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Issue 1, January 2021

BIODIVERSITY & ENVIRONMENT AFRICA

CONSERVATION NEWS

ENDANGERED RAPTORS

HEALTH & WELLBEING

Stress, sleep and sunlight

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Dwarf chameleons

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Cover image: A male Ngome Dwarf Chameleon *Bradypodion ngomeense*

Photo: Warren Schmidt

MISSION

Biodiversity & Environment Africa (publication) strives to present accurate and informative news on biodiversity and environmental issues from across the African continent. We aim to disseminate academic research findings and communicate this in an informative and understandable format to our readers, as well as highlighting important **conservation and environmental issues.**

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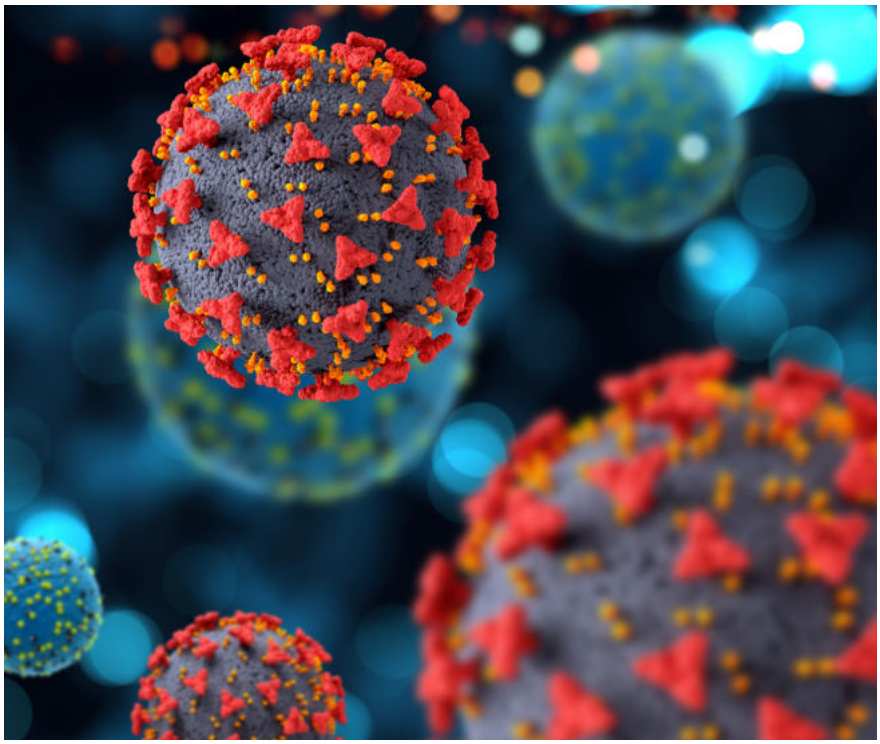
COVID-19 – sifting fact from fiction

Welcome to Issue 1 of *Biodiversity & Environment Africa*. This new digital PDF publication has evolved and branched out from the seeds of Biodiversity Nature, which were planted slightly over a decade ago.
To read more about what *B&E Africa* offers, see page 16.

The world has changed, literally overnight. Despite ample warnings from epidemiologists, and other scientists, over many years, about facing a futuristic pandemic, very few of us have given these warnings much thought or attention. It is understandable – humans have a reactive predisposition to crisis rather than a proactive one in preventing it. Most of us are simply caught up in a daily race to pay bills, nourish ourselves and our families, educate our children, and strive for financial security.

Covid-19 is more than a wake-up call. It is a hard, cold, slap in the face. As I write this piece, an estimated two million people have succumbed to SARS Covid-19. It is completely unknown how many people have contracted or distributed the virus, as many cases are asymptomatic and testing across the population is not logistically possible. The devastating economic impact, however, has affected us all in many ways, perhaps far greater than the disease itself. Economists have been scrambling to calculate the economic fallout and estimates vary dramatically depending on which model they are using. There are so many variables and outcomes that even the best statistical modelling cannot predict with certainty where we will be at the end of the year, nor how long it will take to emerge triumphantly from recession.



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The viral outbreak was officially reported to the World Health Organization country office in China on 31 December 2019. By 30 January 2020, the WHO declared the outbreak a "Public Health Emergency of International Concern". On 11 March, the WHO declared SARS Covid-19 a global pandemic.

It was only around this time that the world started waking up to the reality of how rapidly this virus was spreading and the deadly impact it was having on some nations, most notably Italy and Spain, and later the United Kingdom and the United States, and subsequently, the rest of the world.

International borders closed rapidly as governments started instituting national emergency plans. Some governments were complacent, and underestimated the severity of the virus, but quickly changed strategy when death rates started soaring among their citizens. 2020 will surely go down in historical archives as the year of political blunders and contradictions.

The climate of uncertainty and contradictory statements issued by world leaders and medical experts was the perfect breeding ground for conspiracy theories and misleading news to flourish. With lockdowns across the globe, social media platforms have gone into overdrive in spreading misinformation, and so too have mainstream media. I have watched, morbidly fascinated, how high-ranking politicians, doctors, statisticians, epidemiologists, and other highly qualified and degreed experts have repeatedly argued for and against the severity of Covid-19.

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Big media platforms and academic journals have logged a complete record of this mayhem. So perhaps it is unfair to be overly critical of the conspiracy theorists or armchair specialists when they are being spoon-fed misinformation from "reputable" sources.

What is needed is reliable and trustworthy information. We need to understand the science behind statistics and how this is measured up against the impact of SARS Covid-19. I was most dismayed when I read an article published in *The New York Times* on 14 April 2020, of how health officials were adding mortality rates to Covid-19, without having carried out tests on the victims. That is data manipulation plain and simple, and the very thing that leads to misinformation, false news, and conspiracy theories. Scientists, health officials and statisticians need to be thorough in their assessments and data interpretation. There is no denying the severity of SARS Covid-19, but we need to question how data is obtained and interpreted. I do not doubt that scientists will be studying the figures for months to come, and academic rigour will ensure we eventually obtain correct and reliable information.

An article published by the World Economic Forum, originally from Reuters, highlighted the lack of academic rigour and peer review in numerous academic publications. There are currently hundreds of medical and scientific studies focused on SARS Covid-19 and a race to get results published. It is commendable that academics across the world are writing up their findings, and publishing papers and making them available to colleagues, but it is equally important that they receive adequate peer review and scrutiny before publication. While reputable journals are retracting some published submissions, it is often too late and gets into the wrong hands.

There is no simple answer because the situation and circumstances are complex. It is the biggest health and economic crisis post World War II that governments have had to face. It is unreasonable to be overly critical of how politicians have reacted. I would not like to be placed in a situation where I must make hard decisions about the economy against the backdrop of people dying due to lack of appropriate action.

The standard protocol when dealing with an infectious and highly contagious disease is "contain and isolate". Restricting global travel and implementing social distancing are part of containment and isolation. Understandably, with today's global trade and production output, such a move is bound to deliver a detrimental and lasting blow to the world economy. Hundreds of thousands of people stand to lose their incomes, and they will understandably be angry. The long-term impact of depression and associated psychological conditions must not be underestimated. These conditions can easily lead to increased substance abuse, suicide, domestic violence and crime. Governments will need to institute social health programmes to manage depression and anxiety. The impact could last for many years and difficult to measure.

Despite the devastating economic outlook, I do see some positive outcomes. People are more likely to change their ways only once they have been personally impacted by a traumatic event. I am not overly optimistic about reports of decreased pollution levels, urban wildlife thriving due to lack of people in public spaces, or ecosystems regenerating due to a decline in demand for resources. These are all temporary and fleeting.

Our economic model relies on production, manufacturing, and the exploitation of resources, including a consumer base onto which to deliver these commodities. We can certainly reflect upon "sustainable development", but the world has over seven billion people to feed, house and entertain. Unless we see a reverse trend in human population growth, sustainability will remain a pipe dream. I fear that the economic stimulus needed to revive the world economy and get people reemployed may accelerate habitat loss and environmental destruction. We cannot be complacent.

However, I do believe post-Covid-19 the world will be more aware of environmental issues, including climate change. The best available evidence to date suggests that SARS Covid-19 was a viral mutation with origins in a bat species that jumped through an intermediary host (pangolins are suspected) to humans through a raw wildlife market in Wuhan. The World Health Organisation is currently investigating the exact origins. This has placed a spotlight on wildlife harvesting and trafficking. Many countries are now scrutinizing this trade. Those affected and those who have lost loved ones as far away as Italy, Spain, England and America will be seeking answers. It is an appropriate time to reflect on environmental issues and how we interact with the natural world – our life support system. Perhaps SARS Covid-19 was the environmental stimulus package we needed to set in motion a mindset shift toward a better relationship with our natural world. We can only hope.

VIEWPOINT RESEARCHED AND WRITTEN BY: Warren Schmidt

Warren Schmidt holds a Master of Science degree in Ecological Sciences awarded by the University of KwaZulu-Natal, South Africa. He has three decades of experience in ecology, conservation science, invasion biology and herpetology. He has worked as a journalist, magazine editor, and lecturer, and has presented talks, seminars, and lectures.

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COVID-19 – Impact on biodiversity conservation and ecotourism

In the last several months, international travel has almost come to a grinding halt. Many airlines are grounded and facing the prospect of bankruptcy, while hotels and lodges aren't economically viable without bookings. What does this mean for the future of ecotourism in Africa?

According to figures by the World Economic Forum, tourism accounts for 10% of global GDP and employs upward of 50 million people. Tourism, and by association ecotourism, is an exceptionally important sector throughout many parts of Africa. Global wildlife tourism, or ecotourism, accounts for approximately 3.9% of this figure with a value of US$343.6 billion. To put that into perspective, that is equivalent to the entire annual GDP for South Africa. According to figures by the World Travel and Tourism Council, approximately $48.8 billion is spent in Africa, which helps to employ around 3.6 million people across the continent. Realistically, Africa could easily double or triple this figure.

Funding for numerous conservation projects and the protection and maintenance of reserves comes directly from tourism revenue streams. High-end safari lodges and hunting concessions have sprung up across many parts of Africa during the past two decades. These operations are spread across South Africa, Namibia, Botswana, Zimbabwe, Zambia, Kenya and Tanzania with growing sectors in Mozambique, Malawi and Uganda. They employ thousands of full-time and casual employees from game guides, mechanics and maintenance workers to chefs, waitrons, administrators and hospitality staff.

Apart from paying wages and salaries, revenue generated through visiting tourists is channelled into conservation programmes, employing research scientists, veterinarians, and conservationists. Private hunting concessions have ensured that thousands of hectares of land has been kept in its natural state, thereby protecting plants and thousands of small animals. Local communities often benefit from tourism levies and the selling of curios and other locally-produced or manufactured products. There is a strong initiative to employ people from local communities during initial development through onsite training and education. This can lead to further full-time employment after the project enters the operational stage.

The current SARS Covid-19 outbreak may have a detrimental impact on this sector with thousands of people, many supporting extended family members, potentially being made redundant in the weeks and months to come. The World Health Organization has stated that the pandemic may linger indefinitely and global travel may remain extremely limited for the remainder of 2021. Even with an effective vaccine or eradication of the virus, industries may take a few years to fully recover, especially those facing foreclosure. In addition, current establishments forced to retrench or furlough staff may face difficulties enticing employees back, many of whom may have sought alternative employment or migrated to towns for better prospects.

Another major concern against the backdrop of unemployment is the high rate of poaching in recent years. Increased unemployment may exasperate poaching for meat as well as wildlife product trade. It could be argued that decreased shipping will lessen the demand for contraband products like rhino horn and pangolin scales. This is unlikely, as trade is continuing, but almost certainly with less monitoring due to human isolation protocols being carried out during Covid-19.

It is too early to speculate on the eventual outcome and the impact of a 'lag period' whereby the industry stabilises back to pre-2020 figures, and if the industry will stabilise... Global tourism could fall substantially even after borders reopen and airlines start operating again. Across the globe, recession and unemployment figures are reaching record levels, and disposable incomes are being slashed. Many people are having to rely on savings or cash out on policies to pay their bills and purchase food – millions of dollars that would otherwise have purchased plane tickets, booked hotels and lodges, paid for game drives and curios. Exactly to what degree this will impact ecotourism will depend on how long travel restrictions remain in place, and how much disposable income people will be willing to spend on tourism post-Covid-19.

Another factor to consider is the value of domestic versus international tourism. Economic woes in many African countries, including South Africa and Zimbabwe, may not bode favourably for domestic tourism and many countries will rely heavily on foreign exchange to boost local economies.

In upcoming issues, *Biodiversity & Environment Africa* will interview industry experts and economists for feedback on the impact Covid-19 has had on the continent's ecotourism, hunting and hospitality sectors. We will also be investigating the resilience and long-term outlook of ecotourism and what this means for local communities, conservation and the preservation of natural habitats.

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Tourism revenue supports numerous conservation programmes and local communities often benefit from direct employment and selling locally-manufactured products and curios.

Iconic African raptors uplisted to Endangered Status

Secretarybird *Sagittarius serpentarius*.
Photo by Warren Schmidt

Three of Africa's most famous birds of prey, the Secretarybird *Sagittarius serpentarius*, Martial Eagle *Polemaetus bellicosus* and *Bateleur Terathopius ecaudatus*, have been uplisted to globally Endangered on the IUCN Red List. While this news may come as a shock to many, it should also be a warning bell for us all that our natural world, what little remains of it, is battling to support these wide-ranging predatory birds and urgent conservation action is needed if we are to protect the legacy of African skies filled with large raptors soaring overhead.

In the 2018 State of South Africa's Birds report published by *BirdLife South Africa*, it was highlighted that over a quarter of South Africa's raptors are threatened. Threats facing this group of apex predators includes poisoning and persecution, mortalities linked to human infrastructure (including powerlines, fences and roads), loss of intact habitat with a sufficient abundance of prey species, and destruction or disturbance of suitable nesting habitat. On 15 December 2020, owing to this myriad of threats facing these once-common and wide-ranging African raptors, BirdLife International announced that the Secretarybird, Martial Eagle and Bateleur have all been uplisted to Endangered following seriously alarming rates of decline – as detected by the monitoring work of BirdLife Partners, other ornithologists and citizen scientists across Africa and analysed by the BirdLife science team for the IUCN Red List.

BirdLife South Africa played an important role in contributing to the reassessment of the Secretarybird's global conservation status, having carried out a conservation project focused on this species since 2011 when the Secretarybird was first uplisted to globally Vulnerable. *BirdLife South Africa's* Spatial Planning and Data Manager, Ernst Retief, started the Secretarybird project and had this to say upon hearing the latest uplisting news: "I had the privilege to study Secretarybirds for several years. During this time, I observed them for many hours foraging while walking slowly through the veld, followed their movements through the data we received from tracking devices, and I saw what great parents they are through hundreds of camera trap photos at a nest. I also experienced extreme lows when picking up dead birds under powerlines or stuck in fences, but then there were fantastic days when we found chicks on a nest of an adult bird that we had tracked from his days as a nestling. I learnt that these are amazing birds, unique in so many ways, caring parents, and enduring inclement weather with ease. However, I also saw the threats these birds face daily, too many to mention here, and I fear for the day that we might not see them gracing our grasslands. The uplisting of this species to Endangered is a sad but necessary day. Hopefully, this will help to raise awareness of the plight of this species and lead to appropriate conservation actions."

The Secretarybird project was taken over by *BirdLife South Africa's* Landscape Conservation Programme Manager, Dr Melissa Howes-Whitecross in 2018. Dr Howes-Whitecross drove the successful Bird of the Year 2019 campaign centred on the Secretarybird, raising awareness of their plight across a range of platforms including through a citizen science project to record all sightings of individual Secretarybirds and their nests. Over 800 data points were collected from across South Africa and these data will form part of an important monitoring programme which is currently being developed for the country, which is estimated to have lost over 75% of its Secretarybird population since the 1980s. In response to the Red List update, Dr Howes-Whitecross stated "Encountering a Secretarybird in the wild can only be described as a captivating experience. For me it sparked my love of birds,

> BirdLife International announced that the Secretarybird, Martial Eagle and Bateleur have all been uplisted to Endangered following seriously alarming rates of decline.

birdwatching and ultimately my conservation career, and I am yet to meet someone lucky enough to encounter these incredible birds and not walk away in awe. Watching them stride and strike at dangerous snakes with pin-point accuracy and extreme force will impress even the most hardcore of us. For those lucky enough to get up close with these majestic birds, one can only marvel at the intricate beauty of their long eyelashes and crest of feathers that surrounds their soul-piercing eyes. Their uplisting should be taken as a serious warning sign that our fragmentation and mismanagement of open grassland and savanna ecosystems is having disastrous effects."

The myriad of threats faced by these birds are almost too many to list, but habitat loss and degradation stands out as a prime suspect. These raptors require vast open habitat to seek out prey and trees to nest in, so the development and alteration of natural environments into agricultural fields, plantations, mines and buildings make the areas unsuitable, and also makes the birds vulnerable to collisions with infrastructure.

But even the raptors that nest in protected areas are not safe. For many years, Ernst Retief has followed Secretarybirds that he fitted with tracking devices. A recent analysis of the tracking data by Dr Howes-Whitecross and Mr Retief found high juvenile mortality rates of 46% within the first three years, as well as the lack of support offered by the protected area network: only 4% of tracked points fell within formally protected areas. These wide-ranging birds are often forced to forage beyond the protective boundaries of the reserves, exposing them to greater threats. Hence working with landowners outside of the formally protected areas is vital if we are to preserve Africa's raptors.

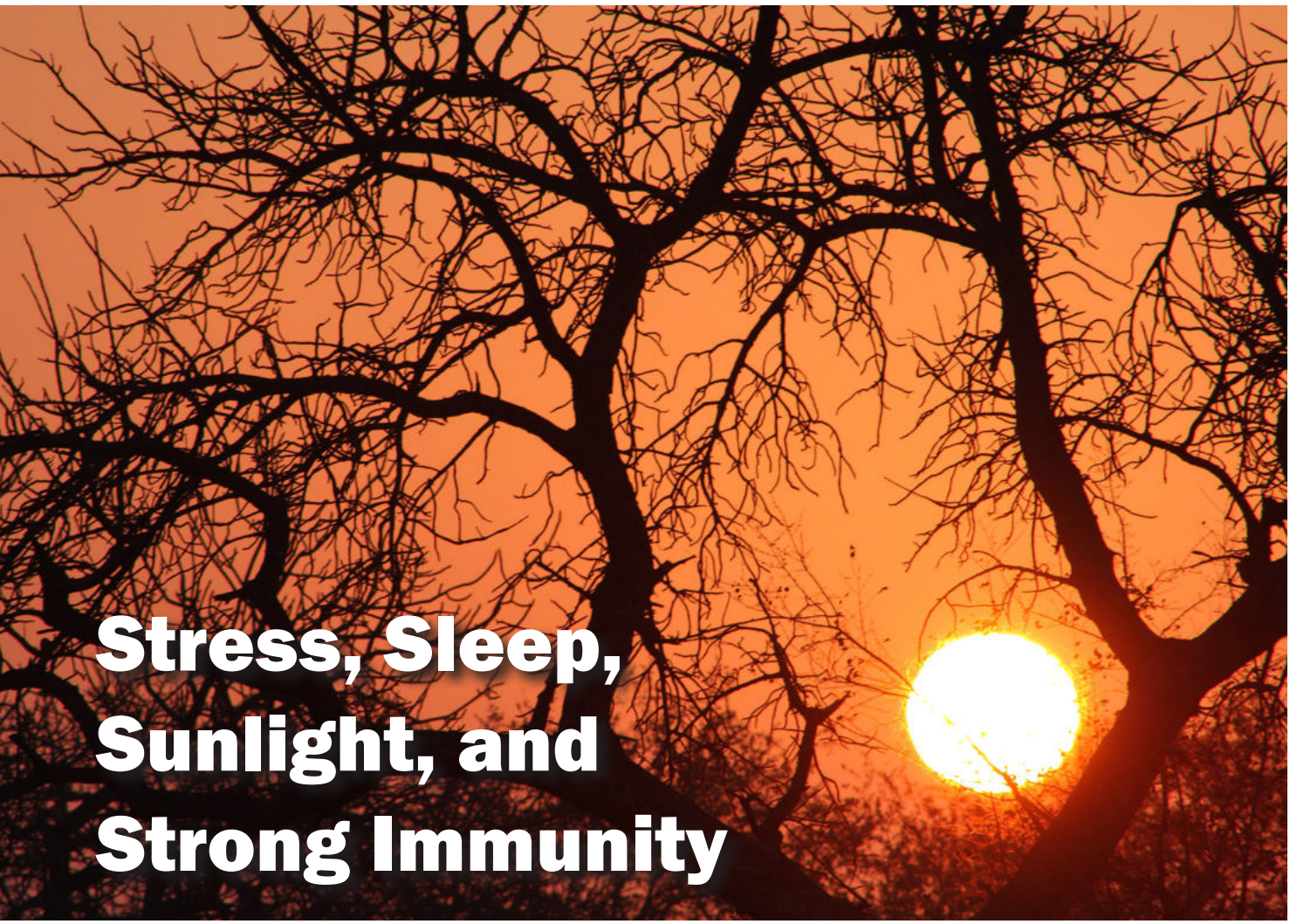
BirdLife South Africa's extensive biodiversity stewardship in the grasslands of South Africa relies on the Secretarybird as one of the flagship species for this conservation project and has enabled the team to declare over 100 000 ha of pristine grassland so far. By working closely with landowners to sensitise them to the presence and importance of birds on their properties, BirdLife South Africa is ensuring that these open landscapes remain a refuge for the Secretarybird and other grassland endemics found in South Africa.

A pair of Bateleurs *Terathopius ecaudatus* scanning the lowveld savanna.
Photo by Warren Schmidt

While acknowledging the terrible news that these species are in trouble, the uplisting also brings about awareness and visibility to the plight of these important birds of prey. Falling under the Endangered category of the Red List focuses these species as conservation priorities and this recognition will assist conservation NGOs such as BirdLife South Africa to raise funds for their important conservation work aimed at preserving these iconic African raptors and their habitats.

BirdLife South Africa would like to acknowledge the generous funding and support provided by Nick and Jane Prentice, Laetitia Steynberg, the Airports Company South Africa and Petra Diamonds, both previous BirdLife International Species Champions for the Secretarybird, as well as the Ingula Partnership, a collaboration between Eskom, Middelpunt Wetland trust and BirdLife South Africa, for their support of the Raptors & Large Terrestrial Birds Project Manager. We would also like to acknowledge the assistance offered by numerous landowners, volunteers, bird clubs and conservation authorities across South Africa.

For more details about BirdLife South Africa, visit *birdlife.org.za*



Stress, Sleep, Sunlight, and Strong Immunity

How we replenish our energy and inner resources is key to our human survival. Be it in the form of chemical-free, plant-based nutrition, or regular access to green spaces for fresh air, enriching ions, sounds, and vibrations. Not least of all is the importance of living within our natural circadian rhythms, where night is night and day is day. This balance seems to become more and more elusive in the post-modern world, as we battle to reset our 'body clock' and find ourselves in further and further stages of industrialization and urbanized living. Arguably, with the level of immersion of our global society in technology, and the uneven distribution of basic essentials to wellness, when it comes to the post-corona world, we could see even greater socio-economic discrepancies further entrenched.

THE NERVOUS SYSTEM AND STRESS

The process of adapting from an already widespread level of stress as a way of life for many people to the 'new normal', during and post Covid, brings up the need for work-life balance like never before. Seemingly overnight, the daily micro-management of our modern reality has upscaled substantially. Underlying currents of fear, worry, anxiety and depression in the midst of looming economic effects, lockdown fatigue, future uncertainty and concern over one's health and wellbeing (especially for those who are most vulnerable) brings about psychological and physiological changes that call on our inner resources the more that such experiences of long-term stress are prolonged.

The stress response is a primitive reaction to a threatening or dangerous situation and has been essential in ensuring survival of the human species. It is commonly known as "fight-or-flight". The hormonal and chemical defense mechanisms that evolved over time as a means of protection have been retained, but today have little outlet. Dire harm can be caused by continuously suppressing our natural instincts to respond physically to a stressful situation.

Physiologically speaking, when confronted by a situation which we perceive to be threatening, our thoughts regarding ourselves and the situation trigger two branches of the central nervous system, namely the sympathetic and parasympathetic nervous systems. The sympathetic nervous system initiates involuntary responses aimed at activating all the major systems of the body. The first response is a flood of hormone secretions. The hypothalamus triggers the pituitary gland which in turn releases hormones that cause the adrenal glands to upregulate the output of adrenalin and noradrenalin into the bloodstream. Corticosteroids also mobilize the body against invading pathogens or foreign proteins, and enhance one's level of alertness. But if the stress response is continuously activated in the form of long-term stress, with little counterbalance from adequate rest and relaxation, the body generally weakens, leading to accelerated aging and illness.

THE IMMUNE SYSTEM AND STRESS

The stress response always activates the immune system. Often, stressful situations are continuous and

perpetuate the stress response on a semi-permanent basis, keeping one on red alert. Yet on the other hand, physical release is usually unacceptable and therefore suppressed, especially in today's society. This stress build-up cannot be maintained for too long before there is something like a domino effect internally, knocking the body systems almost inevitably out of balance, leading to extreme physical and mental exhaustion.

Long-term adrenal stimulation with no resolution, will deplete essential minerals and vitamins like vitamins B and C which are crucial for proper function of the nervous and immune systems. When this pattern enters the chronic stage, the body's normal resistance declines below normal and becomes exhausted. Everyone is confronted daily with potentially stressful situations. One's vulnerability to stress can be influenced by life events, such as our current coronavirus pandemic and the concurrent shockwaves into our individual lives which have consequently resulted, causing undue emotional strain. Emotional distress is another resistance lowering factor. The extent to which stressful events lead to poor health and weakened immunity may depend to a large extent on a person's ability to cope with stress by reviving one's energy reserves. A vital component to the latter is, of course, our sleep duration and quality.

A FOCUS ON MELATONIN AND SEROTONIN

Melatonin and serotonin are neuro-hormones produced by the pea-sized pineal gland, located in the center of the cranium, that among other functions, control all the bio cycles, otherwise known as our day-night or sleep-wake cycle. Small changes in electro-magnetic fields and exposure to light influence the pineal gland, increasing or decreasing production of melatonin and serotonin. While serotonin levels affect our mood, melatonin levels affect our sleep. Low levels of melatonin are associated with poor sleep quality needed for healing both in body and mind.

Circadian rhythms are crucial for a better sleep, and melatonin is a key player in balancing these sleep patterns. It lowers blood pressure, glucose levels and body temperature to make sure we wake up refreshed and ready for the new day ahead. Melatonin also enhances both innate and cellular immunity. It stimulates the production of progenitor cells of granulocytes and macrophages and of NK (Natural Killer) cells. Supplementation needs for melatonin tend to increase with age, from mid-life onwards, and dosage should be prescribed by one's healthcare professional. (Some sources of information suggest avoiding melatonin supplements, which can prevent the brain from producing melatonin naturally.)

Several things we do in our modern way of living, especially in lockdown living, can reduce our melatonin and serotonin levels. Exposure to artificial light after dusk and before bedtime may reduce sleep quality by suppressing production of melatonin and may also have other negative health effects on serotonin, and therefore, mood.

Night-time melatonin secretion is suppressed by a relatively dim light when pupils are dilated. This has been suggested as the main way through which prolonged use of devices such as laptops and smartphones before bedtime can have a negative impact on melatonin secretion, circadian rhythms, sleep, and immune health. With the increased demand for going online in our daily lives, (which has gone through 'the proverbial roof' during global lockdowns in numerous countries around the world), it is important to be aware of the effect this may be having on the pineal gland.

There are some proven ways to support healthy hormone levels, especially if yours are out of sync. Try to carry out the following four changes for a better sleep and watch your energy levels improve. This can only be a good thing for one's immune system too.

1. GET ENOUGH NATURAL SUNLIGHT

As most people now know, artificial light can delay one's melatonin kick – but natural sunlight exposure during the day does not. Like exercise and chocolate, sunlight actually stimulates the glandular system's release of our happy hormone, serotonin.

The brighter the rays we expose ourselves to, the better our body clock and hormonal system can function, specifically serotonin levels. The best way to increase your natural light-levels, by soaking up the sun, is said to be ideally at the start of the day when it's at its brightest. So wherever possible, go out into the sunlight! Obviously during the safer hours. To protect against sun damage, it is important to avoid the sun between 10 a.m. and 4 p.m., when the sun's rays are strongest. It is advisable to wear protective clothing and sunscreen whenever necessary.

As most people know, regular sun exposure is also the most natural way to obtain vitamin D. Vitamin D is a hormone the kidneys produce that controls blood calcium concentration and impacts the immune system. The body makes vitamin D in a chemical reaction that occurs when sunlight hits the skin.

This reaction produces cholecalciferol, and the liver converts it to calcidiol. The kidneys then convert the substance to calcitriol, which is the active form of the hormone in the body. Too little vitamin D makes an individual more prone to infections and illness, cardiovascular disease, and mental illnesses — including mood disorders like depression.

To maintain healthy blood levels, aim to get 20–30 minutes of gentle sunlight on most days of the week. People with darker skin may need a little more than this. Your exposure time should depend on how sensitive your skin is to the sun.

2. KEEP TO A REGULAR SLEEP PATTERN

As tempting as it may be to sleep until a later time in the morning than usual, especially with nowhere to physically go to, hardly any traffic to beat during different levels of lockdown, your pineal gland may plea, "Don't do it!". As life appears to exist more in limbo with regular routines relatively displaced, experts encourage us to stick to a certain schedule as best as possible. Otherwise, you shall

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probably still find that your head is in a fog like state once that Zoom meeting takes place later in the morning.

To create a healthy circadian rhythm, or body clock as they call it, you need to develop a consistent sleep pattern that has you in bed around the same time every night and out of bed in the morning at a regular time also. Sleeping late – even if it's just at the weekends – can confuse your body rhythms and make it more challenging to sleep at night. Aim for seven to eight hours of sleep every night in order to maintain good energy levels during the daytime.

3. SET A CURFEW ON GADGETS

Smart screen devices and late-night Netflix marathons can disrupt melatonin production. For a better sleep, try to stop looking at screens around an hour before you go to bed and completely remove them from your sleep space to keep them out of temptation's way. Meditation, quiet time, light yoga, or just some deep breathing can help instead. Not only that, but the electromagnetic frequencies emitted by smartphones can also contribute to sleep disruption by effecting the pineal gland, potentially disrupting hormone balance and leading to chronic fatigue.

4. USE BLACKOUT CURTAINS IN YOUR BEDROOM OR WEAR AN EYE MASK

Power up your melatonin levels for a more peaceful and sound sleep by making your room pitch dark at bedtime. This will stimulate your pineal gland to raise melatonin levels naturally. Optic nerves in our eyes tell our cells, that respond to light and dark signals, when it's time to wake up. Night-time exposure to artificial light on an ongoing basis causes cortisol levels (the long-term stress hormone) to rise, thereby reducing melatonin. The result: a totally negative knock-on effect when it comes to your sleep-wake cycle.

LOOKING AHEAD

In the next few issues of *Biodiversity and Environment Africa*, we will look at how one can maximize lifestyle habits to the best of our ability in protecting and enhancing overall health and wellbeing. More specifically, we will focus on natural ante-dotes to stress which can help leave us feeling authentically re-energized and support our immune systems, mental faculties, emotional health with natural vitality.

WRITTEN BY: Nicolette Da Costa

After her tertiary education in social sciences, humanities and romance languages through the University of the Witwatersrand (WITS) and UNISA in South Africa, Nicolette began her working career in the linguistic field while living in Spain and Portugal, and subsequently built up experience through various projects and developments inside the wellness industry upon her return. Here, her skills formation has focused on therapeutic modalities aimed at ensuring general wellbeing and mitigation of individual stress at grassroots level with a personal aim of supporting communities. Over the past 16 years, Nicolette has contributed various articles to specialist health magazine publications and blogs, and given presentations on natural therapies including Therapeutic Reflexology and Traditional Chinese Medicine while running her own private practice based in Johannesburg.

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miniature DRAGONS

A male Ngome Dwarf Chameleon *Bradypodion ngomeense* from the Ngome Forest in KwaZulu-Natal.

In the forests and kloofs of South Africa, there be miniature dragons. A slow, careful, forward gait with feet clasping thin twigs, and eyes scanning in two different directions, a small, drab little reptile suddenly freezes, its eyes now focused intently forward. The mouth opens slightly and within a split second, a long projectile tongue shoots out, ensnaring a fly on the moist bulbous tip and instantly retracts back into the mouth.

The first species to be described from South Africa was the Cape Dwarf Chameleon, described by Daudin in 1802. In 1943, renowned South African herpetologist and former director of the Transvaal Museum, Dr Vivian F. FitzSimons, included 10 taxa in his monograph *The Lizards of South Africa* under the genus *Microsaura*. In 1976, a KwaZulu-Natal-based herpetologist, Lynn Raw, resurrected the genus *Bradypodion* and described three new species. 55 years later, herpetologist William R. Branch of the Port Elizabeth Museum included 15 described species in his 1998 Field Guide to the Snake and other Reptiles of southern Africa. Currently, there are 17 described species with at least five more awaiting formal scientific description. The Ngome Dwarf Chameleon was only described in 2009, the Umlalazi Dwarf Chameleon in 2008 and the Swartberg Dwarf Chameleon in 2006.

In 2004 Krystal Tolley and colleagues published the first phylogenetic study on South African dwarf chameleons using two gene sequences – 16S ribosomal RNA and ND2. This gave a clearer picture of the evolutionary relationships between dwarf chameleons indicating the presence of probable cryptic species within the genus. This study contributed towards the three newly described species mentioned above.

Several chameleon species, notably some of the Madagascan species, exhibit spectacular and vivid colour displays, particularly males during courtship. These colours may be bright red, turquoise green, electric blue and bright yellow. Research undertaken by Jérémie Teyssier and colleagues from the University of Geneva demonstrated how Madagascan panther chameleons can shift colour through active tuning of a triangular lattice of guanine nanocrystals within the superficial layer of dermal iridophores. A deeper cluster of iridophores with larger crystals reflect a substantial amount of sunlight. Within dwarf chameleons, those that live in dense forest appear to exhibit much brighter and vivid colour patterning and may have similar mechanisms at work. Those that live in more open savanna, karoo or fynbos

>>>>>>>>>>> *continue to page 12*

A female Ngome Dwarf Chameleon *Bradypodion ngomeense*.

Setaro's Dwarf Chameleon *Bradypodion setaroi* is found along northern coastal KwaZulu-Natal and extends into southern Mozambique.

The Midlands Dwarf Chameleon *Bradypodion thamnobates*.

Umlalazi Dwarf Chameleon *Bradypodion caeruleogula*.

The KwaZulu Dwarf Chameleon *Bradypodion melanocephalum* is widely distributed in KwaZulu-Natal.

The Qudeni Dwarf Chameleon *Bradypodion nemorale* from Qudeni Forest in northern KwaZulu-Natal.

The Northern Dwarf Chameleon *Bradypodion transvaalense* may contain cryptic species and is found in a patchy distribution from the Soutpansberg south to eSwatini.

The Eastern Cape Dwarf Chameleon *Bradypodion ventrale* has been translocated to many different towns outside its natural range.

biomes are drab with browns and greys. Melanophores in the skin produce the dark pigment. The green colourations is caused by chromatophores and the yellows by xanthophore pigments.

Many chameleon species, including dwarf chameleons, have pale or white lateral lines. These have been shown to serve some form of predator avoidance. When a threat is detected, the chameleon will angle its body in such a way that the lateral lines cause a disruption of the body form confusing the predator. In many chameleons, but not dwarf chameleons, they have a white ventral (belly) stripe which they angle towards the perceived threat. This stripe may disrupt the outline of the chameleon's body, making it harder to detect, but the results in these studies were not conclusive, and more research is required.

A recent exciting discovery is that some chameleons can produce fluorescence which illuminates under the ultra-violet spectrum and is produced from bone just underneath a superficial layer of skin. This has been discovered in several chameleon lineages including the dwarf chameleons. This aids chameleons living in shaded forests in mate and conspecific recognition. Research has demonstrated that fluorescence emits strongly in the spectrum of around 430 nm (nanometers) in a blue colour which contrasts vividly against the green and brown background of forest habitats.

Research by Devi Stuart-Fox and colleagues demonstrated the ultraviolet spectrum is used in visual display for conspecifics to detect one another against the dark forest environment whilst at the same time remaining cryptically concealed from potential predators.

Dwarf chameleons are viviparous giving birth to live young. This is an unusual method of reproduction in chameleons as most lineages (genera) lay eggs, the only other exception being certain members of the Trioceros genus from east and central Africa. These live-bearing chameleons are however found at high altitudes, sometimes above the frost line, so viviparity is advantageous in that the females can thermoregulate efficiently while the embryos develop. As with South African dwarf chameleons, they tend to be smaller than their egg-laying counterparts. Bradypodion is thought to have radiated around 14 million years ago during a very cool period. Forest refugia was believed to offer a stable climate, but dwarf chameleons would have had to resort to viviparity in order to successfully reproduce.

Dwarf chameleons are a highly threatened family of reptiles. Under the latest IUCN Red List threat classification, there are currently three species listed as Endangered. These include the Umlalazi Dwarf Chameleon, the Pondo Dwarf Chameleon and the Midlands Dwarf Chameleon.

As tempting as it may be to snatch a dwarf chameleon for your garden, these beautiful lizards should never be translocated. There are currently several introduced populations of dwarf chameleons in various parts of South Africa, including Eastern Cape Dwarf Chameleons in Johannesburg! By all means, encourage chameleons to naturally colonise your garden from surrounding areas by planting indigenous vegetation and avoiding the use of herbicides and pesticides.

WRITTEN & PHOTOGRAPHED BY: Warren Schmidt

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The Southern Yellow-Billed Hornbill

Yellow-billed Hornbill at sunrise. Photos by: Warren Schmidt.

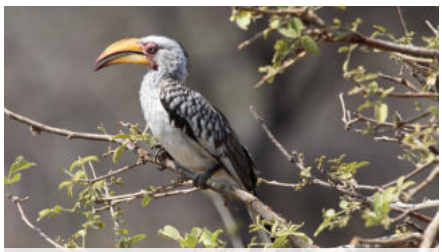
The Southern Yellow-billed Hornbill is one of the iconic birds of the savanna biome, or bushveld. Often referred to as the 'Rod Stewart' of birds due to its flamboyant plumage and bright yellow bill. These birds are distributed widely across the savannas of South Africa, Namibia, Botswana, Zimbabwe, and Zambia. They show a preference for open, dry, broadleaf woodland and Acacia savanna where they can be locally abundant. They generally move about in pairs and seldom form flocks, but will gather in groups around productive feeding zones.

Yellow-billed Hornbills spend a lot of time foraging on the ground but usually launch themselves from a perch higher up. They will also forage along branches and tree trunks. The diet is varied, and these birds will take a variety of invertebrates and small vertebrates, even taking other bird eggs and small rodents and lizards. Spiders, scorpions, grasshoppers and beetles all form part of the diet and prey is manipulated and pulverized in the large beaks. Fruits and seeds also make up an important part of their diet.

Male and females are monogamous breeders and construct solitary nests inside tree cavities. These are lined with bark and dry foliage. They often use cavities with small vertical cracks and manage to manoeuvre in and out of these small spaces. Females lay an average of 3-4 eggs which take up to 24 days to hatch. Chicks emerge from their nest cavity after 19 to 27 days and will remain nearby as the adults continue to feed them for several days, after which they take flight and follow the parents to foraging sites.

These birds are easy to spot and are particularly active in the early morning. On cool and overcast days they are active throughout the day. They are common in most nature reserves and national parks in the savanna biome, and often seen around rest camps in the Kruger National Park and Pilanesberg.

May be confused with the Red-billed Hornbill which has a distinctly red bill and not as broad or yellow as in the Yellow-billed Hornbill.



Yellow-billed Hornbills are common in the savanna biome.

Hornbills are active on the ground and well as trees.

Class: Aves
Order: Bucerotiformes
Family: Bucerotidae
Species: *Tockus leucomelas*
Etymology: *Tockus* = derived from Latin and an onomatopoeic reference to its calls. *leucomelas* = white and black (in reference to the plumage).
IUCN Conservation Status: Least Concern

HOME recycling

Plastic bottles and other debris litter the shores of Durban harbour.
Photo by Dean Boshoff

In April 2019 I travelled with my wife, daughter, and mother-in-law from Johannesburg to Umhlanga in KwaZulu-Natal. This trip was for an auspicious occasion. I was about to attend my graduation ceremony at the University of KwaZulu-Natal. It had been a few years since we were last in KwaZulu-Natal and the excitement in my daughter was uncontainable as we drove over the Umhlanga crest and she saw the ocean merging into the horizon, and a steady stream of ships waiting access to Durban harbour.

It was not long before we headed to the beach and had a swim in the ocean. I was dismayed by the amount of plastic brushing up against our bodies with each passing wave. In fact, I was deeply alarmed, so much so that I couldn't enjoy the experience, consciously aware of the damage this plastic was doing to our ocean ecosystem. Even my daughter started trying to collect plastic bags rather than freely enjoying the ocean like every child should.

The challenge of waste, and plastic pollution seems insurmountable. With over three decades working in the conservation and environmental sector, I can't help but feel that our conservation successes are overshadowed by ever increasing hostile stresses on the natural environment and that we have already tipped ourselves over the edge. It's so easy, and so tempting to give up and turn a blind eye, but each time I look at my daughter and her generation, I realise that despite the odds, I simply cannot give in. We need to fight this madness. And we need a massive, unprecedented, collective effort.

In this first of a regular series on recycling, I will delve into home recycling. Every one of us are consumers of products. Each of these products is manufactured from glass, plastic, metal and other materials, and almost always packaged in material that we often blindly throw away in the dustbin. We will investigate the latest technologies behind waste management and what we can collectively do to prevent tons of waste from polluting our oceans and landscapes.

Under this mat of floating plastic is marine life
Photo by Dean Boshoff

A HOME COLLECTIVE

Let me stress from the outset, recycling is not easy. Against the backdrop of economic woes, concerns around the coronavirus, paying the bills, and keeping relationships on a healthy balance, not to mention the bombardment of information we're subjected to through social media, the press, television and the advertising industry. But, take a deep breath, relax and let's just get started…

Many people living in suburbia have space constraints and often there is an army of informal street recyclers collecting items from dustbins on collection day. This is great. These people are earning an income and removing tons of waste to be recycled. Unfortunately, they're usually after the items that sell. Make it easier for them. When we lived in a complex in Germiston, I used to collect plastic and metal over a period of a month and would then give the washed and sorted items to a collections lady who would otherwise spend her entire day shifting through dirty dustbins. She was most grateful as on that particular day she could fill her recycling bag in a short time and go straight to the recycling depot.

I generally wash all items straight after the dishes. These items are then left to dry. This ensures that there will be no bacterial build up and prevent associated odours, allowing for long-term storage.

Washing recycling items to prevent odours during storage.

PLASTIC

Plastic remains one of our most serious environmental pollutants. Shopping retailers and government legislation have made strides in reducing the amount of waste through shopping bags, but this is only the tip of a monumental iceberg. Virtually every food item is wrapped and packaged in plastic, and it's these smaller packaging plastics that pose a real problem. They get everywhere, into our wetlands and streams, and oceans. In future issues we will look more into the different types of plastics and how they can be recycled, but for the purpose of this article, plastics can be placed in two categories – soft plastics such as shopping bags, and hard plastics, such as cooldrink bottles etc. I fold and compact soft plastic into used bread plastic bags and it's remarkable how much plastic can be folded and stored inside these bags.

I also separate all loose plastic items and bottle caps, tags, and related items I store inside a large empty plastic water bottle. Polystyrene is another product used extensively in food packaging and we will delve more into polystyrene recycling in future issues.

Many plastic items have recycling symbols printed on the packaging and in future issues we will interpret these symbols.

METALS

Most home consumables are in the form food packaging comprising aluminium tins and cans. These can all be recycled. As with plastic items, I wash, rinse and dry aluminium tins and store them for later disposal at a recycling depot.

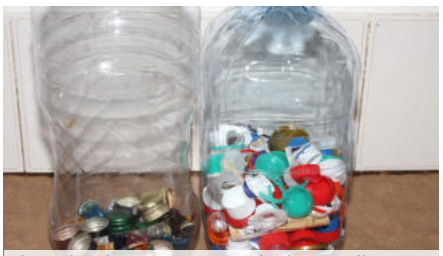
GLASS

Glass is one of the more environmentally friendly products and can be recycled indefinitely. Discarded glass in the environment, although unsightly, causes little harm. However, bottles can be a trap for many smaller creatures. Glass should feature more in packaging, especially for liquids, but it is more expensive to produce than plastic, has a heavier weight to volume ratio, and is more prone to breakage. Unfortunately, in this regard, plastic is easier, lighter and cheaper to produce. In future issues we will look at glass recycling. As with plastic and tin, I wash and dry all glass items and where possible remove the labels. Many glass jars, such as coffee jars, can be re-used as storage vessels for other items such as pasta, rice, sugar etc.

CARDBOARD AND PAPER

Cardboard of various thicknesses and designs is another popular packaging material. Most cardboard and paper products can be recycled, but how about the smaller items such as cereal boxes and milk cartons? Some liquid packaging uses an aluminium film on the inside and a sealable coating to prevent leakage and soiling for the packaging. Can these items be recycled? We will find out more from industry players. At present, I take all cardboard packaging and disassemble them at the seams so that they can be stored flat. This includes the aluminium-lined milk cartons where I remove the plastic caps.

Empty glass coffee jars being re-purposed.



Plastic bottle caps, straps and other small items are placed inside an empty water bottle.

Loose plastic is compacted into bread plastic bags.

Plastic bottles with labels and caps removed.

Aluminium tins.

Glass bottles.

ABOUT US.

Biodiversity & Environment Africa is a fully digital, website-based platform - freely available to readers globally. Publications and resources are available as downloadable PDFs, as well as regular online blog posts. It is our hope to make information available as far and wide as possible. In keeping with its environmental ethos, printing and distribution is effectively reduced, therefore striving towards a low carbon footprint and minimal use of natural resources.

The primary objective of B & E Africa is to interpret and disseminate often complex academic research and environmental policies in a digestible and easy to understand format. The website, www.biodiversitynature.com and blog articles therein, can easily be viewed in alternative languages by right clicking and using Google translate.

Never has environmental communications been as important and pertinent as it is in today's rapidly changing, dynamic world. It is critical that people receive reliable information about biodiversity, conservation, and environmental issues. Just as important, communities need to understand why biodiversity is important in their daily lives and why environmental issues are personally relevant to their health and wellbeing. Given the levels of poverty across Africa, the challenges may seem insurmountable, but can be overcome strategically with foresight, dedication and consistency.

Traditional knowledge and consumption of natural resources must be integrated into sustainable biodiversity management strategies and communities need to see, and experience first-hand, the benefits of biodiversity. The benefits of ecosystem services need to be demonstrated clearly and practically. Africa must also be cautious of international and corporate investments which lead to environmental destruction and biodiversity loss for short-term profit. Such short-term financial gain and profits cannot be allowed to overrun long-term sustainable goals and biodiversity conservation objectives. As humans, we yield immense power over the natural world, but we have a moral and ethical responsibility to leave a legacy of natural wonder to the generations that follow, so that they too can experience the majestic roar of lions, the trumpeting of elephants, and the humble dung beetle in the African savanna.

It may seem idealistic to aim for environmental sustainability and conservation of biodiversity when many regions of Africa are suffering from prolonged civil conflict, disease and poverty, but these challenges can be overcome. It will however take dedication and resolve from politicians, and more importantly, Africa's citizens. Thousands of game guards, wardens and environmental activists have lost their lives protecting biodiversity and natural assets across Africa. This alone goes to show that the will to protect is there. We owe it to these fallen heroes to ensure that their sacrifice will not be in vain.

Africa is custodian to some of the world's most unique landscapes, plants, and animals. Elephant, rhino, gorillas and a plethora of less enigmatic but no less interesting creatures call this continent home. Nurturing an appreciation and spiritual connection to these plants, animals and landscapes is critical to ensuring their long-term survival. It is the continent's youth that needs to be uplifted and guided to do this. Environmental education and resource management are essential skills that should be taught at every stage of a child's education, from pre-school to tertiary level. B & E Africa strives to be a communications channel bridging the gap between academic research findings and translating scientific literature into a format that anyone can appreciate and understand.

B & E Africa will cover a range of topics and carry out interviews with scientists, researchers, businesses, and politicians across the African continent and further afield. Some of the topics covered include:

- Biodiversity (focus on diversity and conservation of plants and animals)
- Biosecurity (the prevention of pathogens and invasive species)
- Climate change (global climate change)
- Community upliftment (environmental benefits to communities, tourism, bioprospecting)
- Conservation (endangered species, trade, poaching and conservation issues)
- Economy (financial economics and the environment)
- Ecotourism (safari and game lodges, ecotherapy, tourism, birding and hunting)
- Environmental management (landscaping, environmental scoping and impact assessments)
- Invasive species (spotlight on invasive animals and plants)
- Legislation (environmental law and legislation)
- Marine resources (fisheries and recreation)
- Recycling (waste management)
- Resource management (agriculture, forestry and mining)
- Sustainability (development and resource management)
- Technology (GIS, satellites and other technology used in environmental management)
- Water (water resource management & wetlands)

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