature conservation organisations participated with the Namibian Ministry of Fisheries and Marine Resources. The team tagged-and-released 216 bronze whalers at Baia dos Tigres, a large bay about 50km north of the Kunene River mouth, one example of the achievement. Some of the tagged sharks were subsequently recaptured again.

A previously tagged bronze whaler was caught more than six years after being tagged, having migrated 770 km to the north. Two bronze whalers tagged were recaptured near Swakopmund, 750 km to the south. These results clearly demonstrated that Namibia and Angola share one bronze whaler population – one of the key questions of this project.

Collecting data for the Southern African Reptile Conservation Assessment (SARCA)
Author and herpetologist Marius Burger involved in the Southern African Reptile Conservation Assessment (SARCA) participated in multiple expeditions. Johan Marais (SARCA chairman and snake expert) also joined the group and together with Eco Challenge finalists, they collected about 200 records of 47 species for SARCA during one expedition.

This is an Atlas and updated 'Red list' of Reptiles in the region. SARCA was launched in May 2005, with specific objectives to be completed in four years. The South African Biodiversity Institute (SANBI) was the lead institution with the Avian Demography Unit (ADU) supporting collection and collating of records. The collaboration of herpetologists and herpetological institutions in the region, as well as the participation of members of the public as citizen scientists remains crucial.

The project's aim was to improve the understanding of diversity and distribution of reptiles in South Africa, Lesotho and Swaziland, and thereby making it possible to improve the conservation status of these animals.

Bat Research - a new species in Mozambique?
The 2006 event to Mozambique targeted fauna and flora as diverse as bats and baobab trees. During the war years these areas were dangerous and research options were limited. The ground-breaking discovery of a new bat colony in an uncharted cave

The Toyota Enviro Outreach team visited the sensitive Northern Cape

system in Mozambique was one of many exceptional achievements.

"This is as exciting as encountering flying elephants," evolutionary biologists Dr Corrie Schoeman and Samantha Stoffberg announced at the time, confirming the first recorded sighting of a Persian leaf-nosed bat *Triaenops persicus* colony within sub-Saharan Africa. "Thanks to the 4x4 Eco Challenge we were able to locate the cave system that had just been speculation. And if you look at the mammal reference guides almost nothing is known about this species."

A new species of bat was probably discovered during this expedition, although that had to await laboratory testing of DNA samples, and an update on the present status would be interesting.

There were also adventures adding spice to the experience; survivor-style overnight camp on an uninhabited island, a dhow race (a race amongst local home-made fishing vessels) that benefited local skippers with cash prizes, a legal beach drive (escorted by the local port captain) to the otherwise inaccessible Bartholomew Diaz point, and an exploration of the remote bushveld in the Zinave National Park. The 4X4 vehicles had to wade through several deep crossings of the Save River. The expedition team played a friendly soccer match with children from the remote Fumani Primary School in Mozambique.

Barcode of life - the International Barcode of Life Project (iBol)
The Toyota Enviro Outreach supported the iBol project for at least five years (2008 to 2013). This challenging project had the objective to gather DNA samples of all living species on the planet. Data generated was uploaded onto the Barcode of Life Database (BOLD), an online platform and reference library of DNA barcodes. This was envisioned to be freely available for use by the broader scientific and citizen science communities. One spin-off foreseen was to make data available with forensic integrity to stand as evidence in court.

The protocol and process to successfully gather species samples had to be carefully monitored to ensure quality DNA samples. These samples were sent to the University of Guelph for further processing and to add to the database. Many thousands of samples were collected. The intensive and focussed research process also led to surprise discoveries, such as species found out of range during the trip of 2013: *Trachyandra* found in the Gamsberg and *Eragrostis sarmentosa* collected at Raap en Skraap, both were the first distribution records in the area.

Invasive species researched in the Fynbos Biome
Collecting data on invasive species in South Africa was one of the objectives of the 2012 expedition. Invasive plant species and insect species collected were of great interest. Some of the conclusions following this trip were:

The fynbos biome is notoriously vulnerable to aggressive plant invaders and even mammals. Insect invaders seem to be less successful; apart from the Argentine ant (a century ago), the scary appearance of hornets recently, and even more recently the harlequin ladybird, few foreigners can survive and multiply in the Fynbos Biome, since the biome is not insect-friendly. The reason is the winter rainfall regime, which rarely offers the two basic needs of insects simultaneously: high temperature and moisture. The natural system is therefore poor in accumulations of compost and nitrogen.

The insects that occur endemically are isolated and specialised relics. There is a rich variety of ants and small shrub-woodborers. The mountains provide refuge for isolated populations of rare flightless beetles. The flower visiting monkey beetles and fruit chafers are represented.

Most of the exotic insects here are introduced agricultural pests, which luckily stick to their alien agricultural host plants. Some were introduced to

control plant invasives, like the successful Cochineal bug and the *Cactoblastis* moth on prickly pear, and the dozens of parasites introduced against other invaders like *Hakea*. Since entomologists are extremely careful in their choices of these releases, there has not been a mishap yet, where these introduced species have switched to endemic host plants. Another example studied is a weevil from the Curculionidae family (the 'Snuitkewer'), which was introduced as a biological controller. It was encouraging to find this insect in areas where it was not introduced, a positive indication that this weevil was successful and spreading.

Snuitkewer (Curculionidae)

Outreach projects: locally and into southern Africa

Many institutions benefited over the years from the opportunity to reach out to stakeholders locally and in neighbouring countries.

With government subsidies for conservation and scientific research projects diminishing, the Toyota Enviro Outreach supported the Wildlife College of South Africa (SAWC) visiting past students in remote parts of southern Africa to asses future training needs for game rangers. "A total of 35 SAWC students have been in the six outreach contact sites. These 35 past students come from 28 different protected areas across Malawi & Zimbabwe. The outreach has therefore truly had an impact on conservation areas within these two countries." said Theresa Sowry, Executive Director at the SA Wildlife College after the event.

WESSA's involvement with the Toyota Enviro Outreach has proactively helped to fulfil their mission of People Caring for the Earth. "The Outreach has made it possible to engage with communities in very remote areas and highlight the importance of healthy eco systems. The dependence of people on the natural resources underpins the importance of the environment in this present day and age. WESSA encourages development which is sustainable in nature, and which doesn't only focus on the economic side" said Bryan Havemann – former Director of Conservation WESSA

Local communities also participated and young learners were exposed to information and interaction with the scientists. They participated often to gather examples of species which were used in the iBol project.

Where are they now? In following articles in this series, the scientists can share results enabled through these Outreach events and the difference made to biodiversity management. In addition to those mentioned above, here is a list of some of the participants involved over the years:

- Andre Botha, Chairman Game Rangers Association of Africa (2008)
- Theresa Sowry, now CEO of the Southern Africa Wildlife College
- Bryan Havemann, former Director of Conservation WESSA
- Stephen Midzi, Section Ranger Vlakte Plaas
- Richard Sowry, Section Ranger Kingfisherspruit
- Prof Erik Holm, past Professor of Entomology at the University of Pretoria
- Dr D.G. Herbert, Chief Curator: Mollusca, Natal Museum
- Prof Herman van der Bank, Department Zoology, University of Johannesburg
- Prof Michelle van der Bank, Department of Botany and Plant Biotechnology, University of Johannesburg
- Dr Tony Rebelo from the South African National Biodiversity Institute (SANBI)
- Dr Kowiyou Yessoufou and Ledile Mankga, African Centre for DNA Barcoding (ACDB) of the University of Johannesburg
- Dr Cornelia Klak, researcher from the Bolus Herbarium, University of Cape Town
- Chrizelle Beukes and Mashudu Nxumalo, University of Pretoria
- Dr Vincent Savolainen, Department of Life Sciences, Imperial College of London
- Christian Deschodt, Department of Zoology and Entomology, University of Pretoria ... to name but a few

Equally important: everyone with the opportunity to travel off the beaten track, should be encouraged to 'travel with a purpose' and become part of the growing citizen science community and add value by sharing information. Here are just two examples where Citizen Scientists can make a huge difference: if birding is your passion, you can contribute by adding your bird lists to the SABAP2 project. Visit http://sabap2.adu.org.za/.

If your interest is wildlife photography, pictures of any species observed can be uploaded to the Virtual Museum Project of the ADU (VMUS). Visit http://vmus.adu.org.za/.

The Toyota Enviro Outreach team visited the sensitive Northern Cape

There are many other options available to contribute as citizen scientist. The Klipbokkop team who founded the 4x4 Eco challenge at the turn of the century ensured the success of these events through quality planning and preparations. They provided logistics and training, and facilitated sponsorships, which made this possible. Said Gerhard Groenewald, founder and leader of the events about his vision: "It was founded to promote environmental awareness, improve 4×4 driving skills, encourage responsible off-road driving and to increase the pleasure all 4×4 owners can get from our magnificent environment – today and long into the future. Obviously, there is the adventure element, but it is equally important to assist with conservation initiatives and to transfer the love and understanding that the scientists have for creatures great and small to a wider audience."

Input by scientists and participants and from the Toyota Enviro Outreach blogs have been used for this article, with thanks.

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A summary for EAPs on the recent changes to the NEMA Listing Notices (Part II)

Peggy Schoeman

On 3 April 2017, a plethora of amendments to the National Environmental Management Act 107 of 1998 ("NEMA") 2014 Environmental Impact Assessment ("EIA") Regulations and Listing Notices came into effect. This is the second part of our two-part article in which we deal with some of the more significant amendments to the Listing Notices. In Part I, we set out the changes to the EIA Regulations.

By way of background, the Listing Notices comprise of three lists of environmentally impactful activities for which an environmental authorisation ("EA") must be obtained. Listing Notice 1 sets out "less impactful activities" and prescribes a basic assessment process. Listing Notice 2 sets out "more impactful activities" which requires that a scoping process and an environmental impact assessment process be undertaken. Listing Notice 3 sets out activities vis-à-vis geographical areas, and provides for the basic assessment process where an activity falls within a geographically-sensitive area, such as a development within a protected area.

Key definitions

- The definition of *linear activity* now also includes canals, channels and firebreaks[1], the construction of which do not require an EA[2]; and
- Reservoirs are excluded from the definition of a "*dam*[3]". An EA is now only required for a reservoir when it is in a geographically-sensitive area (Listing Notice 3)[4] as reservoirs form part of government's service delivery obligations.

Energy activities

- Renewable energy activities which take place on "*existing infrastructure*" are now excluded. i.e., an EA is not required[5]; and
- There are a number of new exclusions for bypass infrastructure for the transmission and distribution of electricity, including temporary maintenance of such infrastructure, infrastructure which is less than two kilometres in length or which takes place within an existing transmission line servitude[6]. The intention here is for Eskom to do the above (maintenance etc.) without having to obtain an EA.

Dams and other structures (canals, bridges, marinas, jetties, boardwalks etc.)

- There is a new exclusion of "temporary infrastructure" with respect to the construction of dams or other structures, which includes the previously listed canals, bridges, marinas, jetties, boardwalks etc[7]. Temporary infrastructure denotes that such will be removed within six weeks and no indigenous vegetation will be cleared. In other words, an EA is now not required for the development of a dam or other structure provided this is temporary.

Sea, seabed and watercourse developments

- There is now a reference to coral vegetation in addition to indigenous vegetation with respect to developments in the sea or seabed[8]. This is pertinent for various exclusions in these activities, and essentially imposes a higher degree of protection for vegetation in the sea;
- Activity 19 in Listing Notice 1, which deals with the depositing, removal or moving of soil, sand, rock etc., has been divided into two activities: in coastal areas, the threshold remains five cubic metres of soil (Activity 19), but for a watercourse, the threshold has been increased to ten cubic metres (Activity 19A); and
- The above activities (depositing, removal or moving of soil, sand, rock etc.)[9] will not trigger an EA requirement if such occurs within a port or harbour and the development footprint of the port or harbour isn't increased. This carve-out for ports and harbours recurs throughout the Listing Notices and reflects Transnet's desire to undertake certain activities within its ports without having to obtain an EA.

Railway line reserve exclusion

- There is a new exclusion for a number of listed activities where these developments take place within a railway line reserve (in addition to a road reserve).[10]

Road developments

- An EA is now not required for roads shorter than one kilometre (both road listed activities in Listing Notices 1 and 2)[11], and for roads within an urban area (for road listed activities in Listing Notice 2).[12]

Residential, mixed, retail, commercial, industrial or institutional developments

- An EA is required where any one of the above developments take place on land previously used for "agriculture, game farming, equestrian purposes or afforestation"[13]. The scope of this listed activity has therefore been expanded.

Petroleum and mining activities

- In terms of petroleum activities[14], an activity requiring an exploration or production right in terms of the Mineral and Petroleum Resources Development Act 28 of 2002 ("**MPRDA**")[15] now includes primary processing of a petroleum resource (previously included in the now-deleted Activity 22 in Listing Notice 2) and excludes secondary processing of a petroleum resource; [16]
- In terms of mining activities[17], an activity which requires a mining right or involves the removal and disposal of minerals in terms of the MPRDA[18] now includes primary processing of a mineral resource (previously included in the now-deleted Activity 21 in Listing Notice 2) and excludes secondary processing of a mineral resource[19]; and
- The reference to exempted activities in terms of section 106 of the MPRDA has been deleted with respect to activities which require a mining right or involve the removal and disposal of minerals[20]. In short, the section 106 inclusion meant that when a farmer took sand from his/her land, despite not triggering the need for a mining right, they nonetheless had to obtain an EA in terms of Listing Notice 2. This is no longer the case.

Phased activities

- An EA is needed where there is a phased activity, namely an activity developed in phases but which together constitutes a listed activity[21]. A number of activities in Listing Notice 2 have now been excluded in this respect; and
- The definition of "phased activities" has further been clarified to exclude previously authorised activity[22].

Deleted listed activities

- The development of facilities for marine telecommunication is no longer a listed activity[23]. This reflects government's imperative to expedite such developments so as to bring broadband costs down; and
- Activities requiring an atmospheric emissions licence under the National Environmental Management: Air Quality Act 29 of 2004 have been deleted[24]. This amendment isn't material as these activities are triggered in any event by Activity 6 in Listing Notice 2 (development activity) or Activity 34 in Listing Notice 1 (expansion activity).

ABOUT PEGGY SCHOEMAN

Education

- *BA (Bachelor of Arts): Majors: Law, Politics and German, Rhodes University, 2005 – 2007.*
- *LLB (Bachelor of Laws), Rhodes University, 2008 – 2009.*
- *LLM (Masters of Law) (Commercial Law), with distinction, University of the Witwatersrand, 2012 – 2013.*
- *PDM (Postgraduate Diploma in Management), Wits Business School, 2010.*
- *PLT (Practical Legal Training), Law Society,School of Legal Practice, July – November 2011.*

Admissions

- *Admitted as an attorney, June 2014.*
- *Admitted as a notary and conveyancer, May 2015*

Professional affiliations

- *Member of the Environmental Law Association.*
- *Volunteer at Bethany Home*

1 Listing Notices 1 and 2; Listing Notice 2 refers to a "linear development activity"; Reg 1 of the NEMA EIA Regulations has also included "*firebreaks*".
2 Activity 27 in Listing Notice 1 and Activity 15 in Listing Notice 2.
3 Listing Notices 1 and 2.
4 Activity 2 in Listing Notice 3.
5 Activities 1 and 36 in Listing Notice 1 and Activity 1 in Listing Notice 2.
6 Activity 11 in Listing Notice 1 and Activity 9 in Listing Notice 2.
7 Activity 12 in Listing Notice 1.
8 Activities 15 and 17 in Listing Notice 1 and Activity 14 in Listing Notice 2.
9 Activities 19 and 19A in Listing Notice 1.
10 Activities 9, 10, 12, 45, 46 and 48 in Listing Notice 1.
11 Activity 24 in Listing Notice 1 and Activity 27 in Listing Notice 2.
12 Activity 27 in Listing Notice 2.
13 Activity 28 in Listing Notice 1.
14 There are a number of interlinked amendments: see Activities 5, 18, 20 & 22 in Listing Notice
15 Activities 18 and 20 in Listing Notice 2.
16 In which case Activity 5 in Listing Notice 2 applies.
17 There are a number of interlinked amendments: see Activities 6, 17, 19 & 21 in Listing Notice Activities
18 17 and 19 in Listing Notice 2.
19 In which case Activity 6 in Listing Notice 2 applies.
20 Activities 17 and 19 in Listing Notice 2.
21 Activity 67 in Listing Notice 1.
22 Listing Notices 1 and 3.
23 Activity 10 in Listing Notice 2 and Activity 62 in Listing Notice 1.
24 Activity 28 in Listing Notice 2.

Mountain water finally arrives at a unique floodplain

THE NYLSVLEY RAMSAR SITE

By Dr Sue Taylor

Around the middle of April this year, Natasha Mőller, the Officer in Charge of the tiny Nylsvley Nature Reserve and Ramsar Site, sent out photos to show the Friends of Nylsvley that water had finally arrived in the wetland, even if very late in the season. From rainfall in the Waterberg massif about 30 km away, it takes about ten days to begin filling up the Nylsvley floodplain.

This year, perhaps because of the four-year El Nino drought that ended during 2017, the summer rainfall in the Waterberg Mountain catchment was late, and this meant that the wetland was dry throughout the 2017-2018 summer. Most of the birds had already given up on their chance of breeding and had moved away. Others (we saw a Red-billed Teal hen with chicks and a Little Grebe with her chicks) are still making a brave effort, racing against time. As winter settles in during May to October, the waters will drain away and the wetland enters a period of extreme winter stress. The struggle will be for the resident birds to just survive, and there is hardly enough food for even that.

Summer inundation brings fish and frogs

With the annual summer inundation of the Nylsvley Ramsar Site, it is not just water that arrives, but fish as well. As the wetland fills up with water, toads and frogs also begin to breed, and this abundance becomes food for herons, egrets, geese, snipe and many other water birds. The great catfish who have waited all year are also eager for the new supply of smaller fish and frogs, and are experienced enough to know in which deeper pools to wait. Experts have also seen very large pythons that lurk in shady pools, and they feed on the fattened catfish. Summer is a very busy (and ruthless) time for all species living in the wetland. Winter, by contrast, is a period of waiting and enduring – that is for those birds and other animals that remain. For others like the swallows, swifts and martins, African Hoopoes and birds of prey like the tiny Amur Falcon, it is a time to fly long distance to somewhere less hostile.

The Nylsvley wetland, fed by the Nyl River, is located on the Springbok Flats in South Africa. The Springbok Flats is an extensive area with very few natural drainage lines and water coming into floodplain region tends to spread out and not drain away easily. The Nylsvley Nature Reserve encompasses the entire Ramsar site, and is 3 970 ha in size with coordinates 24º39'S 028º42'E. The dominant wetland type is the grassland floodplain, surrounded by savannah and woodlands. The Nylsvley Nature Reserve has a small herd of endangered roan antelope *Hippotragus equis*, and other game animals (giraffe, brindled wildebeest, waterbuck and smaller ungulates). In the evenings, the eerie cry of jackals can be heard, and some say there still leopards in the area.

Waterberg Mountains the origin of the wetland water flow

The water that flows along the Nyl River into the Nylsvley Ramsar site begins as rainfall on the Waterberg Mountains, about 30 km away from the floodplain. The area for the Waterberg plateau is about 14 000 square kilometres in extent and it reaches 1 860m asl (above sea level) in only a few places; overall it is about 1 400-1 500m asl; its highest point at Marakele is 2 088m asl. The catchment for the Nyl is about 500 square kilometres in extent, so it comprises only a very small part of the Waterberg (<4%) (Tarboton, *pers. comm.*, 2018).

This year's floodwater came in from just a couple of minor tributaries (Middelfonteinspruit, Dewetsloop, Hartebeeslaagtespruit) and the usual main sources of floodwater (Groot- and Klein-Nyl and Olifantsspruit) did not deliver any water to the floodplain this year - it is these rivers that are being increasingly compromised by abstraction (see www.waterberg-bioquest.co.z). The actual catchment for the floodplain receives about 600 mm precipitation per year. The rainfall in the Waterberg takes about two weeks to arrive at the Nyl floodplain. The water flow normally can arrive at any time between October to May, but is highly variable. There are concerns that with increased farming and urbanisation around the floodplain, the water might just not arrive at all. One of the key threats to the Ramsar wetland is the over-abstraction of water upstream of the wetland, and by local municipalities.

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Roads
THE LAST FRONTIER

Mike Mentis

Most good things in life have downsides – variously called costs, disbenefits, detrimental externalities, impacts and side-effects. Environmental management, which involves avoiding or reducing downsides, is commonplace. Except in the case of roads in South Africa (photo 1). Effective environmental management has not reached there yet. Our roads have severe unmitigated side-effects, mostly next to the road. The road fraternity needs help.

Photo 1: The typical SA roadside, gully and all

This article touches on a few of the bad effects of roads, and on measures to limit them. It draws on traveling 1.5 million km on SA roads over the past 30 years, working on road projects, working on projects, e.g. pipelines next to roads, and engaging with road experts. "It's not the way we do things" has been the common sentiment to my suggested impact reduction. Thinking outside the box has been how environmental ill-effects have come to be cost-effectively contained in other fields.

Why not with roads? In one instance I was told to go read Sanral's drainage manual. Prepared by experts, it's a fine document, as far as it goes. It focuses on road safety and protecting the road infrastructure, both important issues, but ignores what roads do environmentally beyond the road. Barely considered are the constitutional rights to health and wellbeing, and having the environment protected. The manual refers to the old Environmental Conservation Act and does not mention the National Environmental Management Act (NEMA).

Runoff

Soil is among our scarcest and most precious resources. There is only so much of the stuff, a one-time windfall. There are three rules to soil conservation:

Rule 1: Never concentrate runoff.

Rule 2: Disperse concentrated runoff.

Rule 3: Always obey Rules 1 and 2.

Roads fall foul. Road drains collect runoff from upslope of the road, concentrate the runoff, direct it usually under the road, and discharge it willy-nilly. The results are gullied croplands, veld and vlei, and small drainages destabilized and transformed into big dongas (photo 2).

Photo 2: Concentrated runoff discharge from a road, even a path, into a wetland can create a knick, which develops into a gully that grows deeper, wider, longer, and erodes headward. Wetlands incised like this lose their functions of attenuating floods, storing and purifying water, sequestering carbon and supporting biodiversity

How might the ill-effects be reduced? Install frequent under-road drains, every 10 or 20 m rather than 200 or 400 m. Disperse concentrated flow onto grassed double convex slopes away from drainage lines. Dimension all, not for the 1 in 10-year storm, but for big storm events (photo 3). Once a gully forms, or a drainage is knicked, it is expensive and even non-feasible to fix.

Photo 3: Roads are 'permanent' infrastructure. During their long life they will experience extreme events, and should therefore be designed accordingly. This design is a candidate for Justice Malala's 'Mampara of the Week'.

Embankments

Drive along the contemporary road and you'll see silted concrete drains below cut embankments wherever the drain slope is low (photo 4). Of course in steep drains the silt is carried away, to impair water quality and aquatic habitat in the nearest drainage line. A rule-of-thumb is that, with a 10 m slope length and slope steepness of 1 in 5, it is not possible to hold down soil loss to less than 10 t/ha/year with a tufted grass cover. This is already an order of magnitude greater than the generally assumed rate of soil formation. So what do the road boffins do? They try to grow tufted grass to protect the embankment. It's a battle. The applied topsoil, fertilizer and grass seed wash off, to the detriment of the nearest wetland. Sometimes, at great expense, some sort of grass cover is established, and then they kill it with herbicide (photo 5).

Photo 4: Steep cut embankments produce huge amounts of sediment – noticeable when the gradient in the gutter is low – which goes into the nearest watercourse.

What rules might be followed? If the cut embankment is in hard poorly weatherable material, clean the slopes and leave them bare (photo 6). If it's

Photo 5: Sometimes they establish grass on the steep cut embankments, then they spray it with herbicide and kill it.

Photo 6: A cut embankment in hard poorly weatherable rock is best cleaned and left bare. Geological strata are an interesting feature of our heritage, and there is no harm in proudly exposing them.

hard but weatherable, like slaking shale, seal it with shotcrete. In these cases the cut embankment can be steep. But if the material is soft, then steep slopes, if they are unavoidable, should be protected by means other than tufted grass.

Photo 7a: Steep embankments in weatherable rock like slaking shale can be sealed with shotcrete. (Oliviershoek Pass shotcreted some 40 years ago.)

Photo 7b: De Beers Pass not shotcreted 10 years ago

Steeper than 1 in 3 warrant retaining walls (photo 8). Between 1 in 7 and 1 in 3 slopes might be protected by a rhizomatous grass, subject to the climate being sufficient. At shallower than 1 in 7 slope, tufted grass suffices. Remember, grass must be managed – not sprayed with herbicide (photo 9) but cut at least annually – otherwise it will go moribund and die, leaving weeds or bare ground.

Photo 8: Steep embankments in soft material can be protected with one or other form of retaining wall.

Photo 9: When herbicide is applied at the roadside the grass is killed. Weeds then come up, in this case declared alien invader Mexican poppy required by law to be controlled. How will the poppy be controlled? With more herbicide. Become an agricultural chemist, and you too can print money.

Wetlands

Wetlands in the footprint of the road reserve are destroyed, and they may be damaged downstream and even upstream. Wetland environmental services include attenuating floods, storing and purifying water, sequestering carbon and supporting biodiversity. It's unrealistic to expect that wetland function in the road reserve persists through construction and operation. In road construction the wetland 'muck' is replaced with coarse permeable material.

Road engineers don't want water on or in their road. Any water is 'hurried' off or under the road. This is opposite to flood attenuation and water storage. Roads also don't clean water. As outlined below, roads dirty water. It may be that in days of yore, road reserves and hedgerows supported wildlife. But in the current era, plants don't grow on gravel, tarmac or concrete, verge plants are liable to get sprayed with herbicide, and animals crossing the road suffer road-kill, hardly a boon for biodiversity. Under-road drainage experiences concentrated flow and may be self-scouring. But if it clogs, road maintenance cleans out, often canalising the wetland upstream and downstream, thereby draining the neighbouring wetland so that the organic soils mineralise which is the opposite to carbon sequestration.

What might be appropriate controls? First, avoid aligning roads across wetland, as far as possible. Sanral's ill-fated N3 alignment over De Beers Pass, designed 50 years ago along bottomlands and over saddles, was an example of how not to do it. As far as possible, align along ridges or otherwise toplands. If wetland has to be crossed, span it with a bridge. Even only occasional concentrated flow funneled through a narrow culvert is liable to scour often erodible wetland soil – once a knick has arisen, gully erosion can be unstoppable.

Water quality and spills

Would you use road runoff to irrigate your vegetables or water your livestock? No. Depending on traffic and whether the road got washed by yesterday's storm, the runoff would often not meet water quality standards. Typically the runoff would contain fuels, oils, rubber, metals and a miscellany of other gunk. Yet standard road design in SA is to direct road runoff straight into the nearest drainage. Even if the runoff were clean this can be damaging to small drainages. Their natural flood hydrograph – by which they were shaped – is increased. Exposed to a bigger force, the drainage is liable to be reshaped, or destabilized and enlarged in keeping with the principle that channel size is a function of flow. But generally the runoff would be dirty too. Worse, if a spill of noxious substance occurs on the road, the nasties go straight into the watercourse.

I saw in Australia, where traffic is heavy and pollution severe (e.g. freeways, interchanges, and hills) the road runoff is directed first to a retention pond, designed to trap a spill if it occurs, then to an artificial wetland, and only after that to the natural waterway (photo 10). 'But Australia is a developed nation, and we can't afford that in SA'. Bah! I've also seen retention ponds along highways in China.

Photo 10: A roadside retention pond receiving dirty road runoff from an interchange in Melbourne, Australia.

Pollution and spills don't necessarily occur at waterways. Wherever spills happen, by virtue of the duty of care clauses in NEMA and the Water Act, road agencies are responsible for clean-up. They might of course recover costs from the owners of the errant vehicles. However, the legal provisions notwithstanding, walk next a freeway and you can sympathise with the roadside landowners who complain of contamination, litter, pollution, spills, mysterious livestock abortion, sickness and death. My own observations are that clean-up is, without fear of overstatement, incomplete. Spills can kill the

Photo 11: Road spills: A mysterious bare patch along the N3. The grass has been killed. After many months, no effort has been made to revegetate. The site is liable to erode and might not recover in our lifetime.

vegetation, even sterilise the soil (photo 11). Though one sometimes sees soil remediation, I've never seen revegetation on a roadside spill-patch undertaken.

This article only scratches the surface. Lots more could be said about the mentioned impacts, and about other impacts. What needs to be recognised though is that the best engineering alignment is not necessarily where the road should go. Road safety and protecting the road integrity are not the only design principles. The road should be routed to limit environmental and social impacts. Bear in mind that impact control is never 100%, so, if you can, put the road where lapses in environmental management don't matter too much – upgrade an existing corridor rather than go greenfields.

Roads are, hopefully, long-term projects. The 1 in 10-year design principle is inappropriate. Over its lifetime, a road will experience extreme events, so adopt extreme event theory in the design. Configure bridges, culverts, drains and all not just in the interests of road safety and infrastructure protection, but to protect the environment too. Ours is the only biosphere we have, and damage to it is poorly fixable if at all.

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DESTINATION

WESSA NORTHERN AREAS REGION (NAR)

PEOPLE CARING FOR THE EARTH SINCE 1929

John Wesson

Northern Kruger
Photographs: John Wesson

Nyoka Vulture view point

On Thursday 11 March 1926 in the Polley's Transvaal Hotel in Pretoria, several Game Protection Associations came together to form the Wildlife Protection Society of South Africa.

This was the first beginnings of an organisation that was destined to leave its mark on Southern Africa's conservation landscape for many generations to come.

In 1929 in Johannesburg, the early version of the Transvaal branch was formed followed by the Springs branch in 1948, whose aim was to establish a bird sanctuary.

The formal Transvaal branch was formed in 1967 and grew rapidly to be the largest branch in the organisation.

Over the years many centres followed leaving their mark in the region some are still active today. This article is a glimpse at the centres past and a few present, Benoni, Carletonville, Florida, Germiston, Johannesburg, Krugersdorp, Nelspruit, Pietersburg, Pretoria, Randburg, Sandton, RAU centre, Roodepoort, Soutpansberg, Springs, Tukkies, Vaal Volksrust and White River.

The newsletter of the Transvaal branch, *The Chat* was first published in 1969 as the main mouth piece of the region.

A milestone was the West Rand branch organising a two-day symposium in April 1980, dealing with the Magaliesberg mountains with the purpose to address concerns of land owners mainly around the attempt of the Nature conservation department to purchase or expropriate all the farms that were proclaimed a Nature Area in 1977.

In these early beginnings the WESSA head office was based at Delta Park in Johannesburg, except for the conservation division that was in Durban.

Today the region covers a vast range of habitats and protected areas in this northern part of South Africa. Included in this area are several key National, Provincial and Biosphere reserves.

Its main centre is Gauteng with North West, Limpopo and Mpumulanga (excluding the Lowveld) making up the region.

More recently Free State has moved under this umbrella, until one day a regional group can be re-established there.

NAR has the largest number of Friends groups and Affiliates found in the WESSA portfolio.

Friends groups, numbering around 27 of which 18 are centred mainly around Tshwane, where they do invaluable work in keeping these green open spaces maintained and protected. Recently a Friends branch was established to represent all the Tshwane Friends groups. These groups link into the MOU with Tshwane Municipality and WESSA, whereby only fully paid-up Friends groups are recognised by the metro as legitimate supporters, in the various green areas of the city. This serves as an example of how Friends groups and the various city Parks and Conservation departments can build a strong relationship and work together.

The region is managed by a committee consisting of the chairman, coordinator, treasurer, conservation and project leaders, Friends Co-ordinator, the branch chairman and newly formed Zone leaders.

Currently there are three branches Springs-Nigel, Boksburg and Tshwane (made up of Friends groups chairs), with the two new zones, one in Kempton Park and the other in the Paul Roux town area in the Eastern Free State.

The chairs have regularly met with the Rustenburg Wildlife Society to get them back on board as a branch.

There is a process on the go to establish the first University branch in many years at the Tshwane University of Technology.

NAR office bearers play an important role in the Conservancy associations, Magaliesberg Biosphere,

(where WESSA is a founding member), Magaliesberg Protection Association (where again WESSA was a founding member in 1975) and ARMOUR, an NGO focussed on improving the water quality in Gauteng and North West. Armour works through negotiating and educating role players at all levels!

There are currently several projects on the map

- ARMOUR: Where we are part of a group bringing about change in the water systems feeding into the Hartbeespoort Dam from Johannesburg. The project which WESSA seed-funded runs workshops to improve management skills of local authorities and metro water department officials

ARMOUR committee NAR representative Willem Hazewindus second from right. Chairman and founders Anthony and Helen Duingan 3rd and 4th from left

involved in mainly sewage works maintenance and operations. One of the biggest metro water departments in the Southern Hemisphere is represented in these workshops. Since our involvement in this project, there has been a marked improvement in the running of services using negotiation skills and training instead of direct and conflict-based interventions.

- The setting up of a permaculture/community gardening project in the Groot Marico area.
- WESSA has supplied start-up funds to train and establish the infrastructure and has handed over the project to the local community
- Save Magaliesberg Species (SMS). Focussing on regular snare removal activities for interested members and public. Top of the list are the leopards of the Magaliesberg.
- Nyoka Ridge Vulture restaurant and vulture monitoring project, where top facilities have been created, to enable members and the public to view the endangered Cape Vulture, in its natural mountain habitat and at close quarters when visiting the feeding area.
- Over 600 Cape Vultures are thought to be resident in the area.
- The main aim is to supply a consistent supply of food every weekend with the addition of crushed bones in the breeding season.
- Trap cameras are used at the feeding site to photograph the birds' wing tags. This info is shared with the Endangered Wildlife Trust Vulture unit.
- Queen of the Night Cactus Cat 1 invader bio-control project. The entire region north and south of the Magaliesberg, is in various stages of released bugs. This project started on a small scale in 2013. The largest growth of the bugs is in the Peglerae Conservancy. Bugs have also been released towards the Gauteng West Rand and at Bonamanzi Nature reserve in Northern KZN.
- Birds of the Magaliesberg Booklet is an ongoing project with other partners, bringing the most up to date distribution information to all interested parties in a booklet form. Based on SABAP2 data. The booklet has detailed self-drive birding routes as well as habitat and general information on the mountains and how to enjoy them. The booklet was published it 2014 and will be updated in around 2020. There is a possibility of it being converted into a useful app.
- The Blue Cranes of the Magaliesberg project, which is aimed at educating the public about the plight of the birds and protecting the last 2 breeding pairs in the region.
- A focus on getting members involved in the various citizen science projects as available through the Animal Demographic Unit at the University of

One of the many displays run by NAR and mostly in conjunction with affiliate member the National Conservancy Association of SA

WESSA Groen Sebenza students assisting in the harvesting of Queen of the Night Bugs in the Magaliesberg

Cape Town is underway. Bird 'atlassing' remains the key focus with some members showing an interest in Dragonflies.

- Interacting with conservancies as our largest affiliate group and seeing where we can assist.
- NAR along with the National and local conservancy associations is running regular Saturday morning

Members at one of the many regular outings

themed gatherings with special guest lecturers. The first in 2018 took place on the 26 May with the theme 'Heritage.' One of the speakers was one of the team of ladies that excavated the Naledi caves to retrieve the fossils.

- The committee is also involved in several EIAs throughout the region, mining and prospecting applications and one EMF at this stage. In this area NAR is working closely with Birdlife SA, Mariette Lieferinck CEO of the Federation for a Sustainable Environment (WESSA was one of the founding members of this group), the Biosphere board members, Magaliesberg Protection Association. (WESSA was one of the founding members in 1975)

With the roll out of new zones, it is hoped that this will see growth in members activity as these informal platforms are created throughout the region and especially in areas under pressure.

John Wesson
Chairman
Northern Areas Region

A major South African endemic tree

THE MOPANE

Eugene Moll in collaboration with
Johna Turner & Ted Woods

The name *Colophospermum* is derived from the Greek *kolophonios* meaning 'resin' and *sperma* meaning 'seed' – referring to the oily, resinous seeds that are flat, kidney-shaped (~20 by 30mm and 1-2mm thick), light-brown in colour and dotted on both surfaces with tiny resin dots; 'like stars in the sky!' (see also Hugh Clarke's Illustrated Dictionary for more such information on the derivation of plant generic names). Mopane is a species in a mono-typic genus (i.e. with only one species in the genus) in the legume sub-family *Caesalpinioideae* or because some authors split the legume family, *Fabaceae*, into three separate families, some will put this specie in the family *Caesalpiniaceae*; a split not supported by the majority of plant taxonomists globally.

To most people mopane veld is seemingly intensely boring as it generally occurs in apparently endless swathes of nothing but mopane - that offers little of biodiversity interest to the untrained eye. But, as we shall see, mopanes are remarkable trees in many ways and home to many animals.

Showing the distribution of resin dots on the contorted seed surface

What is interesting is that although mopane is common and widespread in arid to semi-arid landscapes in southern Africa, it does not occur north of the equator. (Possibly you may wish to say why?) Generally, the shrubby form of this vegetation type tends to grow in alkaline soil with a high lime content

Shrub mopane

that is shallow and poorly drained, or in clayey ground that is poorly drained and high in sodium (called 'sodic' soils). But this is not always the case, as mopanes do also occur in arid riverine areas on sandy substrates in northern Namibia, and in the rugged east of northern Kruger Park in mixed veld with *Combretum spp*. and other trees on various soils derived from volcanic geological formations.

Mopane has large, distinctive butterfly-shaped leaves. Trees with large leaves are uncommon in dry areas because trees adapted to arid conditions typically have small leaves for water preservation. How then does the mopane cope with both dry environments and large leaves? Trees draw water, with nutrients, from the soil through their roots. The tree uses the nutrients and transpires water vapour through tiny pores, called stomata that occur on the leaf surface. Carbon dioxide is simultaneously taken in through those pores and combined with hydrogen from the water to form glucose in the complex process called photosynthesis. Most trees have stomata on both the upper and lower leaf surfaces. But the mopane is different. It has stomata only on the upper surface, thus roughly halving the exposure to water loss for any given leaf. And there is more. Little motor

The edible caterpillar called the 'Mopane Worm'

cells lie at the base of the leaflets, these cells contract when trees are water-stressed; thereby opening or closing the leaflets relative to one another. In dry conditions the leaflets are pulled close together, with upper surfaces more-or-less facing each other effectively preventing transpiration. An unintended consequence for us humans on a hot, dry day is that mopane trees are not generous providers of shade as the folded leaves offer minimal shade. Finally, a thin layer of oil covers the leaf surface, also helping to limit moisture loss.

The tiny flowers are pollinated by wind, which requires that trees grow near. And mopanes do just that. An advantage of this is that the tree does not waste energy producing flowers with scent or nectar to attract pollinators.

Mopane trees also reproduce vegetatively

Butterfly-shaped leaf

from the base, and from root-suckers. Thus, scrub, mopane, where there are clumps of multiple-stemmed 'individuals' are often all connected below the ground and are in fact cloned individuals. These tactics increase resilience under heavy browsing and from fire damage. Of added interest here is that increasingly we are realising that many more bushveld species are cloned individuals; such as *Androstachys*, *Warburgia* and *Spirostachys* and possibly species of *Albizia* and even *Dichrostachys*.

Mopane is drought deciduous and an important food source for animals and people. The leaves are highly nutritious, with a crude protein content of 12-13%, and the nutritional value is retained after the leaves fall. As such the fallen leaves are much sought-after fodder for antelope like impala, and domestic animals like goats – particularly in Namibia, in winter, when other food sources are scarce. Elephants will eat the leaves all year round as well as strip the bark off trees. In Botswana the mopane stands have been broken off at about 2m height by elephant; such that the whole area seems to have been devasted by some sort of explosion.

Mopane scrub is the most common and widespread growth form, particularly in the central and eastern regions. These are multi-stemmed trees, that seldom exceed 2m that cover whole, flat, landscapes on shallow and hard soils, with occasional Leadwoods, Knob Thorns, Red Bushwillow and Baobabs interspersed.

A tiny gnat-like bee, known as the mopane bee (*Plebina denoita*), nests in Mopane trees. Their nests may be in hollow cavities in trunks, with entry through a small waxy tube. Small amounts of unusually sweet honey can be found in the nests. When walking in mopane veld these little bees can be a nuisance, attracted to traces of water in our eyes or on our lips. This bee is sometimes called the 'sweat bee'.

A Mopane in Zambia

Another fascinating creature hosted by mopane trees is the tiny sap-sucking mopane psyllid (*Retroacizzia mopani*). A psyllid is a sap-sucking insect that looks like a miniature cicada, but it is so small that a hand lens is needed to see it. In spring, mopane psyllids lay clusters of black eggs, like black spots, glued to the leaf. The new generation of psyllid hatches and sucks sap from the leaf. Their excretions form a whitish, hard, insoluble layer on to the leaf surface. These coverings, called lerps, protect the psyllid from predators and the sun.

Lerps, also called 'mopane bread', can be seen mostly along leaf veins. They are high in fructose, glucose, potassium and nitrogen, and provide food for baboons, monkeys and birds, and even people enjoy them. They may make leaves more palatable to some animals that otherwise avoid mopane leaves because of their turpentine taste.

The Mopane Emperor moth *Gonimbrasia belina* lays its eggs on mopane trees. Not long after, a great number of fat caterpillars develop that feed exclusively on the mopane leaves, sometimes stripping trees. These mopane worms are high in protein, and, either roasted or dried, are considered a delicacy by some people, and at the right time of year are collected by the sack full.

The termite-resistant heartwood is dark brown with a resin-like smell and because of its durability mopane posts were commonly used for hut construction. The wood is one of our heaviest and most difficult to work with because it is so hard. However, it is increasingly being used to make woodwind musical instruments because of the difficulty of getting African blackwood *Dalbergia melanoxylon* timber of enough size; since the latter has been over-exploited. Mopane wood and seeds burn easily because of their high resin content and few types of wood give hotter and longer lasting braai fires. When burning mopane, it can provide some fireworks displays of shooting exploding sparks thanks to the resinous wood. The ash makes a good garden fertiliser. Locally mopane twigs have been used as tooth brushes and the bark to make twine to use in thatching.

The distinctive bark of the Mopane tree

There are two other bushveld trees that have butterfly-like leaves that grow in similar mopane habitats. They are the Small false-mopane *Guibourtia conjugata* and Large false-mopane *G. coleosperma*; the former occurs in the eastern part of the region and the latter in the western part.

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Game ranger stories:
ANIMAL ENCOUNTERS IN PARKS

Arriving back at the Napi Trails Camp in the Kruger National Park after dark, I was met at the gate by a very anxious looking camp attendant. We had driven out in the vehicle with the trail group and after a short walk had enjoyed drinks on a beautiful granite outcrop watching the sun looking like a glowing red/ orange ball slowly sinking below the western horizon. The camp attendant shouted that we must not get out the vehicle as the devil had taken over the camp!

Bryan Havermann

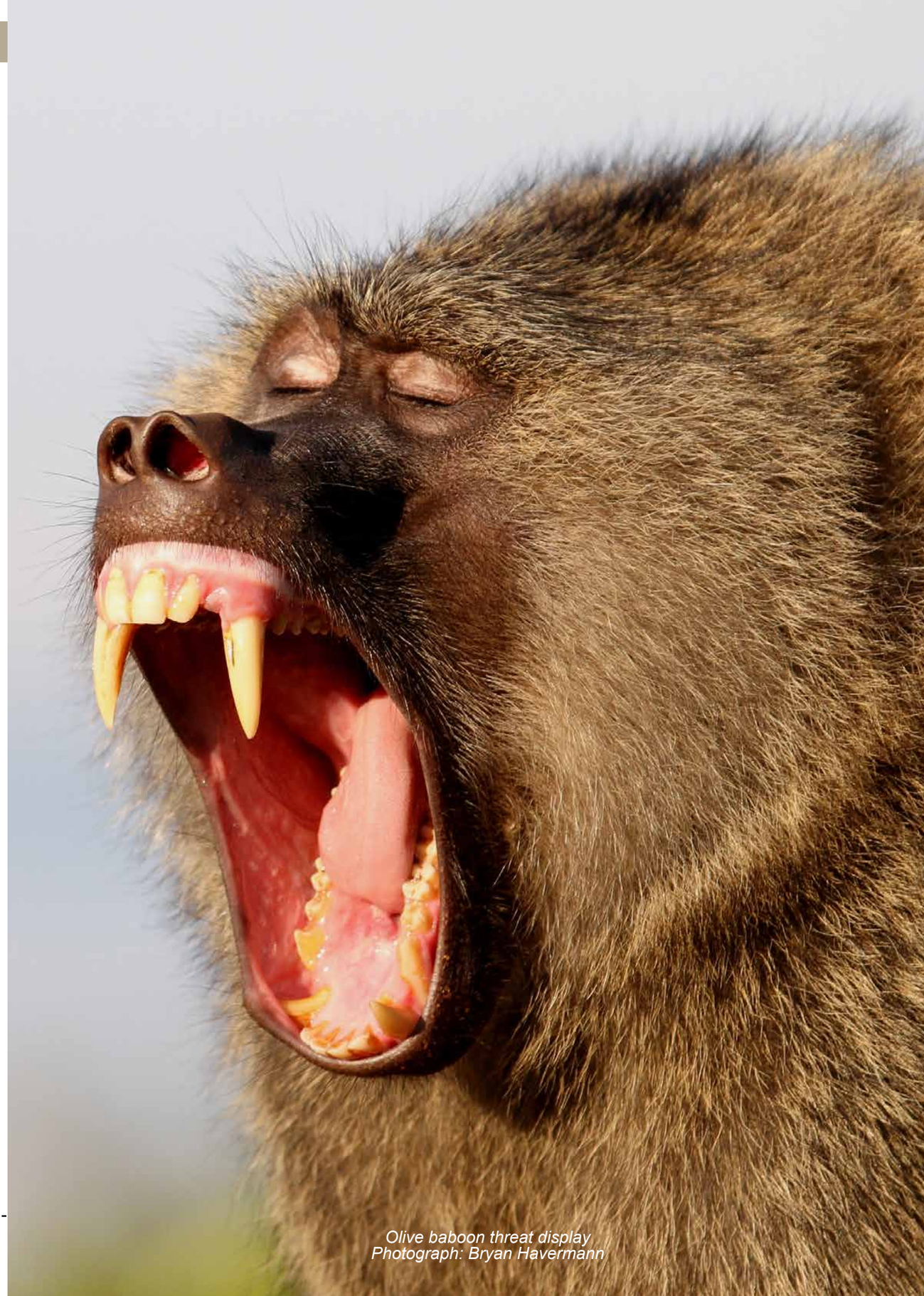
He saw my bemused expression and took me to one side, where he explained his dilemma. After setting up the wood for the fire, he had lit the fire and walked a short way to close the gate that led down to the dry river bed. Walking back he heard a low growl and he sprinted to the central kitchen area. Peeking out between the wooden slats he saw five small lion cubs in the bushes around the fire place inside the camp fence. As he stepped out the kitchen door to shout at them the mother growled like a demented demon from outside the fence. She was frantically trying to get the cubs to join her but the gate was now closed so they were trapped. Not a good situation!

Eventually it got dark and Philemon was too scared to leave the kitchen as the lioness was still growling periodically at any movement. When he heard us approaching he had run to the top gate to warn us before the guests got off the vehicle and walked nonchalantly to their A-frame huts in the dark. I drove into the central parking lot in the middle of the camp and told the trail group to stay put, while we investigated. Fortunately we had a powerful spotlight that was connected to the 12 volt battery of the vehicle so that we could shine around the fireplace. I walked gingerly towards them with my trails assistant, and immediately the growling started in earnest and I realised that we were in a predicament. The lioness was still on the other side of the low fence and the cubs kept on running into the fence trying to join her.

We managed to chase the lion cubs away from the gate and fortunately the mother moved with them, but still tracking their movements from the bush side. While they were still a short distance away, I raced to the gate and opened it wide. Backtracking and moving around behind the cubs, I started applying pressure to move them back towards the gate. Fortunately, they moved quickly along the fence with their mother in constant attendance, growling her encouragement to them and voicing her displeasure at us for chasing her offspring. The cubs eventually got to the opening in the fence and they filed out like obedient children. The lioness did a quick head-count, and then disappeared into the night. The trail group approached with more than a little trepidation, and I must say it was the earliest I had ever seen a trail group retire to bed, safe in their huts. Checking the tracks the next day it appeared that the lioness had been sleeping in the riverbed and the cubs had ventured up the path into the trails camp. Philemon had inadvertently shut them in when he closed the gate.

The Kruger National Park (KNP) has numerous rest camps that are fenced and in theory the fences are there to keep wild animals out. Unfortunately, nobody has ever thought of telling the massive African elephant this. At certain times of the year elephant bulls in particular seem to have a mischievous streak and come into camps, where big trees grow amongst the infrastructure, to feed and generally just cause havoc, because they can. Elephants, just by their sheer size, are very difficult to move against their will. I once helped Ben Lamprecht, who was the Section Ranger at Letaba Camp, to chase a big bull elephant out the camp. It was amazing to see that the elephant was not going to be intimidated but strolled leisurely at his own pace; when he reached the fence he basically side-stepped over it like a hurdler, only in slow-motion. It was comical to watch this massive bull tread on the fence to lower the height and then tippy-toe over it, and see the fence spring back, once his last leg was over.

In another incident at the Jock Safari Camp in the south of the KNP, I received a frantic radio message that there was a rogue elephant bull chasing people and causing havoc. On arrival at the camp I could see nobody and proceeded to walk down to where the reception area was. I heard a leaf rustling sound and turned to see this elephant running full tilt at me and expecting me to run away. He had been playing this game all morning and everyone else had run like rabbits. I took a couple of steps towards him with my arms and rifle raised so that I would look a bit



Olive baboon threat display
Photograph: Bryan Havermann

bigger. Weighing in at around 110 kg and challenging a 6 500 kg elephant bull sounds like madness, but I had a greater vocabulary than him and told him in no uncertain terms how displeased I was at his behaviour.

He stopped a couple of paces from me with head held high and looking down his trunk at me and gave me a very loud bugle rendition of the Last Post before he stomped on me. I stood my ground and suddenly he spun round and took off after another employee who had tried to run from the kitchen to one of the chalets. This elephant was having lots of fun scattering these puny humans, almost like a kitten chasing butterflies. The elephant was in full musth and I realised that I had to get him out the camp soon before someone got hurt. I made sure the main entrance gate was open and then got into my vehicle and proceeded to herd him towards the gate. He charged the vehicle numerous times, but I did not back down and once I got him retreating I was able to herd him out the gate, like a border collie with a rather large sheep. Elephants have the most incredible personalities, and I am sure they share stories over a couple of Amarulas of how they chase and scare humans!

Any wild area where man tries to live in harmony with nature is bound to bring some kind of conflict. Fences might be able to keep large hairy and scary animals out, but these fences do not do much to deter snakes that are often attracted to the buildings in the first place, because of the rats, mice, lizards and frogs these micro habitats seem to attract. While working for African Parks as the Project Manager for the Akagera National Park in Rwanda, I was called to one of the staff rooms late one night. The field ranger, his wife and small child had closed the single door and were going about their business finishing their supper and moving round the room.

Then the wife said she could hear something sliding around, and upon peering under the bed they saw a very large Black Spitting Cobra! The fact that they had not stood on the snake and been bitten was miraculous. On entering the room, I saw that the very large snake was curled under the bed, and with me shining a torch in its direction, I was met with a mist spray of venom. The only thing available was a very old pair of safety goggles that were so scratched you could not see winning Lotto tickets, let alone a two meter, very angry spitting cobra. I could see that the snake was about to shed its skin because its eyes were covered in milky white scales, which also hampered the snake seeing very well and just added to its bad mood. Close by there was a length of square tubing, I thought if I put it near to the snake it might just go into the pipe! It immediately did start going into the 1.5-meter pipe and I reached for the field ranger's gumboot and stuck it over the pipe, thinking that the snake would be blocked and would not be able to reverse back up the pipe.

I picked up the heavy steel pipe, with the snake inside and started moving backwards to the open door where I could release the snake. There was a slight opening at the top of the gumboot which I reached up with my hands to close. As I squeezed a third of the snake's body shot out and I had a hand full of very angry cobra, centimetres from my arms and face. How I was not bitten I will never know! The snake was so intent on getting away, that fortunately it did not take exception to being squeezed like this. Eventually I was able to coax it out the door and into the bush. Although I was covered in venom, and had come very close to getting a full bite, I had been very lucky. It is of paramount importance to have the right snake catching equipment like a grab stick, hooked stick as well as a decent pair of goggles and something to put the snake in. If in doubt, do not even try to catch a poisonous snake in confined quarters, unless you really know what you are doing. Once bitten, twice shy. Leave it to the professionals!

Baboons are absolute masters at not only scaling fences, but they seem to have all gone to a robber school where they have learnt how to enter houses at will and rob and pillage. The massive Olive Baboon that is a resident of the Akagera National Park has learnt over the years how to overcome all the deterrents that humans put in place to try keep them out of their homes. I watched Olive Baboons rattling windows until the handle was loose, and they deftly opened it. I have watched these baboons turning keys in the locks and yanking on the handles until the door opened. Most times one finds that the humans have been feeding the baboons, and this in turn leads to the learned behaviour and the bad habits. I had a new home built at Akagera, and the windows had louvres which could shut very tightly and lock, so that prying fingers could not open them. I always had to remember not leave any windows or doors open when I left a room or the house. One particular afternoon I returned to find that an Olive Baboon troop had broken the louvre panes of glass, and had gained access to my home. They had been there for hours, and when I opened the front door, it was almost comical seeing baboons lounging about on my furniture, watching Animal Planet and helping themselves to everything in my kitchen that was remotely edible.

After a moment of stunned silence, we made eye contact, and then there was pandemonium, with 30 baboons of all shapes and sizes screaming, barking and running amok. I ran from the door, leaving it open so that they could exit, but to no avail. I watched helplessly how the whole troop exited out of the small hole, where they had broken the louvre glass, being ejected from the house like furry pellets from a paintball gun. The house was in a very bad way and it took weeks for the smell to abate and the place to become liveable again.

The previous week some American tourists had asked to see the staff quarters and I had shown them round and they were intrigued by one large male Olive Baboon that was walking from door to door banging on the door and then trying each handle. With them all locked, he sat on his haunches and looked our way. I suddenly saw him fixate on an elderly lady in our party, who had collected some shiny rocks with mica flecks in them and she was cradling them to her chest in her hands. I believe that the baboon thought it was bread and he came sprinting towards her. It all happened so fast that the next thing I knew he had launched at her from about five meters away.

A bull after a mud bath
Photograph: Bryan Havermann

Instinctively I kicked out with my leg, connecting with the shoulder of the baboon and it was enough to knock him down right in front of me. In a flash he was up again and came straight for my throat with his five cm canines bared, and bellowing like an apocalyptic zombie. I knew that if he was able to grab hold of me with his feet and hands, I would be ripped to the bone. Like a trained Kung Fu fighter I punched him on the side of his open jaw and he went down at my feet. I picked up a large stone and made as if I was going to throw it and he backed off. We were extremely lucky that nobody got hurt. Any wild animals that lose their fear of humans are the most dangerous of all.

I have recently had to deal with a hippo that took up residence in a swimming pool. It took almost a week to eventually chase the hippo back into a protected area, with some very scary moments. These incidents included having a mouth opening almost 180 degrees in front of you, with massive ivory fangs wanting to chomp you in half.

A young buffalo bull also wandered into a guest lodge area and was walking round the garden trying to find a way out. One of the drivers of a transport company walked up closer to take a photograph, and the buffalo charged him. He managed to cling onto the horns but was being thrown around like a rag doll. When I received the call to assist we found that some of the staff and the guests had rugby-tackled the buffalo and were all lying on top of him and had hog-tied his feet – a most bizarre sight! The buffalo was successfully loaded onto a vehicle and released back into the reserve. The driver was fortunately okay, bar a few cuts and bruises.

Honey badgers are also masters at gaining entry into locked areas. I have had to deal with many of them that have accessed dwellings and dustbins. I was once alerted to a Honey badger that had been locked in a room, after destroying the pantry door trying to get to the stored food. Peering under the bed I could see it with its head tucked tightly under its front leg, almost as if thinking that if it could not see me, then I could not see it. I opened the sliding door as an escape route but it would not budge. I started poking the Honey badger with a long stick, while I was standing behind an upturned mattress. When it realised that its camouflage was no longer working, it pulled back its lip and growled at me, baring its substantial teeth. It lunged forward suddenly, and I screamed like a girl. Oh man they are scary! I persisted with the poking and it suddenly ran for its freedom, leaving me shaking like a leaf. They have the personality and tenacity of a lion and their reputation as a fearless hunter is well deserved. There are many other wild creatures that interact daily with us in the bush, and it is good to remind ourselves that they have the right to be here, it is their home.....we are the intruders.

Bryan Havemann
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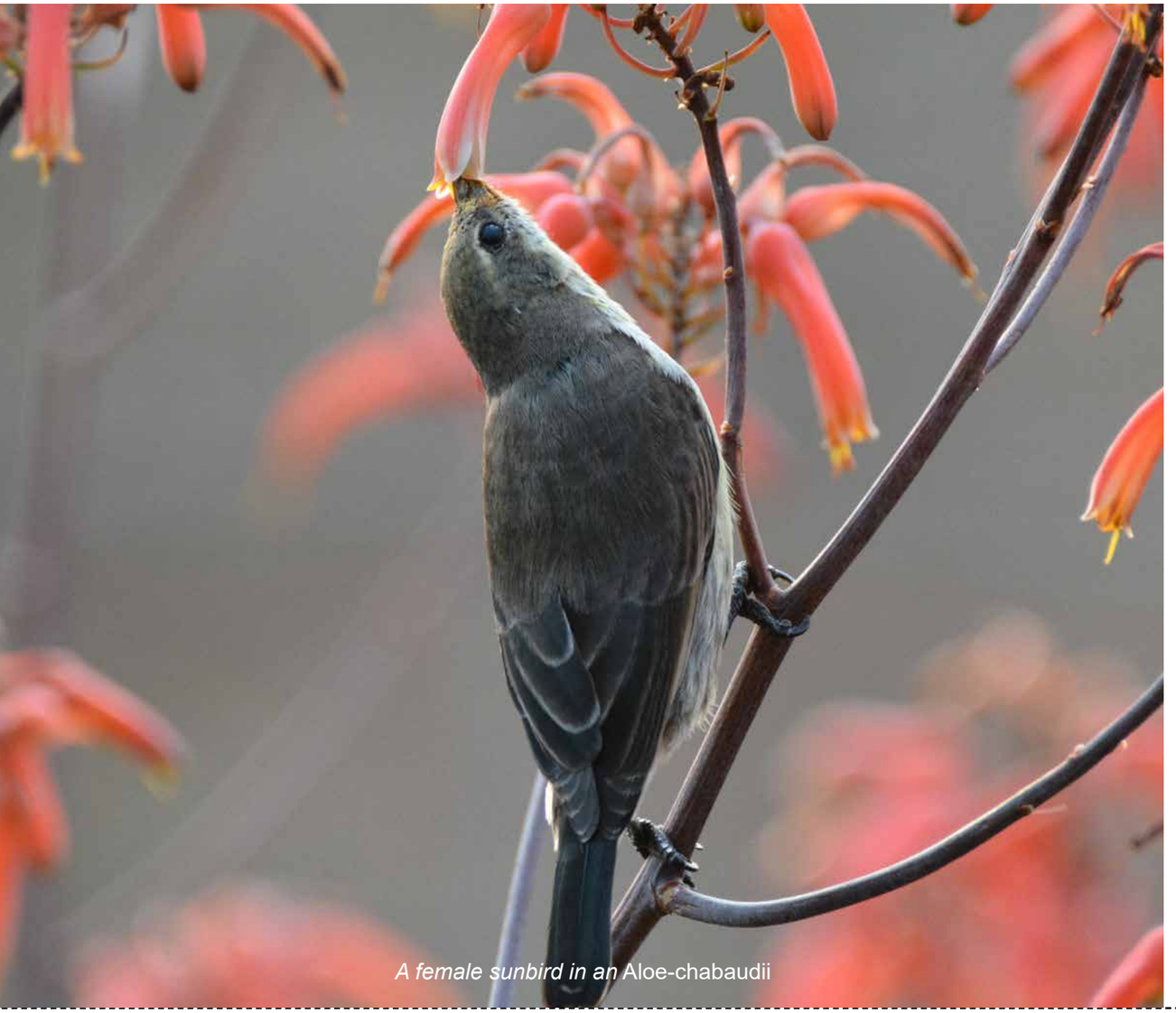
Gardening for wildlife:
NECTAR BEARING PLANTS

As mentioned in the last article, indigenous plants all provide food, shelter and sometimes a breeding place for some form of wildlife or another. We focused on indigenous fruit-bearing plants as a source of food. In this article we take a look at another food source - indigenous plants that bear nectar. Nectar is an invaluable food source that attracts many pollinating insects and birds, and in some areas, small mammals as well, to the wildlife garden.

Heather Balcomb



A female sunbird in an Aloe-chabaudii

A Sooty Blue butterfly visiting Cotula-Sericea

What is nectar?

Nectar is a sugary substance produced by flowering plants to reward their pollinators. This clever strategy seems to have been developed by plants to reduce the waste of pollen, which takes the plant an enormous amount of energy to produce. By providing a reward, plants greatly increase their chances of both their pollen being taken to plants offering the same reward and receiving pollen from other plants of the same species.

Most nectar is produced in glands (nectaries) within the flower, but some plants have extra-floral nectaries situated elsewhere on the plant. The nectar produced by these nectaries is a reward for animals that defend the plants against being eaten by herbivores.

Nectar is made up predominantly of sugars and to varying degrees, amino acids. These amino acids are an important source of nitrogen for insect pollinators, particularly those that feed solely on nectar. So, interestingly, not all nectar is equal, and research shows that nectar feeding creatures have preferences for nectar according to their nutritional requirements. Birds can and do supplement their diet with protein in the form of insects, whereas insects such as butterflies are dependent on nectar with a higher nitrogen content. Bees, which can feed on and digest protein-containing pollen as well, can afford to be a bit less fussy about their choice of nectar, as they are not as dependent on a high amino acid content.

Nectar plants in South Africa

On the basis that not all nectar is equal, we can see that it is important to provide a wide variety of nectar-bearing plants in the wildlife garden. Plants have fine-tuned their offerings to attract those pollinators that will be most effective at successfully pollinating them and, in turn, carrying their pollen to other flowers of the same species.

Nectar for bees and other pollinating insects

Nectar is the primary food source for bees which, in turn, provide us with honey and are vitally important pollinators of fruit and other food crops.

Adult pollinating insects, such as wasps, feed solely on nectar, whilst they prey on other insect pests to sustain the larval stage of their life cycle. Wasps are very valuable in the biological pest control industry, as they keep the numbers of insects that damage crops down without the use of harmful pesticides. They overpower, sting and paralyse these insect pests, which are both incubators for their eggs and food for their larvae.

Some flies also feed on nectar. Scientific experiments have shown that they will change their preferences for plant species depending on their protein requirements.

It also seems that male and female butterflies select different species of flowering plants to visit for nectar. Female butterflies tend to choose flowers with nectar that has a higher protein (amino acid) content, while male butterflies have been found to feed on nectar from species with a lower amino acid content.

On the following page is a list of indigenous plants that are particularly good for providing insect-attracting nectar in the garden.

Trees

Albizia adianthifolia	Flatcrown
Apodytes dimidiata	White Pear
Clerodendrum glabrum	Smooth Tinderwood
Dais cotiniifolia	Pompom Tree
Deinbollia oblongifolia	Dune Soapberry
Ekebergia capensis	Cape Ash
Galpinia transvaalica	Wild Pride of India
Gardenia volkensii	Bushveld Gardenia
Heteropyxis natalensis	Natal Lavender
Nuxia floribunda	Forest Elder
Peltophorum africanum	African Wattle
Ptaeroxylon obliquum	Sneezewood
Schotia brachypetala	Weeping Boerbean
Tabernaemontana elegans	Toad Tree
Turraea floribunda	Honeysuckle Tree
Virgilia oroboides	Blossom Tree
Ziziphus mucronata	Buffalo Thorn

Shrubs

Agathosma ovata	False Buchu
Buddleja salviifolia	Sagewood
Diospyros lycioides	Bluebrush
Dracaena aletriformis	Large-leaved Dragon Tree
Duvernoia adhatodoides	Pistolbush
Ehretia rigida	Puzzle Bush
Freylina tropica	White Honey Bell Bush
Gymnosporia buxifolia	Common Spikethorn
Mitriostigma axillare	Dwarf Loquat
Plectranthus hereroensis	Herero Spur Flower
Portulacaria afra	Porkbush
Psychotria capensis	Black Bird-Berry
Syncholostemon densiflorus	Pink Plume
Vangueria infausta	Wild Medlar

Leonotis leonurus

Synchelostemon densiflorus

Small plants (including bulbs)

Becium obovatum	Cat's Whiskers
Cotula sericea	Silky Buttons
Crassula multicava	Fairy Crassula
Gazania species	Gazanias
Haemanthus albiflos	White Paint Brush
Helichrysum petiolare	Mattress Everlasting
Justicia petiolaris	Blue Justicia
Otholobium decumbens	
Sansevieria aethiopica	Mother-in-law's-Tongue
Sansevieria hyacinthoides	Mother-in-law's-Tongue
Scabiosa africana	Pincushion
Scadoxus puniceus	Paint Brush
Stachys aethiopica	African Stachys

Climbers

Combretum bracteosum	Hiccupnut

Nectar for birds

There are no bird species that feed entirely on nectar. Even nectarivores that feed largely on nectar, supplement their diet with insects, and feed their newly hatched young exclusively on a diet of insects. They gradually add nectar to the diet, increasing the amount as their young mature.

Many flowering plants that have chosen birds to pollinate them, provide a dilute but sugary nectar that has low concentrations of amino acids. Scientists believe that this may be a strategy for plants to encourage the birds to fly further and over a wider area in search of nectar, thus carrying their pollen further afield with them. The flowers are most often tubular, red or orange and not strongly scented, as birds are attracted by colour more than by scent. The nectar feeding bird's beak and tongue are long and narrow, with the tongue being grooved to take up nectar quickly and efficiently from the bottom of the flower.

As one can see, there is a vast array of nectar-bearing plants to choose from, and these lists are by no means exhaustive. If you notice indigenous plants in your wanderings through nature, that insects or birds are particularly busy around, take a picture and see if you can identify it. A good indigenous nursery will most likely be able to help you source the plant or have it in stock.

Place plants so that you can enjoy watching the hive of activity around them, and for butterfly nectar plants, it is particularly important to place them in a warm, sheltered part of the garden, where the butterflies can feed without being buffeted by the wind.

Many of the Aloes and Kniphofias that bear bird-attracting nectar flower best in the sun, so give them pride of place where you can see them too. As nectarivores do not feed solely on nectar, but also on insects, and some on fruit as well, it is important that the wildlife garden also includes plant species that attract many insects, as well as those that bear fruit.

Synchelostemon densiflorus

Heather Balcomb
Random Harvest
www.rh.co.za

Developing a New Generation of Environmentalists. Career pathing youth through the WESSA YES PROGRAMME

YES learners after completing their first module in Environment Practice, Warrenton, Northern Cape

YES learners after training at the Naval Hill education centre, Free State

Learners in De Aar and Keimoes surveying vegetation for a training activity.

ENVIRONMENTAL EDUCATION

The Youth Environmental Services (YES) Programme is an environmentally-focused youth development and training programme funded by the Department of Environmental Affairs (DEA). Having successfully implemented the programme in the Western Cape from 2013 – 2015, WESSA was selected by the DEA to run the programme in both the Northern Cape and Free State from 2017 – 2020.

Lutfiyah Suliman & Morgan Griffiths

The programme provides training and workplace-based experience for 135 unemployed youth per year, per province over this two-year period. Participants were inducted into the programme in February and March 2018 (in the Northern Cape and Free State nodes respectively) and are part of the programme for a one- year period. They receive accredited and non-accredited training and integrated learning opportunities in a mentored workplace.

The National Development Plan aims to eliminate poverty and reduce inequality by 2030. South Africa can realise these goals by growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society. Conservation and tourism are two sectors that can contribute significantly to these goals. These sectors rely significantly on biodiversity assets, healthy ecological infrastructure and the protected area network; being a significant draw for tourists, generating numerous employment opportunities and contributing millions of Rands a year to local revenue. To sustain protection to our wilderness areas, a diverse wildlife economy needs to be stimulated and capacitated

Unemployment amongst youth (18-34) in South Africa is at a staggering 38.2 % in 2018. Youth living in areas with the poorest socio-economic circumstances and high unemployment rates were the target for YES recruitment across the municipalities. We also aimed to select graduates who had never attained their first job. In many areas, graduate numbers were low, with matriculants with biological and physical sciences subjects. We worked with provincial and local municipal structures to advertise the positions, interview and fairly select the participants.

The training interventions centre on the National Certificate in Nature Conservation: Guardianship; focussing on Tourism Guiding skills and knowledge building in environmental practices.

This training is provided by WESSA's Workskills Unit. The training aims to address skills and competencies, enabling entry-level employment and positions, qualifying learners to access opportunities for further development and training in the nature conservation, eco-tourism and environmental education sectors. The typical type of work that YES participants get involved in includes waste management, conservation general assistant work, ranger activities and guiding, community liaison and stewardship work, bio-monitoring, alien species recording and control, compliance monitoring, supportive administration work, ecotourism support work, environmental education, support work in schools, and awareness-raising in their own communities via linking with other NGOs, schools, community-based organisations and faith groups.

Workplace experience

The second pillar of the YES Programme is the year of workplace learning and experience gained with host organisations. Many youths fail to enter the working world because they don't have any work experience. WESSA has been fortunate to secure a wide range of hosts across the Northern Cape (Augrabies, Keimoes, Kakamas, Kenhardt, Barkly West, Warrenton, Kimberley, De Aar and Warrenton) and the Free State (Bloemfontein, Botshabelo, Boshof, Dealsville, Theunissen, Winberg, Verkeerdevlei and Brandfort).

We are grateful to the hosts that have given these youths an opportunity to learn from them: SANBI Botanical Gardens, national parks, provincial nature reserves, provincial environmental departments, golf courses, hotels, recyclers, SPCA, municipalities, environmental consultancies, museums, Reach for A Dream and community-based environmental organisations.

Through their work-experience year, the participants are exposed to aspects of practical environmental management that they would have not had access to, just the theoretical training. Their working year includes a formal aspect of mentoring by host supervisors, to help them accelerate their career-pathing. Being a part of a professional working environment has already begun to deepen candidates' ability to organise and manage themselves and their resources to take care of their communities and environment.

Community service

The third pillar of the YES programme is the community service that each participant must complete. For two days a month, every month, participants engage with the issues facing their communities through their chosen community service activity. Thus far these initiatives have focused on three areas: supporting local care institutions such as crèches and old-age homes; environmental education at schools and within the community awareness-raising (door-to-

door), and stepping in to assist with service delivery – which has ranged from clean-ups around the community, admin assistance at clinics, to installing electricity in RDP households.

YES learners installing electricity for a household in Warrenton, Northern Cape

Galaletsang Sehako, a Warrenton YES candidate tells of one of her community service experiences: "Friday's community service was done by myself, Palesa Motshabi, Mosela Mphafi, Mpho Shomoleile and Lerato Motshele at Warrenton. We decided to help the family by installing electricity for them and we were assisted by our supervisor and municipal team member- we learned a lot." Galaletsang added; "And it does not end here; we want to help in this more often because electricity is a problem in our community."

Making the environment accessible

To fully appreciate the importance of good environmental management and conservation, creating opportunities which enable learners to develop a sense of ownership of the environment is key. For many learners on this environmental programme, the irony lies in the limited opportunities that they have had thus far to engage with conservation efforts. Travel outside of town is costly, and most learners have never even had the opportunity to even visit a national park! That is until now, where WESSA is looking to increase these opportunities through the YES Programme. In May, a field trip to the Mokala National Park in the Northern Cape was arranged for 15 candidates from ***Live Love Believe***, an NGO host in Barkly West.

YES candidate Precious Molopi shared her experience: "It was a day well spent. The staff there are very friendly and helpful. We had a workshop

WE ASKED A FEW PARTICIPANTS TO SHARE THEIR PERSPECTIVES ON THE PROGRAMME SINCE INDUCTION

Lebogang Theletsane, 27 – Magareng Municipality/ Admin and Reception

Do you think the training is useful?
Very much. Some things are relatable, so I think that it's something that I can use in the long run.

What new work skills have you learnt?
Operating a switchboard, I think it's the biggest thing that I've learnt so far, and we're working so much with Excel and it's something that is a fundamental skill.

Do you think this programme is useful for the community?
I think so, because we have so many environmental issues that we have to work towards solving, as the community. Some people are ignorant, some want to work towards solving the problems. If we can work together as a community, maybe we can solve some of those problems.

Obeth Obakeng Modise, 29 - Magareng Municipality/ Library services

Do you think the training is useful?
I learned a lot from WESSA YES- I didn't know about different kind of plants, or environmental impacts etc. The training is useful but it's a lot of work.

Do you think your chances of finding a job after YES will be better?
I think so, yes.

What new work skills have you learnt?
I've learnt how to process the digital information, how to pack books and number them. I already have an N4 so I didn't need to learn how to use the computer.

Do you think this programme is useful for the community?
Yes- it teaches us about the environment- how to take care of the earth and environment. It's a good thing because we as participants can go to the community and teach them about how to take care of the environment - and useful things like how to make a profit out of waste, classification of waste and so forth.

with them, where they told us more about what they do and also touched on career guidance. We went on a tour of the place and the facilities - that was my favourite part. Afterwards we relaxed at a picnic spot and reminisced about the animals we had seen - fun and educational."

We are well under way with the training and mentorship of these young people, aiming to give them the skills and support needed to establish an environmental career path. Looking ahead to the rest of the 2018 programme, participants will continue to receive support in developing their career goals

An important aspect of the programme will be developing exit opportunities for each student. These exits may be in the form of a job at the institution in which they are currently placed, the development of business skills and SMMEs, or enrolment for further study. To make these exit opportunities a reality, the WESSA team members are hard at work with networking and planning for small business skills training opportunities, preparing information sessions with tertiary institutes, and supporting the host projects which ultimately nurture the skills development required for the future jobs market.

Building a playground in De Aar

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Morgan Griffiths
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SOMETHING OF INTEREST FOR TEACHERS WITH A PASSION FOR ENVIRONMENTAL EDUCATION

Dr Lynn Hurry

Are you an educator or a parent or perhaps a grand-parent with a passion for encouraging young people to think more fully about the ecological world in which they live? Are you looking for new and exciting ways of encouraging learners to think and to act rather than just to learn ? If you are any of these then Dr Frank Opie's latest work - Rousing The Sleeper. A book for a changing world might be the very resource that you're looking for.

Rousing the Sleeper is a resource that is centered on Frank's understanding that Environmental Education, while emphasising values and skills, is a learning area in which values are caught rather than taught. And his beautifully illustrated work is a perfect example of this philosophy.

School curricula (what learners learn and HOW they learn) may take time to change but whether they do or not, *Rousing the Sleeper*, by helping to develop thinking skills amongst teachers, will enable them to face whatever curriculum changes may be coming their way.

Rousing The Sleeper Omnibus Edition 2018, A Book For A Changing World has just been released on the Internet. For a full description of the book, why not take a look at this website?
https://www.amazon.com/Rousing-Sleeper-values-building-easy-use/dp/1542702321/ref=sr_1_1?ie=UTF8&qid=1539006141&sr=8-1&keywords=rousing+the+sleeper
If you would like to see Dr Opie's full media statement, please send me an e-mail to:
lynn@ecology.co.za

OIL RECYCLING ROCKS

Dr Cathy Dzerefos

In over ten years of working on the WESSA Eco-Schools Programme, the subject of oil has only come up as a natural resource that should be used sparingly and as an essential component of living organisms. Since 2016, the ROSE Foundation and WESSA have been working on creating greater awareness around the recycling of used oil and precautions to safeguard human health and the environment.

Rose Foundation CEO Bubele Nyiba with Lorraine McGibbon and Donavan Fullard from WESSA at the WC 2016 Eco-schools Awards

We are all familiar with edible oils used in the kitchen, but less known, are the large variety of oils engineered since the Industrial Revolution by humans. Inedible oils are frequently invented with specific properties with the purpose to lubricate the movable parts of vehicles, machinery and turbines. Human-engineered oils have interesting names that allude to their chemical structure and properties, such as polyol ester fluids, polyglycolic fluids and phosphate ester fire-resistant fluids.

The problem

Every day, lubricating oil is drained from engines, gearboxes, hydraulic systems, turbines and air compressors. This oil is dirty from the movable parts of the machine, vehicle or turbine which create wear debris like iron, tin and copper. Heavy metals like zinc and lead can also end up in used oil when it is used in conjunction with petrol, degreasers or solvents. Probably the most dangerous molecules in used oil are polycyclic aromatic hydrocarbons which are generated by petrol engines. Used oil is classified as a hazardous waste, due to the harmful compounds and carcinogens which it may contain. Oil is especially dangerous, as it may degrade to an acid or denature into chemicals with unknown properties that can harm the health of people and wildlife or spoil drinking water. As the familiar refrain on the radio keeps telling us "One litre of used oil can contaminate a million litres of water." As South Africa is a water scarce country, pouring oil down a drain is a criminal offence as it harms our water security and such an offence could result in a prison sentence of 15 years.

Be the solution

It is essential that organisations and individuals take responsibility for the oil used in their area of operation and in their vehicles and machinery. The right thing to do is to make sure that used oil is contained and does not end up in drains, the soil, rivers or the sea. When booking a vehicle for a service, take the time to investigate whether the service provider is storing old oil in sealed containers and if provision has been made to protect the stores from flood and fire. Steel or plastic flow bins make effective storage vessels for used oil, however, it is essential that the container did not previously hold cleaners, solvents, fuels, paint or bleach. Mixing oil with other chemicals, results in a mixture that is non-recyclable, as well as unpredictable and flammable. Oil recycling containers should be clearly labelled as "Used Lube Oil" and should be easily accessible for collection. The containers should be kept in a clean area away from heat or sources of ignition and preferably under cover.

Any workshop that conducts four car oil changes a day, or one truck oil change a day should be registered on the South African Waste Information System (SAWIS). This registration is required when over 20kg of hazardous waste is handled daily. SAWIS was developed by the Department of Environmental Affairs in 2005. It is a system used by government and industry to capture data on the tonnages of waste generated, recycled and disposed of in South Africa on a monthly and annual basis.

Workshops can call NORA-SA on 086-066-7272 to collect oil for recycling. Alternatively, a full list of licensed collectors and processors can be found at https://bit.ly/2rh4ZAV. ROSE registered collectors will issue a Safe Disposal Certificate and Hazardous Waste Manifest thereby fulfilling the requirements of reporting as stipulated by the Waste Act, 2008.

Unfortunately, there are unlicensed collectors, operating illegally, who resell used oil as burner fuel for furnaces, wood preservation or dust suppression. Burning used oil before it has been cleaned of heavy metals releases compounds into the atmosphere which are harmful to workers and local communities. Unscrupulous collectors may offer more per litre of used oil purchased but then under-declare the volumes collected, thereby paying the same total that a licensed collector would have paid.

Engaging schools

Experienced WESSA environmental practitioners, spearheaded the production of two teaching resources for Grades 4 to 6 as well as Grades 7 to 9. These colourful resources have appropriate content and come with ready to use worksheets. Moreover, the resources are linked to the national curriculum to assist teachers to plan and implement informative and useful lessons. Currently the resources are accessible on the WESSA Eco-Schools 2018 toolkit under the theme WASTE or on request from cathy@wessa.co.za.

Competitions to encourage learners to think about the properties and hazards of oils have been planned by WESSA and the ROSE Foundation for 2017 to 2019. The "Oil Recycling Rocks 2018" competition will be closing on 13 October 2018 which is African Penguin Awareness Day. The choice of this environmental day will allow the partners to capitalize on the emotional attachment and regard that the public have for penguins. Ella Bella Constantinides-Leite, Director of the Miss Earth South Africa Programme, says that cleaning penguins after a marine oil spill is heart breaking since the penguins were traumatised and could not understand what had happened to them. She urges everyone to tread lightly on the planet and be environmentally responsible.

For more information contact the ROSE Foundation on (021) 448 7492
www.rosefoundation.org.za

Cathy Dzerefos
cathy@wessa.co.za

DRIVING THE RECYCLING OF USED OIL SINCE 1994

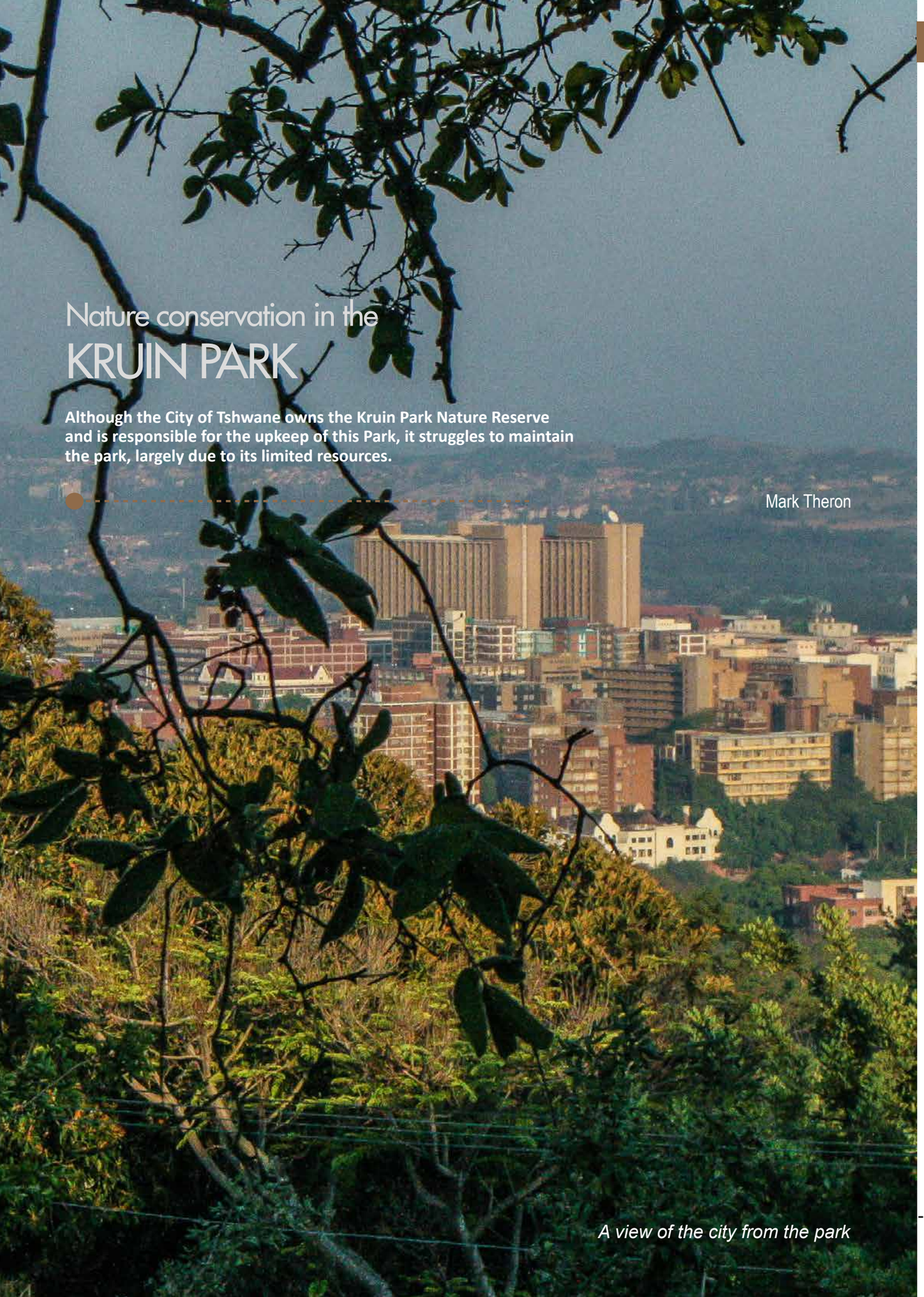
R·O·S·E

The ROSE Foundation (Recycling Oil Saves the Environment), is a national non-profit organisation established to promote and encourage the environmentally responsible management of used oils and related waste in South Africa. Funded by the major stakeholders in the lubricants industry, to enable them to meet their environmental and extended producer responsibilities, ROSE proves that sustainable recycling protects the environment and creates widespread employment opportunities.

Nature conservation in the KRUIN PARK

Although the City of Tshwane owns the Kruin Park Nature Reserve and is responsible for the upkeep of this Park, it struggles to maintain the park, largely due to its limited resources.

Mark Theron



A view of the city from the park

Over the years, members of the Friends of Kruin Park have increasingly become involved in ways that support the Nature Conservation Division, in its responsibility to manage and maintain the reserve, mainly because the city's funding of nature conservation is inadequate. About twenty of our members of the Friends of Kruin Park do just about all the work that takes place in Kruin Park.

We keep the paths open, and pleasant to use, and we are active in work parties that focus on the removing and controlling alien vegetation. We use herbicides and are fortunate to have in our group experienced members with experience and plant knowledge to do the spraying. When we cut and paint invasive plants, someone with knowledge and experience is always present.

As a result of our efforts, we have made huge inroads into the population of Wattles, Lantanas, Bugweed, Cat's Claw Creeper and several other less troublesome Aliens.

Although the Sand Olive, *Dodonaea viscosa*, is indigenous to South Africa it is far less common in the Central Highveld, and it has already invaded too much of Kruin Park's Bankenveld grassland. We have focused on reducing their numbers, hoping to preserve the wild flowers in the reserve. Another indigenous culprit that still needs our attention is the Pencil Plant, *Euphorbia tirucalli*, and we have made a start with removing this plant.

We have arranged several events including guided walks that focus on identifying the wildflowers, but we point out the trees and the birds as we move through. We have also had a very entertaining and informative talk on the Birds of Kruin Park.

Social events

Apart from this serious work in Kruin Park, we arrange social events. Since the start of the year we have had two social events, an event to see and enjoy the so-called Super moon that coincided with it being a blue moon, and the second full moon in January, and a recent Earth Hour Social.

Another important activity that has become the responsibility of the park is to remove litter on a weekly basis. At the same time, we check the perimeter fences, and repair the holes made by criminals trying to use the park as a getaway or hideaway.

Dealing with dense thickets in the forest areas

There are areas in the reserve where thickets of Velvet Rock-Alder, *Canthium gilfillanii* and to a lesser extent Rock-Alder, *Afrocanthium mundianum*, are so dense that it's becoming difficult to get to the Lantanas and Cat's Claw Creeper. These two aliens therefore continue to flourish in these difficult places. Recognising that there is no natural system to prevent the afforestation of the Bankenveld Grassland trees in Kruin Park, we, the Friends of Kruin Park, hope to contact anyone who is researching appropriate forest control practices for use in the nature reserve.

A checklist of the Flora of Kruin Park

To provide a permanent reference resource for the future, one of our members is presently working to produce a checklist of the Flora of Kruin Park, that also lists the weeds and invasives. The document already lists 148 plants, sadly more weeds and invasive plants. This is impressive for a nine-hectare nature reserve close to the heart of the city.

Most of the plants we have found are in the open grassland but some are growing in light and even quite dense forest conditions.

Barleria pretoriensis Gladiolus pretoriensis

The supermoon

Mark Theron
Chairperson: Friends of Kruin Park
legodimong@mweb.co.za

RED-KNOBBED COOT

Photographs: Albert Froneman

A black, duck-like bird with a white bill and white unfeathered forehead. They are a common to abundant resident on dams, pans and lakes, virtually any stretch of fresh water except fast-flowing rivers, in southern Africa.

Willie Froneman

The Red-knobbed Coot, one of nine species worldwide, is the coot of Africa. It is an abundant water bird in southern Africa. The Red-knobbed Coot population on some water bodies can number thousands of these gregarious, inoffensive weed-eating birds.

Both sexes are alike in plumage colouration; however, the female is slightly smaller in size. In the adult birds, the head, neck and tail feathers are black, and the remainder of the upper parts are a dark slaty grey to black. The bird's underparts are mostly dark grey, however the lower flanks to under tail coverts are black. The flight feathers of the Red-knobbed Coot are dark grey-brown, with the outer webs slaty. The primary feathers have black towards the tips, and in some birds, there are a few white-tipped feathers at the carpal joint. The bill and frontal shield are white, occasionally with a bluish tinge. This horny frontal shield extends back beyond the bill. The two red knobs on top of the shield, on the forehead, become larger and more noticeable when breeding, otherwise they are inconspicuous, and are only visible at close range. The Red-knobbed Coot has red legs and toes, which are notable for having the lateral fringes of the toes expanded into well-developed lobes, as an adaptation for swimming and diving.

The immature birds are ashy brown to greyish on the sides of the head and neck. The flanks of the immature Red-knobbed Coot are dark olive-brown to mottled off-white. The chin and throat are whitish, with the remainder of the underparts pale ash grey, palest at centre of the bird's belly. The eyes are dull grey to dark brown, with the frontal shield smaller than that of adults. The legs of the juvenile are a dark grey.

The Red-knobbed Coot's call is a harsh, metallic like *claak*. They also give a wide variety of calls, the significance and function of many of these calls are largely unknown. Their common contact calls include a sharp, shrill *kik* or *krik*, a low reedy *kek* or a trilled *krrt*, a double *clukuk* and may also include a deep *kup*

with reedy overtone. Alarm calls include a metallic, ringing *cro-oo-k,* and group predator alarm call is a nasal high-pitched *hue-hue-hue*.

The diet of the Red-knobbed Coots is vegetarian. They feed by dipping under water to pull up submerged aquatic plants, mainly the plant *Potamogeton pectinatus*. A great many dams and water bodies have been enriched by agricultural fertiliser and other nutrients draining into them, a process called catrophication. Many of these dams and water bodies are rapidly colonised by *Potamogeton pectinatus*, to the fisherman's disgust, but to the coot's delight. It eats mainly aquatic plants but derives most of its energy and nutrients from the small animals living on these plants. They are also known to graze on grass lawns, especially liking the filamentous algae, macroscopic algae, aquatic ferns, stems, flowers and aerial roots of knuckle-beans, water hyacinth and torpedo grass. They also eat bivalve molluscs and campers' scraps, insects and seeds.

Sometimes things under water get the coots first! A most unfortunate end for some coots, who had been ringed at Barberspan in the Northwest Province, and later recovered in KwaZulu Natal, from the stomach of a Nile Crocodile. This fact was established when the crocodile, itself a victim of an unfortunate end, was run over by a tractor while walking in a sugarcane field.

The Red-knobbed Coots are usually in flocks, are highly gregarious when not breeding, and on large water surfaces, and flocks can number over 1 000 birds. They spend most of their time swimming in open water, often chasing each other by pattering across water. They also stand on the shoreline to preen. In the breeding season they pair off.

All southern Africa's natural systems and wetlands have been impacted by man. The utilisation and management of the subcontinents water resources have become a massive industry. Practically every water catchment in the region has been subject to the manipulation of its water resources. In this process some aquatic systems have been winners and other losers, and so the water birds have benefitted or been victims. The Red-knobbed Coot is one of the species that have benefitted from this. Unfortunately, many water bird species are sadly victims of this water manipulation by man.

Not one water bird species is endemic to South Africa, many that are found here, range widely across Africa with some extending to other continents. The Red-knobbed Coot being one and is distributed in southern Spain south to Morocco and Algiers with isolated populations in Ethiopia, and Madagascar. The Red-knobbed Coot is largely absent from the northern Karoo, Kalahari and most of the arid parts of Botswana and Namibia.

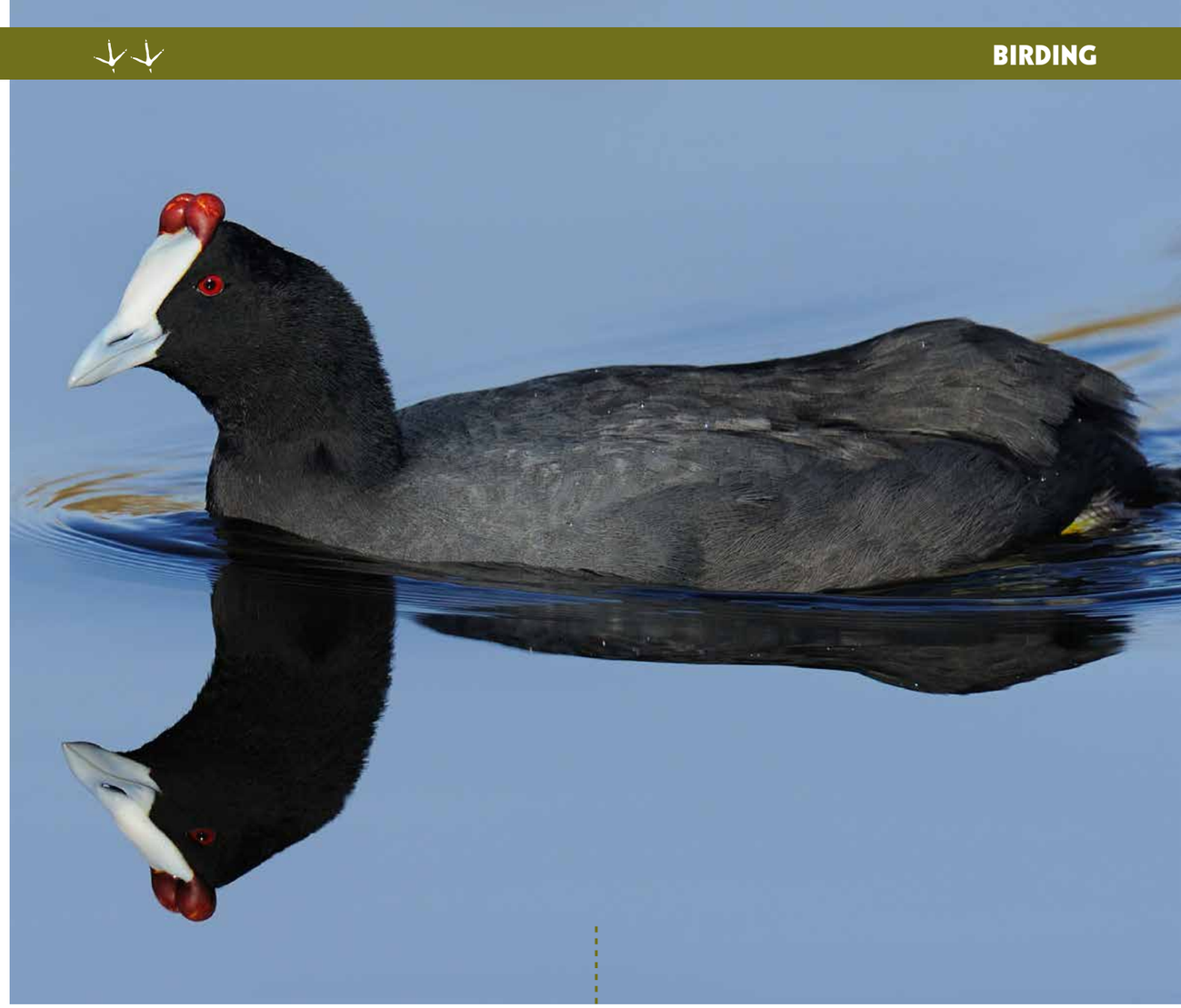
They are a success story for dam makers. There is scarcely a dam, from farm dams to large lakes, the like of Lake Kariba on the mighty Zambezi River, on which this species is not present. The highest tally of coots on record on a single water body exceeds 45 000. They are one of the most conspicuous, common and widespread of southern Africa's water birds. Its black plumage renders it unmistakable and its vegetarian diet enables it to feel at home on virtually any water body. They choose open fresh water habitats, that are confined to non-saline lacustrine waters.

Although they look barely capable of sustained flight, they are inveterate travellers across the night skies and find newly filled dams with unerring predictability. Ringing has shown that they commute up and down the sub-continent, one was even sighted in the open sea 15 kilometres off shore, reaffirming the adage 'as crazy as a coot'. Numbers fluctuate markedly according to environmental conditions. In suitable environments they become abundant residents and highly nomadic, but without regular migrations. They are found on almost any inland waters, especially those with floating water plants, less commonly on rivers and coastal lagoons.

The Red-knobbed Coot seldom takes full flight, pitching onto the belly when landing on water. Ducks pitch onto their feet when landing. Once airborne the coot flies strongly, feet extending well beyond tail.

They seem to breed all year round, when suitable conditions prevail, normally mid-summer. They are monogamous, facultative cooperative breeders, solitary nesting and strongly territorial. The Red-knobbed Coot is very pugnacious during the breeding season, fighting and quarrelling with any bird that comes near their nest. They defend their territory with a charging attack (swimming towards the intruder at a high speed), with a more intense pattering attack (running across water with wings flapping). There seems to be no courtship display. Paired birds often allopreen.

The nest is built by both sexes, occasionally with help of juveniles. It is a floating mound of vegetation of sedge stems, grasses, leaves, weed stems or reeds, using large quantities of vegetation. The nest has a ramp on one side and a deep open cup on top, lined with finer materials. The nest of the Red-knobbed Coot is out in the open or among emergent vegetation. Nesting material is added during incubation. The nest may be defended pugnaciously, and distraction displays are recorded. These birds are known to build



'false nests' and rafts as resting platforms. They are particularly belligerent toward unrelated water birds.

The usual clutch is two to six eggs. Eggs are buff or yellowish-stone in colour, with small purplish brown dots. Both sexes incubate for approximately 22 days, with frequent changes.

Newly hatched young of the Red-knobbed Coot is mostly covered with ashy to grey black down above, with bare pink and blue on the crown. The newly hatched bird has underparts of pale grey, tinged with silvery or blue grey colour. The neck, mantle and back are a golden yellow. The bare skin above the eye is blue on the newly hatched coot, with the bare on the head bright pink. The bill is red, tipped white and black, with eyes brown, and legs and feet pale grey green. Breast feathers emerge first, flight feathers last. They are precocial and able to leave the nest at day one, and able to dive soon after. The fledglings are fed and cared for by both adults. The fledging period is estimated to be about 55 to 60 days.

Many fledglings fail to survive to adulthood through predation (the Grey Heron is the only identified predator). In Gauteng, eggs contain light levels of heavy metals, very likely leading to poor hatching success, and early chick mortality. Adult birds are also attacked by domestic dogs and cats.

Willie Froneman
Birding Expert & Enthusiast
willie.froneman@gmail.com

Leaving a LEGACY

WESSA has played a key role in the conservation of our country's natural heritage. Our mission is and remains to implement high-impact environmental and conservation projects, which promote public participation in caring for the Earth. As an NGO, we depend on funding from individuals and businesses to make possible the work we do. Unrestricted gifts allow us more flexibility in dealing with environmental priorities. Below are some examples of options you might like to consider.

All of us would like to leave this world knowing we're passing on a healthy and thriving planet to our children and others. One of the most significant ways to show your support and passion for the conservation of the earth, and all that lives upon it, is to leave a bequest to WESSA in your will.

Making a will ensures that everything you have worked hard for in your life is passed on to your loved ones and the causes you care about. A bequest is a personal gift of great importance and a lasting legacy to your beliefs and values.

It is thanks to bequests made that WESSA is able to run hundreds of conservation projects, protect many species and improve the quality of people's lives – today and into the future.

If you already have a will it is easy to add a codicil which names WESSA (the Wildlife and Environment Society of South Africa) as a beneficiary.

A Specific Sum:
This is the simplest form of bequest. However, it does not allow for inflation or charges within your estate.

A Residual:
After making provision for your family and friends, you may wish to leave the unallocated portion of your estate to WESSA.

A Percentage:
Often it is difficult to predict the final value of your estate. By giving a percentage of the total, rather than a fixed amount, you can be sure that all your beneficiaries will receive the stipulated share.

A Gift of Real Estate or Property:
This may be made outright, or you can arrange for the property to pass on to WESSA after the death of another beneficiary, such as your spouse.

An Assurance or Endowment Policy:
Often an insurance policy taken out years ago loses its relevance as you get older. Such a policy may be ceded to WESSA as the beneficiary.

COMPANY REGISTRATION NUMBERS
Reg No. 1933/004658/08
(Incorporated Association not for gain)
Registration Number in Terms of the Non-Profit Organisation Act 1997: 000–716NPO
Tax Exemption Number:
18/11/13/1903

WESSA
MEMBERSHIP

WESSA
PEOPLE CARING FOR THE EARTH

WESSA is one of South Africa's oldest membership-supported, non-governmental organisations and for over 90 years has played a key role in the conservation of our country, helping to ensure sustainability for present and future generations through environmental action; education programmes; and human capacity development to empower individuals and communities to make sustainable choices. Friends Groups and Affiliate members make a valuable contribution to the work WESSA does in the areas of conservation and education as well as strengthening the environmental movement by networking and actively working in communities at a grass roots level.

INDIVIDUAL

OPTION	FEE P.A	DESCRIPTION	DETAILS
Level A	R500	Full benefit	Membership + African Wildlife & Environment and EnviroKids, e-communications
Level B	R370	African Wildlife	Membership + African Wildlife & Environment, e-communications
Level C	R260	EnviroKids	Membership + EnviroKids, e-communications
Level D	R270	Discounted	Membership + African Wildlife & Environment, e-communications * Under 25 and over 60 only
Level E	R150	Basic	Membership, e-communications, add on magazines as required
Level F	NIL	Supporter	Free supporter. Optional donation from R50, e-communications
Add-on mags			EnviroKids @ R130 per annum / African Wildlife @ R180 per annum

Members receive:

- Portal access, e-communications: newsletters and newsflashes. Certain areas may also receive communications from their local regions or branch. According to the levels subscribed to above, *African Wildlife* and *EnviroKids* at a special subscription price for members.

WESSA's membership portal:

Full access for Levels A – E and limited access for Level F. Log on to the WESSA membership portal at www.wessalife.org.za to join member groups of interest to you; participate in group and branch activities; connect with environmental initiatives and projects; edit your membership details whenever necessary … and much more.

SCHOOLS

OPTION	FEE P.A	DESCRIPTION
Level 08 (S1)	R530	Membership + discounted EnviroKids x 2 and African Wildlife & Environment x 1, e-communications
Level 08 (S2)	R350	Membership + discounted EnviroKids x 2, e-communications
Level 08 (S3)	R400	Membership + discounted African Wildlife & Environment and EnviroKids, e-communications
Add-on mags		EnviroKids @ R130 per annum / African Wildlife @ R180 per annum

- A WESSA School Member logo for use on stationery and website
- Learners, teachers and parents qualify for a reduced rate should they wish to become WESSA members

FRIENDS GROUPS & AFFILATES

R 560.00 per annum. WESSA Friends Group and Affiliate members qualify for use of an affiliate member logo, full portal access, quarterly editions of African Wildlife and EnviroKids magazines plus newsletters & activity newsflashes. Their members also qualify for a special reduced group rate should they wish to become full WESSA Members, or they can sign up as free WESSA supporters to receive newsletters and newsflashes about events and activities.

BUSINESS

PLATINUM R35 000 p.a	GOLD R20 000 p.a	SILVER R8 000 p.a	BRONZE R3 000 p.a	SMALL R1 500 p.a
Member fee R1 500	Member fee R1 500	Member fee R1 500	Member fee R1 500	Member fee R1 500
Contribution R33 500	Contribution R18 500	Contribution R6 500	Contribution R1 500	Contribution optional

Membership fee includes: Membership subscription; WESSA business member logo according to level of membership; Certificate of Acknowledgement; Acknowledgement of support on the WESSA website and in the WESSA Annual Review; Quarterly issues of magazines: African Wildlife & Environment and EnviroKids (one of each); E-communications: Newsletters and activity newsflashes.
Platinum to Bronze Levels: Contribution as indicated above. This contribution determines the level of membership and provides invaluable support for WESSA's many environmental projects. If preferred, this can be processed as a donation with a Section 18A Tax Certificate.
Small Business Level: Contribution optional. In support of WESSA's work, any donation amount will be much appreciated and can be added to the membership fee. A Section 18A Tax Certificate will be issued on request.
WESSA is an accredited facilitator of Socio Economic Development and more than 89% of the direct beneficiaries of WESSA's projects are Black South African citizens as defined by current B-BBEE legislation.

Magaliesberg central site of the vulture restaurant. Photograph: John Wesson

NATIONAL MEMBERSHIP
100 Brand Road Durban 4001
Tel: 031 201 3126 ext. 1 Fax to email: 086 519 2018
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Jenny Duvenage: jenny.duvenage@wessa.co.za | John Wesson: jwesson@wessanorth.co.za

RETURN WITH PROOF OF PAYMENT TO:
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Account No: 62 219 969 732
Deposit Reference: Subscribers surname & initials + AWE

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Level B	INT R290	SADC R215 (African Wildlife & Environment)
Level C	INT R175	SADC R140 (EnviroKids)

SADC COUNTRIES: Angola, Botswana, Burundi, Comoros, Congo (DRC), Congo (Peoples Rep), Gabon, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Reunion, Rwanda, Seychelles, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

If paying in a foreign currency R155 bank charges must be added to total amount due. Bank charges are not applicable to common currency African countries i.e. Lesotho, Namibia and Swaziland. They do not apply if payment is made in ZAR from a local bank account or credit card.

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