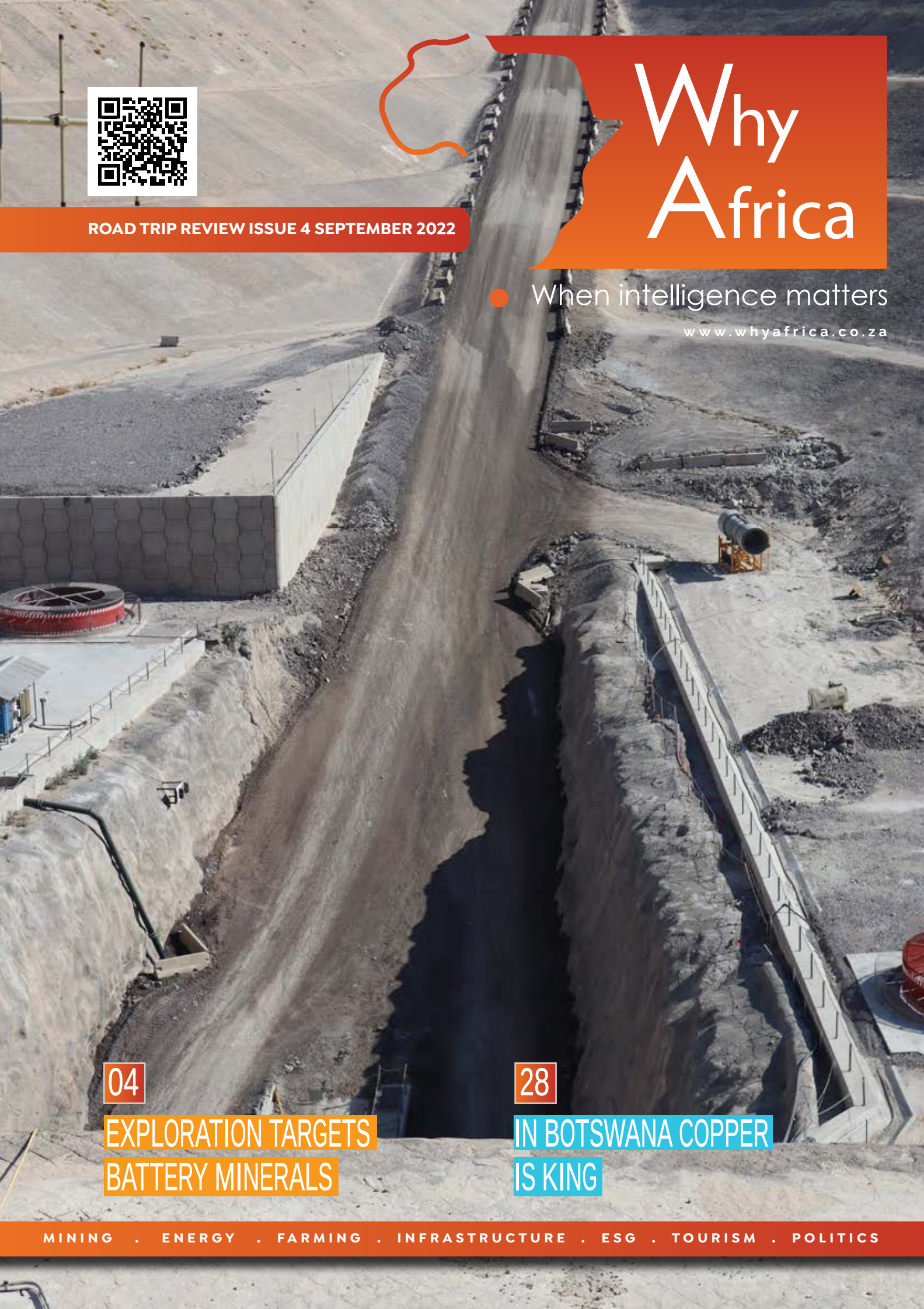

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ROAD TRIP REVIEW ISSUE 4 SEPTEMBER 2022

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WHYAFRICA ROAD TRIP 2022: SOUTHERN AFRICA IS ALIVE AND KICKING!

A visit to Sua Pan in Botswana during the last week of *WhyAfrica's* Southern Africa Road Trip 2022.

Leon Louw for WhyAfrica

After spending 42 days travelling almost 9000km and visiting 32 project sites, I can report that on the ground, the Southern Africa region is making great strides in rebuilding after the devastation of a global pandemic.

The inaugural *WhyAfrica* Road Trip started on Monday 20 June 2022 in Johannesburg and finished 42 days later in an overcast and cold South Africa.

The route took me through the Northern Cape Province of South Africa, Namibia, Zambia, Zimbabwe and Botswana. As promised, *WhyAfrica* visited 32 project sites in the mining, energy, agriculture, infrastructure, water, tourism, plant and equipment, quarrying, cement, and conservation sectors, while at the same time noting ESG issues and considering the political and economic climate within these countries.

With the reliable Toyota Landcruiser, sponsored by **Remote Exploration Services (RES)**, I traversed five countries and gathered enough business intelligence and information to ensure that *WhyAfrica* publishes original, on the ground and first-hand information about Southern Africa on our website, in our bi-weekly newsletters, and in *WhyAfrica*'s exclusive magazines, exactly as we promise our followers, readers, advertisers, sponsors and partners.

While I continue contemplating the complexities of a fascinating region in Africa, we have already started planning next year's *WhyAfrica* Southern and East Africa Road Trip through Zimbabwe, Zambia (including the Copperbelt), Democratic Republic of the Congo (DRC), Malawi, Tanzania, and Kenya.

A sincere thanks to the following companies who allowed me to visit their sites and my sponsors and partners who made the trip possible:

- OMV Raubex Stilfontein, North-West, South Africa
- Orion Minerals' in Prieska, Northern Cape, South Africa
- Scatec's solar PV plant close to Upington, Northern Cape, South Africa
- Vedanta Zinc International's Black Mountain and Gamsberg projects, Aggeneys, Northern Cape South Africa
- Diamond boats and diamond divers in Port Nolloth, Northern Cape, South Africa
- Knight Piésold and the Namibian Ministry of Agriculture, Water and Forestry that allowed me to visit the Neckartal Dam, Keetmanshoop, Namibia
- The local authorities and private sector in Lüderitz that allowed me to visit restricted areas, rail infrastructure and port facilities in Lüderitz, Namibia
- Sperrgebiet Diamond Mining's Elizabeth Bay project close to Lüderitz, Namibia
- Lagoon Aquaculture's oyster farm in the Bay of Lüderitz, Namibia
- Chamber of Mines of Namibia in Windhoek, Namibia
- Lodestone's iron ore project close to Dordabis in Namibia
- Osino Resources' Twin Hills gold project close to Karibib, Namibia
- Namibia Wildlife Resorts and the Namibian authorities at Sesriem Canyon and Sossusvlei
- Port of Walvis Bay and salt mines close to Walvis Bay, Namibia
- E-Tech Resources' Rare Earths project close to Karibib, Namibia
- Antler Gold's gold exploration project close to Karibib, Namibia
- AfriTin's tin and lithium project close to Uis, Namibia
- B2Gold's Otjikoto mine between Otavi and Otjiwarongo, Namibia
- Trigon Metals' Kombat copper project close to Grootfontein, Nambia
- Ohorongo Cement near Otavi, Namibia
- Namibia Wildlife Resorts in Etosha National Park, Namibia
- ReconAfrica's oil and gas drilling project close to Rundu in the Kavango region of Namibia
- Small scale farmers in Divundu in the Caprivi Strip of Namibia
- Zambian and Botswana authorities at the Kazangula bridge between the two countries.
- Tourism facilities in Livingstone, Zambia and Victoria Falls, Zimbabwe
- Safari Par Excellence's Zambezi Waterfront in Livingstone, Zambia
- Conservation authorities in Hwange National Park, Zimbabwe
- Pandamatenga's Agricultural Economic Zone in Botswana
- Bird Sanctuary at Sua Pan close to Nata in Botswana
- Khoemacau Copper Mining close to Maun in Botswana
- Remote Exploration Services (RES) in Maun, Botswana.

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- Our premium sponsor BME who, as an explosive and blasting expert, has extensive experience in dealing with unique African challenges
- Our silver sponsors Minrom Consulting, Rham Equipment, law firm NSDV, and mining company Osino Resources.
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WhyAfrica informs and advises global companies, investors, and entrepreneurs about doing business in Africa through sharing our knowledge and expertise, and through consulting with our extensive, worldwide business network.

WhyAfrica has two branches: a content generation department and a consultancy and research arm.

Southern Africa exploration targets battery minerals

Challenges aside, Southern Africa remains one of the hotpots for mineral exploration in Africa.

By Leon Louw

With buzzwords like a just energy transition, Environmental and Social Governance (ESG), climate change and the green economy dominating the narrative on the world markets today, Southern Africa provides numerous exploration opportunities. With large deposits of lithium, copper, cobalt, tin, nickel, graphite, manganese, and rare earth elements (REE), the region could become a green energy hub.

Added to these green commodities, the mining sector is backed by exceptional deposits of more traditional natural resources like gold, diamonds, Platinum Group Metals (PGMs), coal, uranium, chrome, and diamonds.

According to Oscar van Antwerpen, CEO of mining consultant Minrom South Africa, South Africa still provides the best opportunities in terms of mineral assets, mining skill, and supporting infrastructure. This is despite regulatory failure, poor decision making, onerous approval processes, intermittent electricity supply and legislative inconsistencies hampering the development of new exploration activities, and ultimately, the development of mines. Minrom's focus is to unlock mineral assets across Africa and internationally.

"Currently, the global demand for minerals exceed the rate of exploration, development, and the establishment of new projects world-wide. South Africa, being a country of great geological endowment and mineral superlatives can fill this demand," says Van Antwerpen.

South Africa has large deposits of PGMs, large high grade iron ore and manganese deposits and great pegmatite deposits in the Northern Cape. There are numerous tin deposits remaining at properties like Rooiberg and Zaaiplaats, and in addition gold, zinc, lead, mica, industrial minerals and even inland ilmenite, zircon, and rutile. Furthermore, the country has some of the world's largest fluorite and chrome deposits.

Although many of the mines in South Africa are depleted or at the end of their lifetime (excluding some super deposits with existing producing mines), new technology and improved geophysical methods to detect, define and locate new opportunities can extend the life of these ore bodies. Advancement of metallurgical processes greatly aid in fur-

Currently, the global demand for minerals exceed the rate of exploration, development, and the establishment of new projects world-wide. South Africa, being a country of great geological endowment and mineral superlatives can fill this demand.

South Africa and Namibia hosts onshore and offshore diamond reserves. In picture are the diamond boats in Port Nolloth, on South Africa's west coast.

Leon Louw for WhyAfrica

ther unlocking the value of these projects.

"Furthermore, South Africa has a competent mining workforce in comparison to emerging mining frontiers, a good established mining industry, a large network of suppliers and service providers, manufacturing capabilities, institutional knowledge, universities, all types of engineers, geologists, and top operating mines.

"But sadly," says Van Antwerpen, "South Africa is hindered in attracting investment due to a non-functional and non-transparent mining permitting system, inconsistent decision making and a lack of administrative interaction between state departments in the approval process and, in addition, the lack in support to failing infrastructure (Eskom, Transnet, Portnet, national road network).

A focused plan is required to amend these stumbling blocks and once again restore South Africa as a top mining nation it has been known for in the past. Currently Tanzania, Botswana, Namibia, and the DRC is attracting more interest.

Opportunities in Botswana, Namibia, and DRC

Botswana looks attractive for exploration companies as there are several mineral deposits locked up in the ground. However, the downside is that exploration in Botswana is expensive due to some areas being extremely remote and because the deposits are covered by a thick layer of Kalahari sand. Although there are a number of very prospective copper projects in Botswana, extensive exploration is required to unlock and determine

Leon Louw for WhyAfrica

Lodestones iron ore project close to Windhoek in Namibia might be an early mover in what could become a significant iron province producing green iron.

the potential of the Botswana extension of the Copperbelt with mineralisation in Zambia and the DRC remaining the largest copper resource base.

"The DRC is an absolute phenomenal country hosting super deposits in copper, lithium, tin, cobalt, and gold. The lithium, cobalt and tin deposits are spectacular in grade and size. But unfortunately, the cost to work in the DRC is extremely high. The capital equipment must be imported, and several tax challenges hinders the development," says Van Antwerpen.

The DRC is not an easy mining jurisdiction. There is strict legislation, strict financial control, security of tenure issues, importation taxes, levies, and tax

Leon Louw for WhyAfrica

AfriTin is mining the substantial tin and lithium deposit close to Uis in Namibia.

regimes. "Nonetheless, there are massive mines in the DRC and extremely large deposits that have not been developed yet," he adds.

Namibia has been talked about extensively. The country hosts enormous uranium deposits and there is remaining resources of onshore and offshore diamonds as well as good deposits of gold. Although the gold concentration is lower grade in relation to the Wits Gold Basin in South Africa, a company like B2Gold has proven that it is viable to mine these deposits as the company has done at its Otjikoto operation in the northeast of the country.

Van Antwerpen says Namibia is a top mining jurisdiction. "The road network in Namibia is excellent. Although functioning, the railway infrastructure is aged, but that can be upgraded easily. Furthermore, Walvis Bay is one of the largest ports in Africa and there is sufficient electricity in the country. With the newly discovered gas fields contiguous to South Africa, Namibia will soon be an exporter of electricity as well," he says.

Besides becoming an attractive mineral exploration destination, Namibia is destined to become the energy hub of Africa. The country has deposits of oil and gas (inland and offshore) and more than enough sun and wind to ensure plenty of renewable energy. With the stable political and financial system, great mining legislation, a transparent mining cadastre and permitting system and the recent petroleum finds, Namibia is most certainly a very attractive investment opportunity.

With the massive green hydrogen project planned in the south, the country is making great strides in fulfilling its ambitions to become a top exporter of electricity.

Lodestone is currently exploring proven green steel production technology to leverage on the cheap production of green energy and hydrogen planned in Namibia. They believe that they will be able to produce 1.5 million tonnes per annum of hot rolled coil at a competitive price for the export market.

According to Van Antwerpen, Zimbabwe, Zambia, and Angola should always remain on the radar of investors in exploration. Angola is rapidly transforming and expanding its minerals sector with cost effective diesel and energy making earth moving very competitive. On the other hand, Zimbabwe remains problematic, despite its massive potential and mineral riches.

"The Southern African region can become a super-power due to its rich mineral endowment and the large mining potential in countries like South Africa and the DRC. Zimbabwe's mining sector should be expanded, and with the substantial oil and gas fields in Namibia and Mozambique, and the hydro power in DRC, added to a functioning and expanded ports and rail network, the region can become a global powerhouse. The Southern African region's governments, however, will have to focus on improving tenure systems and mining application processes, developing proper financial controls, establishing functional infrastructure and manufacturing capital equipment. In addition, corruption, nepotism, and a lack of transparency are serious issues that need to be addressed.

Opportunity to explore the Kaapvaal Craton

John Paul Hunt, principal exploration geologist at SRK Exploration Services says that Southern Africa's long geological history gives the region a healthy foundation of a wide range of mineral deposits and commodities.

"The Kaapvaal Craton, for instance, is an important source of base and other precious metals. No matter what commodity is being sought, there is opportunity here due to the sheer age of rock formations – with pegmatites spanning the full scope of geological record," says Hunt.

Leon Louw for WhyAfrica

Antler Gold is exploring the gold deposits in the Damara Belt.

"With the emphasis on critical metals related to battery production and the green economy, there are huge opportunities in Southern Africa. Lithium, tin, nickel, cobalt, vanadium and rare earths have all been discovered in Namibia, Botswana, Zambia, Zimbabwe, and South Africa – especially the Northern Cape. These are not just exploration plays, and many are being developed into sizeable projects," says Hunt.

Among the largest of these is Nkombwa Hill in Zambia, where niobium, tantalum, rare earth elements and phosphates are to be mined. Smaller lithium deposits abound in Zimbabwe, such as the Zulu lithium project. In Namibia, the Uis lithium-tantalum project has been brought back online, with a few satellite deposits.

Hunt points out that there are significant phosphate deposits in the carbonatite Schiel complex in South Africa's Limpopo province, which is currently in feasibility stage.

"Discovered even before the larger deposits at Phalaborwa, Schiel now finally looks promising due to improved infrastructure, technology, and market demand. Other phosphate sources include Elandsfontein and Phalaborwa," says Hunt.

Furthermore, exciting progress is being made on a sedimentary nickel deposit in Zambia. The Enterprise project could reportedly become the largest nickel producer in Africa. This adds to the importance of the region for the battery mineral market – as it already a leading producer of copper and cobalt.

Battery minerals become more strategic

As a host region for battery minerals like rare earths, graphite and nickel, Southern Africa could become more strategic to the west, given that Russia and China have historically been leading producers of these commodities.

With the uncertain geopolitical environment globally, the US and Europe may be looking more to Africa for these critical metals. This has to a certain extent encouraged explorers to invest in Southern African prospecting and development programmes.

According to Steven Bateman, senior exploration geologist at SRK Exploration Services, much of Southern Africa's geological value cannot be realised due to insufficient infrastructure, including roads, rail, and electricity.

"Water is likely to be the greatest constraint to development in Southern Africa," says Bateman.

"There are many valuable deposits, but their limited scale and lifespan often means they struggle to afford installing the necessary services if these are not already in place. If there was more existing infrastructure that could readily be leveraged, more of these deposits could be progressed from exploration stage to mining projects," says Bateman.

"For example, pegmatite-hosted lithium deposits that are found across Southern Africa, tend to be high-value but small. This hampers the economics of the project in areas of poor infrastructure.

Sara Turnbull, senior exploration geologist at SRK Exploration Services says that graphite is another important battery mineral, and this is being produced in Mozambique, Tanzania, and Madagascar.

"A key component of lithium-ion batteries is graphite, as it is the primary material used in the battery's anode. Many of these deposits also contain vanadium as a valuable by-product that enhances project economics, says Turnbull.

As the world continues searching for solutions to the persistent energy and climate crisis, Southern Africa's battery minerals might just be the answer.

WhyAfrica visited several early-stage exploration projects across Southern Africa during our road trip in June, July, and August. More in-depth article and reports about the countries that we visited and specific exploration projects will be available to purchase on our on-line store next year.


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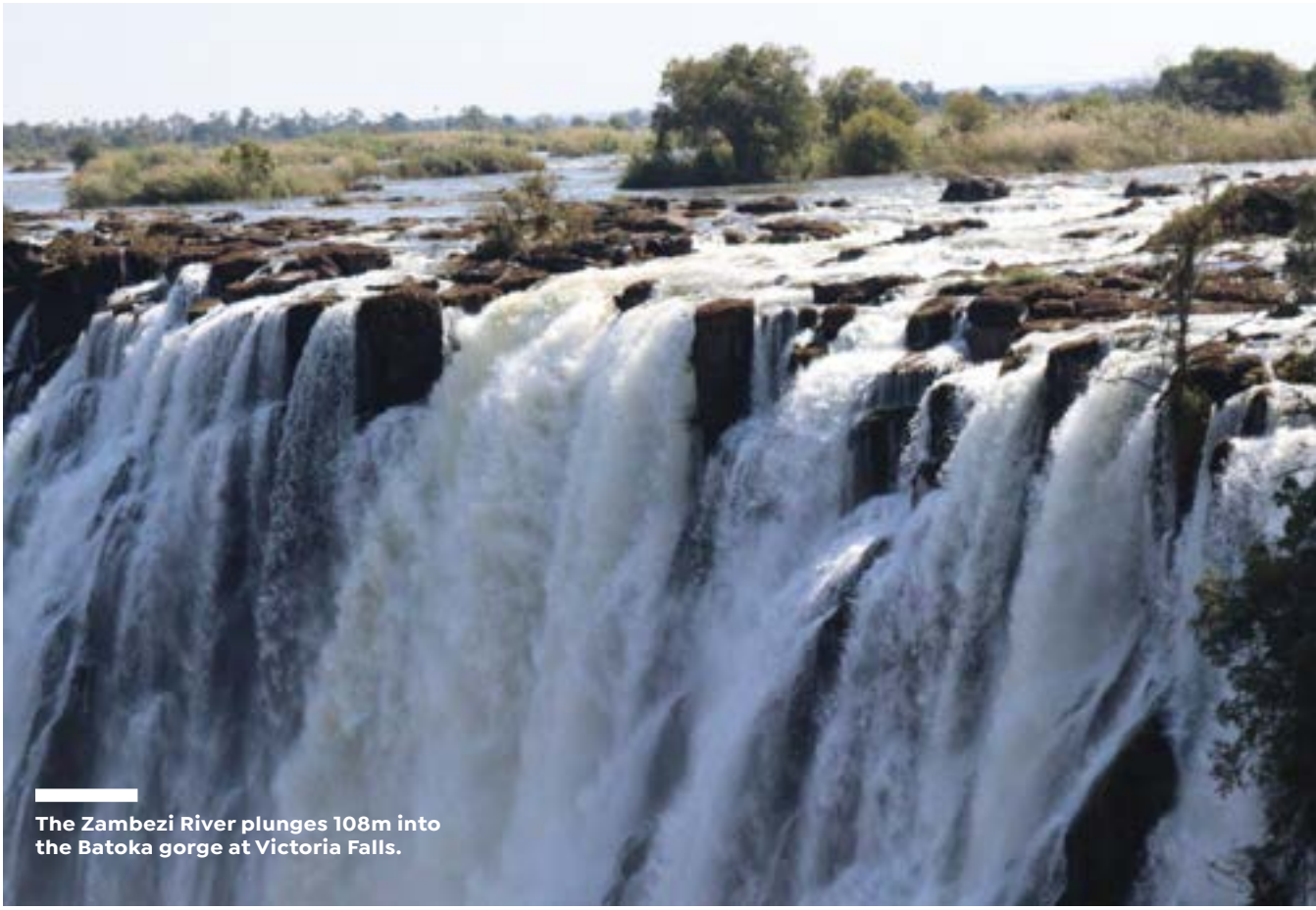
TAKE A BREAK

Will development steal Livingstone's thunder?

While tourism numbers in the towns of Livingstone, Zambia and Victoria Falls in Zimbabwe are steadily increasing after Covid-19, there are fears that the iconic waterfall might be in danger of losing its heritage status.

By Leon Louw



Leon Louw for WhyAfrica

The Zambezi River plunges 108m into the Batoka gorge at Victoria Falls.

The falls can be viewed from both Zambia and Zimbabwe and is located on the border between these two countries. With a width of close to 1,708m it is one of the world's largest waterfalls and marks the point where the tumultuous water from the Zambezi River (the fourth longest river in Africa) plunges 108m into the Batoka gorge below.

Before Covid-19 disrupted the global tourism industry, Victoria Falls (locally known as Mosi-oa-Tunya [the Smoke that Thunders]) attracted record numbers of foreign visitors. This heritage site is on the bucket list of most international tourist visiting Southern Africa. As tourists slowly return in the wake of the global pandemic, there are increasing rumours about development projects that could affect its heritage status.

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) recently warned that Victoria Falls could lose world heritage site status if the Zimbabwean and Zambian governments proceed with development plans near one of the seven natural wonders of the world.

According to the UNESCO report, plans are afoot to build a hydroelectric power station, a 300-bed hotel complex and a golf course near the falls.

The power plant proposal comes as Zimbabwe is facing an acute shortage of electricity that

Leon Louw for WhyAfrica

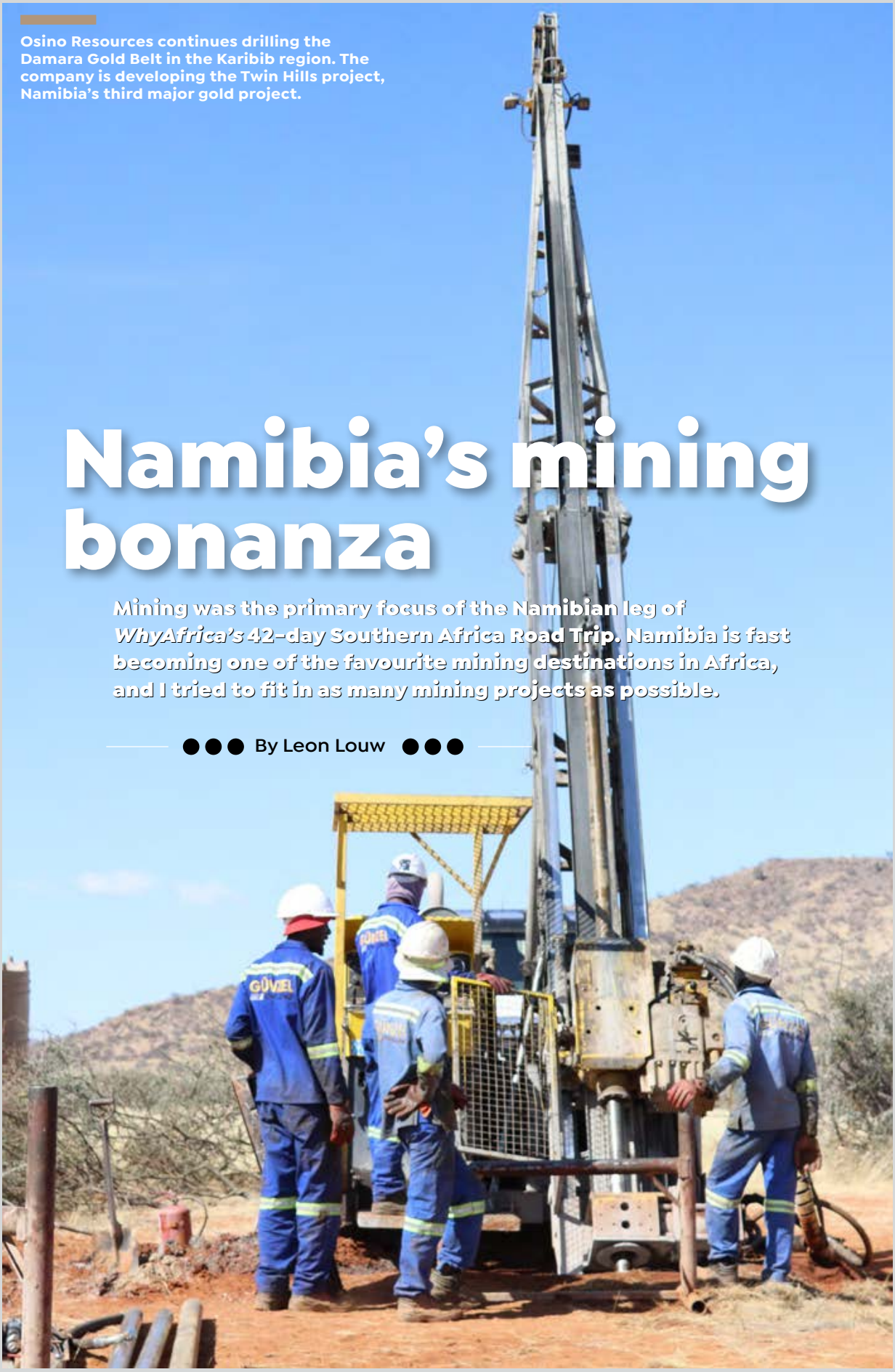
Most people in the towns of Victoria Falls in Zimbabwe and Livingstone in Zambia, depend on tourism to earn a living.

Endorphin Expeditions' desert tour will take you to the Skeleton Coast of Namibia. One of the highlights on this trip is the seals at Cape Cross. Follow us as we make our way through the masses.

has seen the Zimbabwe Electricity Supply Authority (ZESA) introduce power cuts. ZESA is also struggling to pay at least USD6-million a month for electricity it gets from Zambia – which has achieved an electricity generation surplus of 1,156MW since a new power plant was built in the north of the country.

Zimbabwe is in desperate need of electricity. The question is whether the development of hydroelectricity will be to the detriment of the tourism sectors in Zambia and Zimbabwe?

Contact WhyAfrica Travel and Tours and check out our sister company Endorphin Expeditions for information about visiting Zambia and Zimbabwe. Read more about Southern Africa's travel and tourism sectors in the WhyAfrica reports which you will be able to purchase on our online shop early next year.



Osino Resources continues drilling the Damara Gold Belt in the Karibib region. The company is developing the Twin Hills project, Namibia's third major gold project.

Leon Louw for WhyAfrica

Namibia's mining bonanza

Mining was the primary focus of the Namibian leg of *WhyAfrica's* 42-day Southern Africa Road Trip. Namibia is fast becoming one of the favourite mining destinations in Africa, and I tried to fit in as many mining projects as possible.

By Leon Louw

Leon Louw for WhyAfrica

Before the proverbial gold rush, Karibib was known for its high-quality marble. Today, most of the marble mines are owned by Chinese operators.

From the wild diamond coast of the Sperrgebiet, to the uranium laden desert of Erongo; the scorching gold belt of Damaraland and the flooded copper valley of Otavi; to the iron ore deposits at Dordabis and tin and lithium fields of the Brandberg - my mining boots got a royal workout.

Namibia's mining industry is on a high as more exploration projects move into development stage. As Osino Resources prepares for first production at its Twin Hills gold project close to Karibib, established gold mining operations like QKR and Epangelo Mining's Navachab and B2Gold's Otjikoto continues churning out the ounces, while exploration companies like Antler Gold probes the Damara Belt's deep hidden secrets even further.

Meanwhile, AfriTin is ramping up production at its magnificent Uis mine close to the Brandberg in Damaraland, which will elevate it to a top producer in Africa. AfriTin's lithium resources are even more vast, and with new lithium exploration licenses in the pocket, keep an eye on this fast-moving company. Trigon Metals is attempting the impossible in trying to liberate water drenched copper at the historic Kombat mine in the north-eastern Namibia close to Tsumeb, while the jury is out whether Lodestone is sitting on a new iron ore hub at Dordabis close to the capital Windhoek.

Nevertheless, it's the Namibian uranium miners that's bringing out the bubbly right now, as Europe turns to nuclear in response to the energy crisis brought about by the Russian invasion of Ukraine. With the uranium spot price heading north, top uranium producer Langer Heinrich is knocking off the rust after being on care and maintenance since 2018. Paladin Energy has secured the necessary funding to restart Langer Heinrich by 2023, with a life of mine of 17 years.

Bannerman Resources' Etango could potentially become the second biggest uranium mine after Swakop Uranium due to its large shallow resource base, while Norasa's Valencia mine completed a definitive feasibility study in 2015. Deep Yellow's Reptile project at its Tumas and Tubas deposits are still largely at exploration phase. Tumas was approved to proceed to definitive feasibility study stage.

The above projects all have the potential to transform the entire Erongo region into an industrial hub. In the same light, they have the potential to jump start the economy with much needed jobs in the shortest time.

Erongo now a mining hotspot

The Erongo Region has already become the mining hotspot in Namibia. When one drives from Swakopmund towards Karibib on the B2 in a north-easterly direction, you pass, within about

Namibia's mining industry is on a high as more exploration projects move into development stage.

Canadian company B2Gold's Otjikoto mine has consistently been delivering the goods, despite being a low-grade operation.

Leon Louw for WhyAfrica

170km, two of the largest uranium mines in the world, a lead and zinc operation, a Rare Earth Elements (REE) exploration project, the oldest producing gold mine in Namibia, a lithium project, marble and aggregate quarries, and two gold exploration projects, one of which will be in production as early as 2024.

About 60km north-east of Swakopmund lies the Husab uranium mine, the largest open pit mine on the African continent and the second largest in the world. The mine is operated by Swakop Uranium and is majority owned by the China General Nuclear Power Company (CGNPC) of which state-owned Epangelo Mining holds 10%.

Close to Husab, the China National Uranium Corporation (CNUC) operates Rössing mine, one of the sixth largest open-pit uranium mines in the world.

A stone's throw from Husab, a road signs indicates the location of Trekkopje, where Orano Resources' uranium project has been on care and maintenance since 2005.

Closer to the town of Usakos, Canadian listed E-Tech Resources' second round of exploration drilling at the Eureka REE project has just been completed and Chris Drysdale, director of E-Tech Resources, is confident that the drilling samples will return positive results.

Although it is still very early stages, Eureka is an exciting prospect. There are other REE projects in Namibia, but E-tech Resources is focussed specifically on neodymium (Nd) which is used in wind turbines, electric vehicles, and a range of other applications. Drysdale is working with a formidable team of local Namibian geologists who are familiar with the conditions on the ground.

Drysdale is also the director of TSX listed Antler Gold, another exciting new prospect in the Erongo region. Antler's license area, close to Karibib, lies adjacent to by now well-known Osino Resources' Twin Hills project, which is expected to start producing gold as soon as 2024.

Osino has focused on five main targets and several satellite deposits and with geophysics and improved geological methods, defined a resource worth pursuing. When Osino starts producing, it will become the second active gold mine in the Karibib area, with QKR's Navachab just down the road, being in operation since 1989 when AgloGold poured the first gold. As the race for gold in Namibia heats up, more companies are bidding for licenses.

Although the grades in this part of the world is low, technology has made extraction methods more efficient, and as B2Gold has proven at Otjikoto further north, it is possible to operate an extremely lucrative gold mine even if the grades are lower that the great gold mines in the world.

Not far from Navachab, Australian company Lepidico is hoping to turn the Karibib lithium deposit around. The mine, previously owned by Desert Lion Energy, never achieved the great results its shareholders were promised.

Before the proverbial gold rush, Karibib was perhaps best known for its high-quality marble deposits. The best marble mines are today mostly operated by Chinese outfits and still contributes to the local economy, although there are accusations of illegal operations. Most of marble is exported from Walvis Bay to Italy.

More detailed articles and reports about the projects that we visited during our road trip will be published during the year so keep on following WhyAfrica news. Research reports about various aspects of the Namibian economy will be available to purchase on our online shop next year. WhyAfrica Tours and Travel will, in partnership with its sister company Endorphin Expeditions, undertake a geology and mining tour of Namibia in 2023. Please contact us for more information.

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Lüderitz lays to rest the ghosts of its past

By Leon Louw

If you follow developments in Africa and you haven't flagged Lüderitz in Namibia yet, you might be missing a trick. Plans for several large new projects are well advanced and will be commissioned before the end of this year. We paid a visit to this often overlooked but fascinating corner of Namibia on Day 6, 7 and 8 of *WhyAfrica's* Southern Africa Road Trip

The famous wild horses of Aus in the Namib desert temporarily distracted me as I made my way west towards the Port of Lüderitz. They appeared like ghosts through the thick cloud of sand that battered the new Toyota Landcruiser persistently ever since I started up the V8 engine in Keetmanshoop more than two hours before.

As they crossed the road, the horses seemed unperturbed by the blanket of grains that enveloped them and that appeared to hover in the air much longer than what the laws of physics would allow them to do.

It was the infamous Namibian East Wind that moved the fluttering molecules from the mountainous hinterland to the coast. This restless wind is an annual occurrence and keeps even the most hardened local indoors. With the sand, the East Wind brings blistering heat. In the morning, the Easterly races down the interior plateau towards the coast with induced venom. It dies down somewhat by midday, but only to gather more energy for the next morning's onslaught.

When I drove into this barren, far-flung south-western corner of Namibia a week into my road trip, the East Wind was angry, and continued howling for three days, as if protecting a long-forgotten history.

Lüderitz's warm, windy welcome

When I drove into this barren, far-flung south-western corner of Namibia a week into my road trip, the East Wind was angry, and continued howling for three days, as if protecting a long-forgotten history. After all, there are many secrets that lie buried deep beneath the moving sand dunes of the Sperrgebiet (Forbidden area).

For many years not accessible to the public because of its rich diamond resources, the area in and around Lüderitz remains an enigma. It feels surreal driving past the historic German mining town of Kolmanskuppe into Lüderitz suddenly being confronted by French company InnoSun's three towering wind turbines.

These behemoths inject close to 5MW into the national grid managed by Namibia's national power utility NamPower. Although they stand in stark contrast to their ancient surroundings, the ever-rotating blades represent a new future. Locals will tell you that there is always wind in Lüderitz. Fortunately, it is not always the East wind, but some say there are strong winds for more than 320 days of the year – ideal for wind farms.

Like the resurrection of the historic Elizabeth Bay mine by Sperrgebiet Diamond Mining Company (SDM), the establishment of a massive green hydrogen project, one of the world's greatest oil and gas finds, and an ever-developing blue economy, InnoSun's wind turbines represent the coming of Lüderitz's third revolution. They are the revival vanguards of a desert town that refuses to lie down. Despite a global pandemic, an extremely harsh climate and ever-moving sand dunes threatening to obliterate human endeavour, the people of Lüderitz always get up in the morning, clears the sand, and moves on.

The railway line from Aus to Lüderitz has recently been refurbished

Although the Port of Lüderitz is attracting more business, it needs to be expanded to become a world class port on the west coast of Africa.

Leon Louw for WhyAfrica

Plans to transform Lüderitz still on track

Business in the tranquil west coast town on the southern edge of the Namib desert were as hard hit by the Covid-19 pandemic as any other region in the world. Nevertheless, plans to transform the port village into a powerhouse within the southern Africa region are still on track, despite Covid-19's lingering negative impacts.

The first large project, SDM's Elizabeth Bay mine, about 40km south of Lüderitz, will be in operation as early as September 2022, with more expansions in the pipeline over the next two years. The mine started recruiting a workforce of close to 200 employees when I was there towards the end of June.

Lüderitz finds itself in a favourable position within the eye of a perfect global storm. Geopolitical turmoil, sanctions against Russia, volatile markets, a global energy transition and the spike in demand for diamonds are all part of a potent concoction of factors that will change the face of Lüderitz forever.

The historic Elizabeth Bay diamond operation is getting a facelift as SDM ramps up refurbishment work in the first phase of its development plan over the next six months.

The old mining town of Kolmanskuppe just outside of Luderitz is a popular tourist attraction and falls on the license area of Sperrgebiet Diamond Company

Leon Louw for WhyAfrica

Oyster farming and the blue economy have become significant job providers in the Lüderitz region.

According to Paul Lombard, General Manager of Sperrgebiet Diamond Mining, Lüderitz is on the cusp of an unpresented boom. Lombard also heads up the Lüderitz Business Forum "There is a buzz in town and new hope in Lüderitz, not only because of the mine, but also because of the planned green hydrogen project, the massive tourism potential of the Sperrgebiet which is now easier to access, and several oil and gas projects that will be developed over the next ten years.

Hydrogen top of mind

Philip Balhoa, a member of the town council, says that the proposed green hydrogen project is set to introduce the "third revolution" of Lüderitz, the first being the initial diamond rush and the second the great fishing booms. Balhoa adds that the once thriving town has been struggling with high rates of unemployment and aging infrastructure over the last decade or so.

"For a town that's really been struggling economically for 10 or 15 years, maybe even longer, this is a possible lifeline and something that people are really very excited about," says Balhoa.

Lüderitz is central in what could be the most ambitious green energy project in the world, which will include amongst others, large desalination plants, wind and solar farms and a port expansion.

The preferred bidder, South African based Hyphen Hydrogen Energy, is set to start production in 2026 and will have the rights to the project for 40 years once the necessary feasibility processes are concluded. The project will be based close to Lüderitz on the Tsau/Khaeb National Park, adjacent to the Elizabeth Bay mine, and will ultimately produce around 300,000 tonnes of green hydrogen per year.

But hydrogen is not the only thing on the minds of Lüderitz inhabitants. Norwegian company BW Energy is set to develop the Kudu gas field a little further south and has recently finalised a cost cutting revamp that would make electricity generated by the project much more affordable.

Gas on the mind

The Kudu gas discovery is in the northern Orange sub-basin approximately 130 km off the south-west coast of Namibia. It is situated in Petroleum Production License 003 which has an area of 4,567 square kilometres. Lüderitz is expected to benefit as secondary industries look to service offshore developments from the port. Expansion of port infrastructure is in the pipeline.

According to Gerd Kessler, local businessman and owner of Lagoon Aquaculture, all these new developments are a boon for Lüderitz and just the injection the town's inhabitants need. Kessler operates three oyster farms in the Lüderitz lagoon and has plans to expand in the future.

The blue economy in the Port of Lüderitz is a growing sector of the local economy. Aquaculture requires a lot of unskilled labour and has limited environmental impacts, which makes it a very attractive development option for coastal towns like Lüderitz.

Although Kessler's oyster farm requires specific ecological conditions to be successful, he is convinced that the offshore mining, green energy, and port developments will have minimal impact on the blue economy of Lüderitz. In addition to Kessler's oyster farms, other aquaculture operations in town include crayfish, abalone, scallop and kelp farming.

Aquaculture has become an important industry in Lüderitz after it was dominated by farmers in

The Sperrgebiet Diamond Company is refurbishing the historic Elizabeth Bay diamond mine which was previously operated by Debmarine.

Signs of German diamond mining on the coast in the Sperrgebiet. German miners constructed substantial infrastructure at Elizabeth Bay before World War 2

Leon Louw for WhyAfrica

Walvis Bay, north of Lüderitz for many years. "The one development that may be negative for the oysters is the mining of offshore phosphate, which affects the water quality significantly," Kessler told me when I visited his operation.

Despite these great opportunities some residents in Lüderitz feel development is hampered by a lack of political will. Although port expansions are in the pipeline, the Namibian Port Authority seems to be moving slow in luring manganese and iron ore miners from the Northern Cape Province of South Africa to utilise its facilities. As mines in South Africa increase production, Lüderitz is perfectly located to service the growing capacity, especially as South Africa's beleaguered ports and aging infrastructure continues to operate inefficiently under more and more pressure.

Furthermore, the railroad to Lüderitz, which is brand new, is underutilised. Lombard also says that TransNamib, the national rail authority, will need to invest in new rolling stock as soon as possible as they are currently operating with an aging fleet.

Nevertheless, despite many possible challenges and concerns about sustainability and environmental impacts, Lüderitz is an African town on the move. If you want to experience Lüderitz the way it has been for the last hundred years, I suggest that you take a long drive to this neck of the woods within the next two or three years, before Lüderitz lays to rest the last of its colonial ghosts.

The Sperrgebiet Diamond Mining Company will bring the historic Elizabeth Bay mine into production again by September this year. Leon Louw, editor of *WhyAfrica*, interviewed Paul Lombard, General Manager of Spergebiet Diamond Mining Pty Ltd on site. Watch the interview here:

More about Sperrgebiet Diamond Mining's Elizabeth Bay project

The heart of Sperrgebiet Diamonds' operation is the historic Elizabeth Bay mine on the southern coast of Namibia, 25 km south of Lüderitz. Diamond exploration and mining take place both offshore and inland of the Lüderitz region.

The recent equity investment by RZ Murowa Holdings (RZM) part of the Global Emerging Markets (GEM) group into Sperrgebiet Diamond Mining (SDM) will result in RZM acquiring a majority shareholding of 78% in SDM.

Phase 1: Initial capital investment

The first portion of capital investment will be towards the final commissioning of operational readiness phases of the project. This first phase will require an estimated NAD100-million to be directed towards:

- Plant refurbishment (Front-end, Scrubbing and plant infrastructure, new process water intake, sort house integration,
- Infrastructure upgrades (dewatering, tailings dump system and long-lead items
- Equipment replacement (crusher replacement, mobile equipment)
- Strategic spares (crushers and screens)
- Accommodation (Staff and offices)
- System upgrades (Maintenance, security and finance)

Initial Phase 1 will call for around 200 full-time jobs and attract further good and service provision from local, regional and country wide vendors. The company also aims to facilitate the growth of small and medium enterprises service delivery through direct and indirect needs created in the region.

Phase 2: Scaling opportunities

The upgrade will include the construction of an infield plant that will fulfil the role of a high-rate pre-treatment and feed preparation facility for the current main treatment plant. The Infield Pre-Treatment Facility (ITF) is estimated to treat at least 1000 tonnes per hour of gravel which will render this operation as the highest head- feed throughput rate diamond plant on the West Coast of Africa

The inclusion of the infield operation will not only double-up the head-feed but also result in doubling the capacity of the main treatment plant's diamond production without any material changes to its process design.

The cost of the Phase 2 investments is estimated between a further NSD200-NSD250-million and will require additional mining capacity and an additional estimated 100 jobs. This upgrade should see the operations reach monthly diamond production levels of circa 40,000 carats per month and the higher profitability margins due to reduced operating unit costs and the doubling of headline revenues.

Exploration funding and the revival and development of the offshore areas

The aggressive approach will require a strong focus on mineral resource development to maintain healthy mining reserves. This will require additional exploration funding, not only for the onshore extension and satellite deposits, but also for major potential offshore that lies within the offshore portion of ML45 and the offshore licenses of ML128A and ML128B.

The investment into exploration will include building a new batch plant which will enable the company to sample the new onshore extensions and double-up as a toll-treat plant for beach and shallow water contract operators. This plant will enable the restart of contractor operations which is a much needed revival of the smaller scale diamond mining community.

Offshore resource development will include reprocessing of geophysical data to target key areas for bulk sampling campaigns. These campaigns will include renewed survey and resource development work to pave the way for larger operating vessels to extract and recover diamonds from the deeper midwater and deeper water areas.

(Infra)structural integrity

When it comes to construction contracts, the South African government has a clear favourite: the NEC3/4 – which is great news for our clients here at NSDV, because we're fairly fond of the NEC suite ourselves. So much so that we've grown to know its intricacies inside out, which means we're able to offer second to none cost, time and stress-saving advice to the people we partner with.

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Visit us today at www.nsdv.com for free access to our NEC3/4 for Newbies tip series.

NSDV

Africa beckons for Remote Exploration Services

With Africa's mineral sector and spectacular geology in the spotlight, companies like RES are well positioned as interest in African exploration continues to grow.

By Leon Louw

RES on site in Southern Africa. The company has been providing services for exploration companies in Africa for more than 20 years.

> **... a faster-than-expected recovery in market conditions and easing of lockdowns allowed explorers to reactivate projects by mid-2020, which caused some programmes to carry over into 2021.**
>
> **– Kevin Murphy**

Photographs by Remote Exploration Services

Brett van Coller, Managing Director of Cape Town based mineral exploration consultancy firm Remote Exploration Services in the field.

Exploration around the world has seen a significant uptick in 2021/2022 compared to a lethargic 2020. While logistical challenges and managing the Covid-19 pandemic dominated the agenda in 2020, geologists and exploration companies returned to the field in 2021 in numbers as it became easier to travel again in the wake of Covid-19 restrictions.

According to the S&P Global Market Intelligence's Corporate Exploration Strategies series, the aggregate annual global nonferrous exploration budget has increased by 35% year on year to USD11.2-billion from USD8.3-billion in 2020.

According to Kevin Murphy, Principal Analyst with the Metals and Mining Research team at S&P Global Market Intelligence, a faster-than-expected recovery in market conditions and easing of lockdowns allowed explorers to reactivate projects by mid-2020, which caused some programmes to carry over into 2021.

"Along with higher metals prices and increased financing activities, this has led to a strong budget recovery in 2021. We expect the aggregate exploration budget to increase between 5% and 15% year over year for 2022," says Murphy.

Africa disappoints but the future is bright

While Africa underperformed somewhat with budget allocations for exploration up just 12% in 2021

The vast plains of Southern Africa.

Remote Exploration Services

to USD1.1-billion, exploration activity has at least returned to pre-Covid-19 levels and is expected to increase over the next two to three years with exciting projects in the pipeline in 2022/2023.

Despite many positive trends, some African countries continue grappling with regulatory certainty and political instability. Investors need certainty before parting with their hard-earned cash and mining is a long-term commitment if there is only bare ground to begin with. Exploration remains the bedrock on which mining is built, and if there are no funds for geologists and junior explorers to find new deposits with, any country's ambition to become a mining giant will be stillborn.

But there are some countries and regions in Africa where great strides have been made in enticing investors and luring back the intrepid exploration companies. West African countries like Ghana, Senegal and Burkina Faso come to mind, although security and political risk is a concern in the entire West Africa/Central African belt.

Southern African countries like Namibia, Botswana, Zambia, and even troubled Zimbabwe, have seen the best geologists exploring the Kalahari Craton after a reluctant hiatus, while the floodgates have opened in Tanzania and geologists are returning in large numbers after the departure of the late president John Magufuli.

RES well positioned to manage challenges

According to Brett van Coller, Managing Director of Cape Town based mineral exploration consultancy firm Remote Exploration Services (RES), more and more opportunities are opening-up across Africa as a growing number of governments adopt the use of land cadastre management systems.

"Companies are starting to feel more secure as governments realise that the security of land tenure and creating a more enabling legislative environment are critical conditions necessary to grow the economy," says van Coller. Van Coller has more than 24 years' experience in exploration and mining projects across Africa. RES is one of the most intrepid and active exploration service companies in Africa, and its top-class geologists and geophysicists have clocked many miles working on exciting discovery focused projects.

Van Coller says that the RES team is well-positioned to manage the emerging challenges and meet clients' needs in the exploration and resource industry in 2022 and beyond.

"The full extent of the impact of Covid-19 on the exploration and resource industry continues to unfold. This means we need to strategically explore new opportunities and consider how to best position our team, skills, and experience to ensure we emerge from this crisis evolved, better adapted, and equipped.

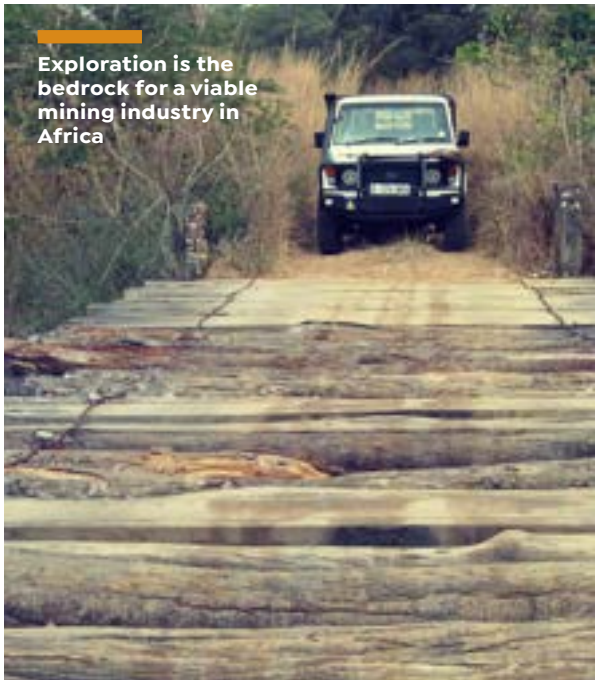
"Fortunately, it seems that there is revived interest from both the majors and junior mining companies interested in Africa and significantly more exploration funding available. This has provided RES with a broader client base and enabled us to invest in new opportunities and continue growing the range of services we can offer industry," says van Coller.

Namibia, Zambia, and Botswana are three countries that van Coller regards as offering great potential opportunities. *WhyAfrica* visited all three of these countries as part of its inaugural 2022 Southern Africa Road Trip in June and July, supported by RES, who has played a prominent role in making this unique and first of its kind experience possible.

According to Van Coller, initiatives like the *WhyAfrica* Road Trip highlights what Africa has to offer from the ground up – both the challenges and the exciting opportunities.

Stability lures potential investors

Botswana, traditionally a solid democracy characterised by regulatory certainty and political stability, has drawn interest not only for its well-known diamond deposits, but increasingly for its copper potential. In the race to negotiate a global energy transition, copper has become paramount, and analysts are predicting an imminent supply deficit in the short- to medium-term.



Exploration is the bedrock for a viable mining industry in Africa

Remote Exploration Services

Zambia has traditionally been the copper hot spot in Africa. The mining industry in Zambia has experienced somewhat of a revival after Edgar Lungu was recently deposed at the ballot box by an energetic president Hakainde Hichilema. Hichilema has rung the changes since his inauguration, and in the process lured investors back to what could probably be the African success story of 2022.

Namibia has always been a geologist's dream, and yet so much of the country remains unexplored. However, with the uranium price heading north and with gold in vogue again, exploration companies are heading back to the desert lands of Southern Africa.

"Overall, the impact of Covid-19 was well buffered by the nature of the diversified mining portfolio of Namibia," Fabian Shaanika, Sector Lead of Mining and Natural Resources at Rand Merchant Bank, recently told the Global Business Report.

Namibia is the world's fourth largest uranium producer, has the seventh largest diamond output and hosts smaller mining operations in other strategic commodities such as copper, iron, and zinc. The mining value chain is one of the historic bedrocks of Namibia and today accounts for approximately 11.1% of GDP.

According to Jurie Wessels, Executive Chairman of Vanadium Resources, an Australian junior mining company, Namibia is attractive due to its consistent economic and political stability, well-established infrastructure, and rich mineral resources.

The country witnessed an increase in its Investment Attractiveness Index from 58.22 in 2019 to 59.72 in in 2020 in the Fraser Institute's Annual Survey of Mining companies.

RES has several on-going projects in Namibia and has been operating in the country for more than 20 years. Tracing its roots back to early exploration work in the late 1990s, the company was formally established in the early 2000s. Today it has a team of 50 committed geoscience professionals, servicing every aspect of the discovery cycle – from defining prospective areas for early-stage exploration, through to extending the resource on advanced brownfield projects.

The essence of exploration success in Africa

Van Coller says that operating in Africa, no matter where, remains a challenge and requires careful planning to ensure that the company continues delivering projects on time, within budget and safely.

"RES has developed comprehensive in-house operational procedures, recorded in its Operations Manual. This document captures the experience gained through many years of tough field work in diverse terrains across Africa which, together with its documented policies and procedures, provides an essential reference tool for successful project management and implementation across the continent.

In addition, van Coller cites the selfless commitment of each member of staff as, undoubtedly, the key factor that ensures RES prevails in unpredictable environments. "Ultimately, we lean heavily on our teams' commitment to excellence, a strong safety culture and can-do attitude. These three elements ensure that we employ the latest and most appropriate technology on projects, are dedicated to practicing good science, and prioritise safety, while striving to manage logistics seamlessly and maintain administration that is accurate and appropriate."

For van Coller and his RES team, the most valuable aspect of exploration and geophysical surveys is the integrity of the data.

"We recognise that exploration success starts at the coalface. Integrity of data is critical, and it is essential that we take a systemic view. For this reason, we place as much importance and value on bagging and tagging of samples out in the field, as we do on a 3D inversion back at the office. Close attention is paid to detail and all client deliverables are reviewed and signed off by a Principal Geoscientist and overseen by the Technical Director," he says.

Van Coller adds that the company attaches great value to innovation. "Implementation of an appropriate technology specific to our client's project needs requires effective communication, with a clear understanding of scope and deliverables. The diversity of interests and strengths within our team has allowed us to drive numerous R&D initiatives. We proactively invest in the development and upskilling of our team and look to create an environment where our staff are empowered to take personal responsibility for contributing to what RES can offer."

Exploring is the foundation of mining in Africa. With more countries in Africa opening their doors for business, investment will follow, and companies like RES are well positioned to continue assisting mining companies make new discoveries. Indeed, Africa beckons.

Pandamatenga: Tillage or no-tillage?

The soils in the Pandamatenga farming region in Botswana needs intensive management to continue producing satisfactory yields.

By Leon Louw

Today, the Pandamatenga farming area covers almost 40,000 hectares. The Botswana government cleared 25,000 hectares of bush in 1984 to make way for the farmers. Before that the whole area was covered in grassland savanna and Mopane shrubland.

Leon Louw for WhyAfrica

The Pandamatenga farming area in northern Botswana was established in 1984 when the government allocated an initial 25,000 hectares of virgin bush to commercial farmers.

The aim was to increase the country's cereal production and boost food security. With fertile black cotton soils and annual rainfall of more than 600mm Pantamatenga was the most suitable area in Botswana for crop production.

The total Pandamatenga region covers a land area of almost 280,380 hectares of which, today, more than 40,000 hectares is farmed.

The area is flat, with a gentle slope and rainwater flows following natural drainage routes. The vegetation is extensive grassland savanna in association with Mopane (*Colophospermum mophane)* and thornbush.

In 2002 the government put up a fence around the Pandamatenga farms to keep wildlife out as animals like elephant, eland and kudu destroyed the crops. Today, wildlife migrating from the Chobe system in the north to the Botswana interior, is still a challenge, although the electric fence has limited damage to crops by wildlife. It comes at a high cost though, as farmers pay high levies towards maintaining the fence.

According to Mataba Tapela, Executive Director, Natural Resources and Materials at the Botswana Institute for Technology Research and Innovation (BITRI) another big challenge for farmers in the area has always been managing the vertisol soils using conventional tillage systems to produce satisfactory crop yield.

Vertisols such as the ones found in the Pandamatenga region are considered good farming soils, but they also have unique properties that require special management if full yield is to be realised. Most farmers in the area practiced conventional tillage to grow sorghum, sunflower and the occasional cotton. Conventional tillage means a lot of energy input and carbon emissions. It also often results in the degradation of soil.

In the research paper: *Potential for no-tillage agriculture in the Pandamatenga vertisols of Botswana,* Tapela and co-authors B. Kayombo and F. Pule-Meulenberg, argue that no-tillage methods might be better, although when they wrote the article, research in the area just got underway. "Minimising energy-related inputs of tillage, fertilisers, and monitoring changes in the physical, chemical and biological status of the soil are major areas that deserve attention," they wrote.

The problem with no-tillage methods, on the

The Botswana government had to erect a fence around the Pandamatenga farming area in 2002 to prevent crop damage by wildlife such as elephants and eland.

Leon Louw

The Pandamatenga agricultural area in Botswana produces more than 50, 000t of crops such as, amongst others sorghum, legumes, sunflower, mung beans and cowpeas. The National Development Bank of Botswana is one of the key financiers of commercial and small-scale farmers in Pandamatenga.

other hand, is that it involves and promotes a reliance on herbicides and cover crops to suppress weed growth. The environmental effects of herbicides can be detrimental, and caution and more research are needed if this method is to be applied. However, the damage to soil caused by conventional tillage can be long lasting and detrimental to the entire area.

"Under a conventional tillage system, the whole field is ploughed using either a moldboard or disc ploughs followed by 1 to 2 harrowings before seeding. This system destroys soil structure leading to problems related to soil degradation and compaction," says Tapela.

Soil compaction is caused by high field machinery traffic as well as continuous cropping that result in an increased exposure of soils to high intensity storms. The result in the long term is a decline in crop yields.

Problems of accelerated soil erosion, high costs of energy inputs, and low yields return associated with conventional tillage methods of seedbed preparation have led to increasing adoption of no-tillage systems for production of row crops. Research is ongoing.

Research will become increasingly important in the Pandamatenga area in the future. Utilising the most efficient farming methods, preserving the soil structure and minimising water loss are key to improve crop yields in an area of southern Africa where climate change is expected to have a significant impact.

World class infrastructure at Khoemacau's copper mine in the Kalahari Belt of Botswana.

Leon Louw for WhyAfrica

In Botswana copper is king

Khoemacau Copper Mining has found its rhythm in Botswana's Copper Belt.

By Leon Louw

Under layers of sand, the north-eastern flank of the Kalahari Craton in central Namibia and Botswana, hosts what geologists refer to as magmatic arch rock which, they say, contains sediment-hosted stratabound-type copper (Cu) deposits.

Overlying the arch rocks is the Tsumis Group of rocks which extends northeast from Namibia for hundreds of kilometres into Botswana, where it is known as the Ghanzi Group.

The Tsumis and Ghanzi groups include copper and silver deposits that constitute the Kalahari Copper Belt (KCB).

The belt is 1000km long and in places up to 250km wide. In Namibia, the KCB includes the Klein Aub, Oamites and Witvlei deposits. In Botswana, several mineral exploration companies are probing the KCB while production is imminent at Sandfire's Motheo and Khoemacau Copper Mining is ramping up to full production at its copper and silver mine.

Exploration company Cobre Limited recently released drilling results from their early-stage Ngamiland project close to the town of Ghanzi. The initial results sent their share price skyrocketing on the Australian Stock Exchange a month or two ago. Cobre owns 51% of Kalahari Metals Limited (KML), a private UK company that controls approximately 8,100 km^2 of tenements within the KCB in Botswana.

Not far from the Cobre project site, Australian exploration outfit Sandfire Resources is developing the Motheo copper project. Motheo is scheduled to start producing its first concentrate as early as next year. The mine is in an advanced stage of development.

Sandfire also holds tenements in Namibia and is set to become one of the major copper players in the Kalahari Belt of Botswana and Namibia.

Further north-east from Ghanzi and close to the village of Toteng in Ngamiland, one of the first

The Khoemacau copper deposit sits beneath more than 120m of Kalahari sand. *WhyAfrica* joined the mines' surveyors for a few minutes while on an underground site visit.

Leon Louw for WhyAfrica

During our site visit to Khoemacau, we ventured down the Tlou Portal of Zone 5. Join us on our trip down the decline

movers and now the main player in the Kalahari, Khoemacau Copper Mining, has developed the impressive Khoemacau copper and silver mine in the most prospective area of the KCB.

The Boseto mine, processing plant and infrastructure initially developed by Discovery Metals Limited (bought by Khoemacau Copper Mining in 2015) is an important part of Khoemacau's operation and specifically the now upgraded processing plant with its associated infrastructure. The Boseto processing plant is about 35km from Khoemacau's Zone 5 new flagship underground mine. I spent a full day on site at Khoemacau during *WhyAfrica*'s recent road trip to find out more about the first large scale, underground and fully mechanised copper mine in north-west Ngamiland and, for that matter, in Southern Africa.

Subdued Okavango floods

Zigzagging between cattle, donkeys, goats, kudus, and the occasional elephant or two is part of the territory if you sign up to drive through the heartland of Botswana.

It was no different the morning that I left Maun in the last week of my five-week long journey through Southern Africa. Maun is a fast-growing frontier town located on the banks of the Thamalakane River and right on the southern edge of the Okavango Delta wilderness area, a UNESCO heritage site.

When the Cubango River comes down from An-

Leon Louw for WhyAfrica

Khoemacau is one of the few mechanised underground copper mines in Africa

We had some uninvited guests join us on the tour of the Boseto processing plant.

gola and spills its water into the delta as the Kavango in Botswana, the people in Maun celebrate. It takes months before the flood makes its way from the Angolan highland through the channels and small rivulets of the delta before it reaches Maun.

This year, the flood was subdued though. Celebrations were put on ice as people waited for the water mass to arrive. Locals were concerned. There were bad seasons before, but this year the flood seemed to be very late. There were even mumblings about drought and global warming; world problems that not many people in this part of Africa often talks about.

Globally it is suggestions about net-zero, green energy and climate change that have pushed the copper price through the roof on international markets. Copper is used in renewable energy technologies, including solar panels and wind turbines, and can be recycled, which makes it an attractive material in the green economy.

For as long as the copper price remains strong, which is highly likely, development of the KCB in Botswana will be viable. Unlike the great copper finds in Zambia and the DRC further north and east, and even in central Namibia, Botswana's ore bodies are buried under deep layers of sand.

Drilling through 70m to 150m of Kalahari sand and sinking a shaft or decline to reach the ore body, is not an easy (or cheap) undertaking. However, Khoemacau's success in discovering a world class ore body in the KCB and then building a successful underground mine could become their trademark and a benchmark for future mine development in the central Kalahari. The mine is a gem. Its infrastructure is something to behold and could compete with anything the majors will be able to dish up.

Khoemacau: a gem in the Kalahari

The mine is located within 20km, as the crow flies, of the long-forgotten Lake Ngami, a large body of freshwater that once formed part of the Okavango, but after tectonic shifts dried up completely during a severe drought in the mid-1960s. In Toteng village, where one turns off the A3 towards the mine, which is another 25km on, a number contingent of Herero people settled after being persecuted by the German colonial government of Namibia in the German-Herero war of 1904. They form a large part of Khoemacau's local community and, together with Batswana from the other local villages in the area, they are a part of the workforce on site today.

In winter, it's freezing at night, scorching hot during the day, and dry and dusty in Toteng. The smell of sage hangs thick in the air throughout the year and when the wind sweeps across the sparsely vegetated Ngami basin, it stirs up fine white dust and Kalahari sand that refuses to settle.

Khoemacau's 35km paved road from Boseto to Zone 5 stretches through the sand, silt, and other debris that Ngami deposited on the shores of a dying lake. Boabab trees along the road indicate age-old elephant migration routes (elephants have a special relationship with the baobab, eating its fruit and spreading the seeds).

Leon Louw for WhyAfrica

Copper ore being processed at the fist underground copper mine in Ngamiland.

Potential for further expansion

"The deposits continue at depth and there is a lot of potential for further expansion," Warren Rigelsford, Expansion Project Manager and Chief of Staff at Khoemacau, tells me as we pass another Boabab. "Although Zone 5 is our premier resource at the moment, there are three expansion projects in the pipeline which should come online within the next couple of years," Rigelsford adds as we watch a couple of Whitebacked vultures circle overhead.

These expansions will all be mined using the same methodologies as in Zone 5. Zone 5 consists of the South and Central Mine Corridors (both with two declines) and North Mine Corridor, which has one decline. The underground operation at Zone 5 is fully mechanised, where the underground team mines sulphide ores at a rate of 3.65 million tonnes per annum, followed by treatment of these ores at the upgraded Boseto concentrator (about 35km from the mine), to produce a high-grade copper silver concentrate.

Being mechanised makes the mine a lot safer than traditional mining, which requires a large workforce in the stopes.

Australian contractor Barminco uses automated drill rigs, roof bolters, loaders, and haul trucks to carry out the operation. Despite being a mechanised mine, Khoemacau employs more than 1500 employees and contractors. During construction about 2500 people worked on site.

The underground infrastructure and ground conditions at Khoemacau are immaculate. As we entered the Tlou Portal (the name of one of the big five which the portals are named after) at the Central Mine, it was hard to believe that we were venturing into a mine almost 250 to 300m beneath Kalahari Sand. The solid benches of the entrance to the portal are stacked up row upon row like concrete bastions – the fingerprints of a world class mine. If this is the benchmark, I can't wait to see how the planned future developments at Khoemacau plays out.

According to Khoemacau these expansions will require major infrastructure built, which is planned to be in place by 2027 at the latest.

"We have been advancing the Pre-Feasibility Study and associated resource drilling for the expansion project. The three additional projects are expected to double current production to approximately 130,000 tonnes per annum of copper metal and 5 million ounces per annum of silver metal in concentrate.

"The project involves the expansion of the Zone 5 mine to increase production at all three declines from 3.65Mtpa to 4.5Mtpa, development of new mines at Zone 5 North, Zeta NE and Mango NE and the construction of a new process plant at the Zone 5 Mine."

KCB not a sunset

The new processing plant would operate in parallel with the current Boseto plant, delivering over 8 million tonnes per annum (Mtpa) of total ore throughput. The four ore bodies mentioned above currently host JORC compliant resources of 168Mt at 2.1% copper and 28g/t silver. There is no doubt, Khoemacau is here to stay.

I drove back to Maun as the sun set over the Kalahari with much to think about. For a second, I spotted a large Kudu bull in the rear-view mirror, ambling towards a dry pool of water in the fading light. The sustainability and continued existence of places like the Okavango Delta and wildlife such as Kudu's depend to a large extent on how humankind manages the impact of climate change. Copper will play an integral role in the energy transition, and for now, copper is king in Ngamiland.

***WhyAfrica Tours and Travel* has 25 years of travel experience in the Kalahari and will give first- hand advice if you have plans to visit Botswana's Kalahari and Okavango Delta. Its sister company Endorphin Expeditions undertakes a guided tour through the Kalahari once a year. Contact us for more information. Khoemacau will feature in *WhyAfrica* book about Southern Africa that will be published early next year. The book will be available on our online store.**

Scatec's three solar farms and Spanish company Abengoa Khi Solar One's imposing tower have become such a part of the Karoo landscape along the N14 from Upington to Keimoes that locals hardly blink an eye when being confronted with miles and miles of futuristic technology.

Leon Louw for WhyAfrica

Chasing the Northern Cape sun

Global energy giant Scatec has taken the South African energy sector by storm. *WhyAfrica* visited Scatec's Dayson Klip 1 solar project close to Upington in the Northern Cape Province during its recent Southern Africa Road Trip to find out how this Scandinavian company has become such a big part of the South African landscape.

By Leon Louw

Leon Louw for WhyAfrica

It was a cloudy day when we visited Scatec's Dayson Klip 1 solar project close to Upington in the Northern Cape Province of South Africa.

It was a gloomy and wet morning when *WhyAfrica* arrived at Scatec's Dyason Klip 1 (DK1) solar project close to the town of Upington in the Northern Cape Province of South Africa. Earlier that morning, with dark rainclouds rolling in from the south, I waddled through ankle deep water to open the typical South African farm gate that gave us access to one of Scatec's six massive solar farms in South Africa.

Not being in this neck of the woods for many years, it was unusual to see row upon row of solar panels covering the characteristic knee-high shrubland and wilting grass. It was even more unusual to open a farm gate in this arid part of the country under cover of an umbrella in June. But we live in unusual times, right?

Changing weather patterns because of climate change, and trying to reduce carbon emissions, is exactly why this Norwegian based energy giant's PVs are covering such large tracks of land in the Northern Cape. This entire region is normally drenched in rich rays of golden sunlight (the reason why Scatec has chosen this part of the world), not buckets of water.

But, on day three of our road trip the heavens opened-up. Although local livestock and grain farmers could dance with joy, overcast conditions, and non-stop torrential rain, is not what gets sun farmers excited, especially if their brief is to feed much needed electricity into beleaguered South Africa's faltering national grid.

"This is an unusually wet dry-season, with less sunny days that what we are used to," Sazi Ramoekipa, Operations and Maintenance Manager at Scatec, tells us upon arrival. "In a good month though, DK1 could provide South African power utility Eskom with more than 2500MW of electricity, like we did in February this year," says Ramoekipa.

The Northern Cape holds significant potential to increase the share of renewable energy in South Africa's energy mix, a country that still generates most of its electricity from coal, and who's national grid continues to be plagued by load shedding and power cuts.

Amazingly, on the day of our visit, despite grey skies and unseasonal rain, Scatec's DK1 solar panels still managed to generate some form of electricity to augment Eskom's power supply, albeit in reduced quantities.

Hotspot for renewable energy

Some parts of the Northern Cape enjoy, on average, close to 290 days of sunlight, often accompanied by strong winds, which makes this far-flung province in South Africa one of the hotspots for renewable energy projects in Africa. Several solar farms and two wind turbine projects have sprung up around Copperton and Prieska, where we stayed over after our underground site visit to Orion Mineral's Prieska mine the day before.

Scatec's three solar farms and Spanish company Abengoa Khi Solar One's imposing tower have become such a part of the Karoo landscape along the N14 from Upington to Keimoes that locals hardly blink an eye when being confronted with miles and miles of futuristic technology.

Abengoa's unique solar plant, a stone throw from DK1, consists of a 205m high tower surrounded by 4,200 solar mirrored panels. It is the first and only concentrated solar powered thermal plant in Africa. Scatec's three Upington facilities are situated

on adjacent plots, 25km outside of the burgeoning town of Upington.

Upington's solar plant could power 120 000 households

Ramoekipa says that when in full swing, DK1 produces close to 217GWh – enough clean energy to service about 40,000 households annually. "The three projects combined could provide energy to more than 120,000 households and lead to the abatement of more than 600,000 tonnes of CO_2 annually," he adds.

Scatec was awarded preferred bidder status for the Upington project in the fourth bidding round under the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme in 2015. Construction of DK1 started in the first quarter of 2019 and the facility was commissioned towards the end of the same year.

The company has also started construction of the three Kenhardt projects, in the Northern Cape as well, under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) after reaching financial close.

Once operational the Kenhardt project will have a total solar capacity of 540MW and battery storage capacity of 225MW/1,140MWh, and provide 150MW of dispatchable power under a 20-year Power Purchase Agreement to the Kenhardt region – in a country that is currently suffering from power shortages.

"This project is a first of its kind and will be one of the world's largest solar and battery facilities. We are now looking forward to starting construction of this unique and exciting project, which will be a major contribution to South Africa's economy and green energy sector," said Scatec CEO Terje Pilskog, in an interview earlier this year.

The Kenhardt project will be the largest investment in Scatec's history with a total capex of approximately R16.4-billion (USD962-million) to be financed by equity from the owners and R12.4-billion (USD727-million) in non-recourse project debt. The debt will be provided by a group of lenders which includes the Standard Bank Group as arranger and British International Investment.

Scatec sub-Saharan General Manager Jan Jurie Fourie, is convinced that the solar-battery project will address the so-called intermittency, or variability of renewables. Fourie says that the massive facility, which will be made up of three projects on a 10km-by-10km site, will be able to dispatch electricity into the South African grid between 5 o'clock in the morning and 9:30 at evening.

Being world class requires immense effort

Scatec's plants use some of the best technology available in the solar energy sector. This means that the Upington complex is one of the top solar projects in the world. Making sure it remains this way is not always a walk in the park (so to speak), as we discovered during the visit. It requires immense effort from a dedicated and competent team. Every day brings new challenges, and to maintain such a massive technology hub, requires innovative solutions.

"The maintenance involved is quite intensive," says Ramoekipa. "Because the equipment is very sensitive, it needs daily maintenance. The tracking systems to monitor the movement of the panels, for example, can get stuck, or communication constraints could prevent these panels from operating optimally," Ramoekipa adds.

The solar panels in the plant face east in the morning and then needs to move west towards the evening using advanced technology. The grass underneath these panels needs to be maintained and cut at a length of about 200mm to 300mm. The grass cannot be removed completely though, as insects, rodents and other small mammal species need the vegetation cover as protection. Furthermore, longer grass cools the solar panels, and the temperature of each panel needs to be checked regularly, especially on a hot day. Ironically, solar panels need the sun but do not like the heat. At 0C 50 the panels are not that effective, for every degree over 0C 35, each panel is 4,9% less effective.

The upside of this intensive maintenance is that it creates unskilled jobs in a country and region where the unemployment rate is close to 34%. For example, a team of about 12 people is needed to clean the 232,464 panels once a week. In addition to cutting the grass and cleaning the panels, firebreaks need to be maintained and local security companies keep a watchful eye 24 hours a day. So, although most jobs are created during the initial construction phase of a solar plant, the assumption that such projects don't create sustainable employment, is incorrect.

As we left DK1 the sun broke through the heavy clouds and the rain stopped. DK1 started humming like a chorus of cicadas on a hot day in the African bush. They gulped up the remaining rays of sun and slowly started turning towards the west. Come rain or shine, these suncatchers of the Northern Cape never stops searching. They chase the light to reduce our carbon emissions.

There is no doubt that research and technology will deal with the teething problems of large solar farms. Research is currently underway to deal with dust, cloud cover, size, and output. The structures within the cells of panels that will be used in the future are currently being upgraded to produce more power. According to Ramoekipa, the panels at DK1 generates 480W, and they were installed only two years ago. The latest technology already generates 520W. Scatec continues expanding its footprint throughout Africa and if DK1 is anything to go by, the future is bright, even on a gloomy day.

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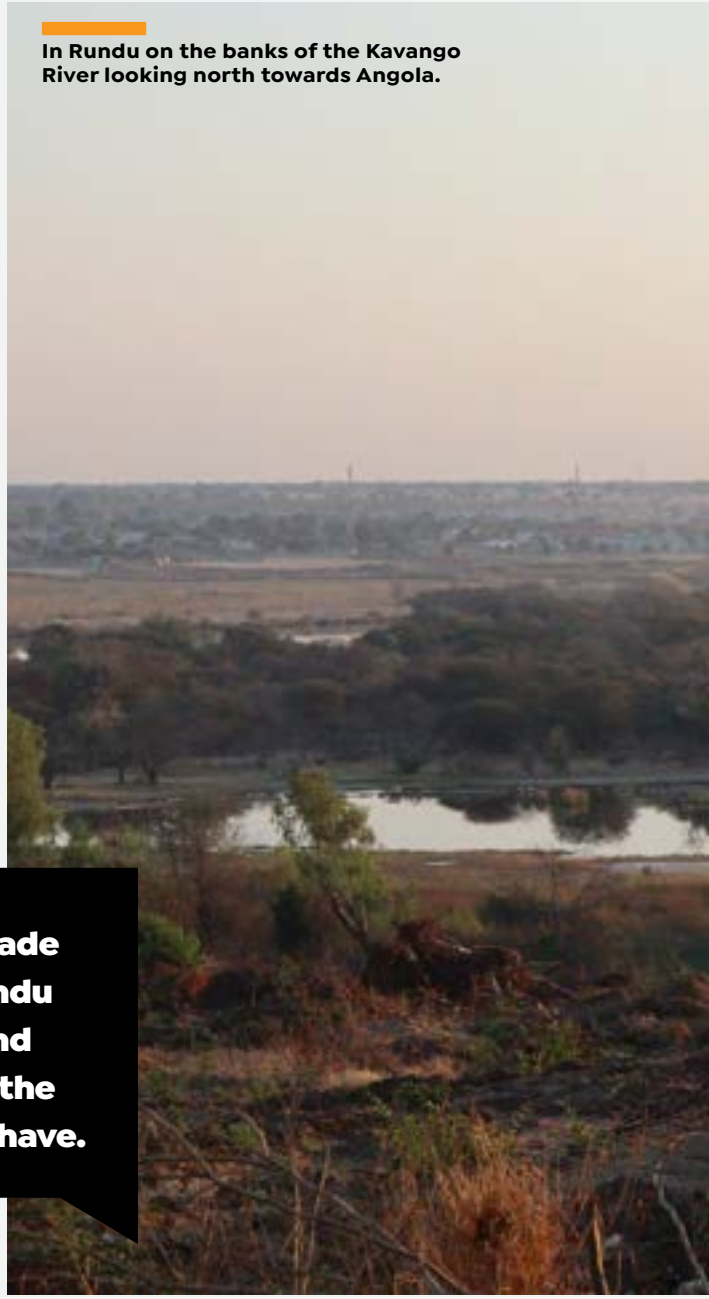
Oil in the Kavango: blessing or curse?

Expectations amongst local people of the Kavango Region in Namibia that Canadian company ReconAfrica's oil and gas find close to the town of Rundu, will change their lives for the better, are high. But would an oil and gas project in this region be a blessing or a curse?

By Leon Louw

"I've seen people from villages around Rundu on their knees at meetings praying that ReconAfrica's oil and gas find will be commercially viable," says Mwanyengwa Ndapewoshali Shapwanale, Director Communication and Stakeholder Relations at ReconNamibia, the Namibian subsidiary of ReconAfrica. Shapwanale met me in Rundu before we drove to Kawe, a village in Kavango East where ReconAfrica drilled their first stratigraphic well, in 2021. A few kilometers away, at the Macadena village, ReconAfrica has deployed its Jarvie-1 rig to drill its third stratigraphic well in the area.

I remind Shapwanale that there have been a lot of negative media reports about communities opposing the project. In fact, ReconAfrica's project has been in the firing line of international environmental organisations ever since it started early-stage exploration drilling in January 2021, a time when Covid-19 tightened its grip on the world. Nonetheless, many of the local people that I spoke to during my stay in Rundu supported the project, although there were some that had con-



In Rundu on the banks of the Kavango River looking north towards Angola.

It will be fantastic if ReconAfrica made a large discovery. The people of Rundu and surrounding villages understand the benefits and are well-aware of the impacts the project could possibly have.

Leon Louw for WhyAfrica

Leon Louw and Mwanyengwa Ndapewoshali Shapwanale, Director Communication and Stakeholder Relations at ReconNamibia on site during *WhyAfrica's* Road Trip in July.

cerns about the possible impacts.

I asked Shapwanale what it would it mean for the Kavango region and for Namibia as a country, if ReconAfrica does finds significant amounts of oil and gas?

"It will be fantastic if ReconAfrica made a large discovery. The people of Rundu and surrounding villages understand the benefits and are well-aware of the impacts the project could possibly have. In the end, it is up to the people of Kavango and the people of Namibia to decide," she says.

Lifeline for a bustling town

Rundu is a bustling African town. I know it's a cliché when referring to African cities or large towns. But there's no better adjective to describe Rundu, especially after travelling for 22 days through the sparsely populated thirstlands of the Namib desert.

Rundu has always been a gathering place for a diversity of people long before it was declared the capital of the Kavango region in 1936, or before European countries arbitrarily drew Africa's borders at the Berlin conference in 1885. The inhabitants of what is today known as Angola, Zambia, Namibia, and Botswana were attracted to the area by the lifegiving water of the Kavango River, which snakes through Angola and Namibia before it spreads out and ultimately vanishes in the thick sand of Botswana's Okavango Delta.

The Kavango region's soil, along the river, is fertile, and subsistence and small-scale farming, as well as fishing, have been the backbone of the local economy for thousands of years. However, the Kavango people, and inhabitants of Rundu and surrounding villages, are running out of land. The further people move away from the Kavango River, the harder it becomes to access fresh water sources. Moreover, Covid-19 and its lockdowns have taken its toll on the health system and the economy of a rural town bursting out of its seams.

Other than fishing, farming, and trading, there is not much else to do in Rundu, especially for young people. With unemployment at record high levels, the youth of Rundu and its surrounding villages are restless. There might be a lifeline though. But the jury is out whether the solution will be a blessing or a curse. Could oil and gas be Rundu's saviour?

The company had to fend off a court application by a third party that challenged recent amendments to ReconAfrica's Environmental Compliance Certificate. The amendments were approved by the Environmental Commissioner of the Namibian Ministry of Environment, Forestry, and Tourism.

The third party requested an order from the court for an interim interdict to restrain ReconAfrica from continuing any oil and gas exploration

ReconAfrica's Jarvie-1 rig in the Kavango East Region of Namibia.

activities. This episode once again proved the controversy of the oil and gas project, even if it is only in a very early exploration stage.

Early in August, the court dismissed the application for the interim interdict and ordered that the applicants pay all legal costs. ReconAfrica then announced that it has received a three-year extension to its Environmental Clearance Certificate (ECC), from the Office of the Environmental Commissioner, Ministry of Environment, Forestry and Tourism of the Republic of Namibia, covering the entire PEL 73 permit, which covers over 6.3 million acres (25,000 km^2), in northeast Namibia.

According to Scott Evans, CEO of ReconAfrica, the ECC authorises the company to continue drilling stratigraphic test wells, to depths as well as completing a side-track of the company's first well, Kawe 6-2, in the Kavango Basin. The extended ECC has been approved by Ministry of Mines and Energy and National Petroleum Corporation of Namibia (NAMCOR) and is valid for three years from August 26 2022 until August 26 2025.

"The extension of the Environmental Clearance Certificate was underpinned by extensive on-the-ground and research-based data gathering by our technical teams working in combination with our third-party technical partners.

"The extension further demonstrates how ReconAfrica is working collaboratively with our interested and impacted stakeholders in Namibia including local and national government entities and representatives, as well as with the Traditional Authorities, as we pursue the commercial development of the Kavango Basin. The extension enables the company to plan and execute our current stratigraphic drilling and side-track programs," says Evans.

Does benefits outweigh adverse effects?

According to Minette Le Roux, Principal Environmental Specialist (EAP) at boutique South African law firm Nupen Staude de Vries, there will be social and economic benefits for Namibia and the Kavango Region if ReconAfrica's project is commercially viable. "However," she says, "these benefits may not be as sustainable as the socio-economic benefits derived from protecting wilderness areas, or developing an area for tourism, for example."

Le Roux adds that possible negative impacts of a large-scale oil and gas project could include loss of natural vegetation, habitat fragmentation and noise and visual pollution.

Shapwanale says that all specialist impact studies have been carried out. "ReconAfrica is committed to minimal disturbance of habitat, in line with best international standards, and implement environmental and social best practices in all of its project areas," she says.

"Managing community expectations is extremely important to us," Shapwanale adds. "Stakeholder engagement is key in this project. It is important to mention all the impacts – negative and positive - of the project during our engagements. Most important though is that we need to emphasise that this project is still in the very early exploration stages," she says.

Although there are strong indications that point towards an oil and gas find, ReconAfrica's project is in a very early exploration phase and data is still being processed.

The fact that hydrocarbons are present in a petroleum basin, does not mean that the company has made a significant oil and gas discovery.

Moreover, if commercially viable oil is found, it will take at least another five to ten years before the well starts producing.

ReconAfrica's project is controversial for several reasons. For one, hydrocarbons are not in fashion at the moment. Furthermore, this find is

ReconAfrica's Jarvie-1 rig in Namibia

the first discovery of onshore oil and gas in Namibia, although the country's offshore resources, and the onshore and offshore oil deposits of its northern neighbour Angola, is well known.

The project is in the Kavango Region which is associated with the Okavango Delta, a world heritage site. Although some concerns about the environmental and social impact are valid, there are a few points that must be made very clear and that have been misrepresented in media reports and by several activists.

Consider all facts and arguments

Until a production licence is granted, only exploration drilling activities are currently taking place. Drilling activities are not in or near the Okavango Delta in Botswana, which has been reported in some media coverage. It is at least 180km from the start of what is known as the Panhandle where the Kavango River, which starts in Angola, splits into the three main channels at the villages of Sepopa/Etsha 6 and Seronga.

The project site is about 90km south of the Kavango River's main channel which flows through Rundu and forms the border between Namibia and Angola. The Kavango River is not fed by underground acquirers as is the case with ephemeral rivers further south in the dry Namib desert.

The river's catchment catchment area is in the Angolan highlands where the river starts as the Cubango before it becomes the Kavango in Namibia and Botswana. There are no river courses, dry river-beds or runoff channels anywhere close to ReconAfrica's drilling sites.

There are so many other factors to consider before any person or organisation can outright condemn the drilling for hydrocarbons, but then again, as all extractive activities, it will have environmental and social impacts, which is being addressed and managed by a very competent and local ReconNamibia team.

In the end, it is not for any western government, foreign activists, or oil companies to decide the fate of this project or the fate of Namibia and its energy vision, and whether it should include oil and gas or not. The Namibian people and communities must decide without the intimidation and interference of unscrupulous agents of various organisations.

The communities of the Kavango Region are well aware of the benefits and of the potential negative impacts of the development. In the end, it will have to be these people that have to decide about their own future.

No matter what the outcome of ReconAfrica's exploration drilling, a big oil and gas play in this part of the world will have ramifications for the entire southern Africa region. However, its most

immediate impact will be felt in Rundu, located on the banks of the Kavango River, one of the most iconic rivers in Africa.

The Kavango River is 1700km and has its origins as the Kubango River south of Vila Nova on the Bié Plateau in Angola, at an elevation of 1780m. The river flows south and after encountering several rapids at Popa Falls on the Namibian side of the border, it enters Botswana and near Sepopa, splits into three main channels as the elevation flattens and the mass of water gradually gets soaked up by the Kalahari sand of Botswana.

At the border between Namibia and Botswana the Mahango National Park provides protection for large herds of endangered Sable and Roan antelope, and small herds of roving elephants and buffalo, close to the villages of Etsa 6 and Sepopa, in Botswana, lies Tsodilo Hills, a small area of massive quartzite rock formations that rise from sand dunes to the east and a dry fossil lakebed to the west in the Kalahari Desert. These hills preserve one of the highest concentrations of rock art in the world. Tsodilo Hills and the Okavango Delta are UNESCO World heritage sites, and both have enormous tourism potential.

Low impact tourism destination

The entire Okavango basin, in Botswana and Namibia, has for many years been a low impact tourism destination and a number of lodges, concentrated along the main riverbank and in the Delta proper, have provided the local Hambukushu, Bayei and the Banoka people with employment as guides or polers.

Polers are nature guides that take tourist out on Mokoro's (traditional wooden canoes) into the channels of the Delta. Their salaries are meagre and their jobs seasonal, and they rely on gratuities.

Human-animal conflict across the Kavango region, is intense. When polers are not taking tourist into the delta on their mokoro's, they subsistence farm or fish. If the rainfall permits these small-scale farmers plant sorghum, maize, watermelons, potatoes, and sweet potatoes. They eke out a living on land big enough only for a handful of goats and one or two cows.

Most rural people in Botswana and Namibia are in conflict with elephants and lions. Although they know that these animals attract tourists and foreign currency, elephants also destroy their crops, irrigation systems and dams, while lions and leopard take their goats, cattle, and donkeys. This could leave them without food and milk for a full year, and if there are no tourists, like during Covid-19 lockdowns, they are dependent on the goodwill of neighbours or family members to survive.

Non-productive Mopani forests

Apart from elephant, game numbers in this part of Namibia and Botswana are low. Away from the flood plains of the Kavango River the thick, clayish soil of the Kalahari is not fertile at all, and Mopani trees proliferate in the substrate. Mopani forests are not productive and do not attract grazers, although elephant, kudu and buffalo do browse on the leaves. The little patches of ground cover and grazing between these Mopani dominated areas, have been decimated through years of intense grazing by large numbers of feral goats and donkeys.

Non protected areas in the region, especially in Botswana, are severely overgrazed. Apart from the disastrous veterinary fences that the Botswana government erected in the 1960s (which cut off and altered historical migration routes of elephant, buffalo, zebra, and wildebeest, and killed tens of thousands of these animals), overgrazing and desertification are arguably the most damaging environmental and ecological calamities the region has ever experienced.

It is a man-made natural disaster that is hardly ever reported about, highlighted, or researched.

Oil exploration in the wake of Covid-19

It is against this background, and in this overly complex and intricate environment that ReconAfrica is conducting their conventional oil exploration program. There is no doubt that the impact of oil extraction in the region will be significant and long-lasting.

It could change the plight of local communities for the better, or it could become a disaster area like the Niger Delta in Nigeria. It is an extremely delicate balancing act to choose between development, conservation, and tourism. Despite its inspiring natural beauty and abundance of wildlife, local communities in and around the Okavango Delta and along the banks of the Kavango River, are extremely poor, and their fight for survival will be made worse by climate change.

It is highly unlikely that a great oil discovery will alter their trajectory, just as it is highly unlikely that preserving the Delta and its natural wonders will significantly improve their daily grind. It has not for the last 200 years. The development of mass tourism will have significant environmental impacts on a sensitive and fragile ecosystem, just as any other substantial development will. In fact, the development of oil fields, if not managed correctly, could have a destructive impact on the people and the ecology.

The development and extraction of minerals, oil, and gas close to or within protected areas or national parks located in poor regions of Africa, will multiply in the future. Development and conservation can co-exist, but pragmatism is needed to find a balance and to make the right decisions. Let us hope that the Namibian (and the Botswana authorities, for that matter) are pragmatists. ●

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Carbon markets and improving ESG performance

The mining industry is under increasing pressure, amidst growing concerns globally around climate change and the industry's environmental and social impact.

By Joshua Kilani

Access to, and the cost of, capital is becoming more and more dependent on sustainability metrics as a growing number of investors demand projects that achieve multiple sustainable objectives.

The regulatory noose is also tightening, as evidenced by the sharp increase in the nascent South African carbon tax rate, which is a forewarning that the carbon tax regime will increase in its severity.

On the client side we are already seeing an increased demand by Original Equipment Manufacturers (OEMs) for less carbon intensive inputs. It is not unthinkable therefore that in future offtake-agreements the carbon intensity levels of mining output will be a contractual obligation, like grade and contaminants.

In extreme cases we are already seeing pressure applied, from the supplier side, with some service companies insisting on only partnering with aligned organisations.

Carbon markets aim to provide the financial incentive for businesses to reduce their carbon footprints, providing a pragmatic impetus towards improving ESG performance.

The first voluntary carbon markets were established in the 1990s, reaching an all-time market value of USD6.7-billion in 2021.

Companies within the mining industry can create additional revenue streams by leveraging the power of these markets and generating measurable atmospheric carbon removals from their operations which equate to tradeable carbon offset credits.

From an ESG perspective it is important to note however, that credits generated for carbon markets are only temporary solutions designed to smooth the corporate low-carbon transition, while inspiring innovation towards creating new ways of doing business as usual.

In extreme cases we are already seeing pressure applied, from the supplier side, with some service companies insisting on only partnering with aligned organisations.

Currently, the voluntary carbon markets are supported by over 500 different global governance instruments, called standards, which ensure the quality of specific reduction metrics and create a platform for communication and co-ordination amongst market participants.

These markets are complex, presenting a wall of jargon, definitions and an overwhelming assemblage of carbon standards, methodologies, and certifications.

Joshua Kilani is Managing Director at Xpotential Mining Services (XMS)

XMS

Carbon credit potential varies between different companies and there exists no one ready solution that can be applied for all types of mining operations, furthermore in some cases credit generation may even prove not to be economical. To properly value and validate decarbonisation potential therefore, a number of factors need to be considered, such as:

- geographic location,
- the license area,
- commodity type,
- processing requirements
- power sources used.

Notwithstanding these considerations, the mining industry offers some very exciting and unique crediting opportunities, especially around novel processing technologies, carbon capture and storage potential and large agricultural holdings within the license area.

In addition, the application of green energy alternatives such as solar panels, wind turbines, hydrogen fuel cells, electric vehicles, battery storage, metal recycling, biofuels and synfuels all offer substantial opportunities.

Companies in this space can further enhance their credit generating potential through a general decarbonisation strategy and improved operational efficiency.

Furthermore, any company embarking on infrastructural projects should seriously consider the adopting and incorporating of innovative design-led thinking, prior to their capital investment, in order to ensure that new developments are suitably structured for credit generation from the onset.

To realise the full value of these markets and avoid the inherent market risks requires the help of knowledgeable professionals who understand sustainability concepts and operations within the mining industry whilst also having the capacity to market and commercialise generated credits.

At XMS we understand that financial sustainability is a pre-requisite of true and holistic sustainability. We specialise in unlocking ESG value through innovation and the adoption of novel integrated solutions. Our tailor made, flexible path to decarbonisation is designed to integrate into existing operations and provide measurable economic value, assisting you in your transition from being carbon powered to being empowered through carbon.

... the mining industry offers some very exciting and unique crediting opportunities, especially around novel processing technologies, carbon capture and storage potential and large agricultural holdings within the license area.

The succulents of Gamsberg

Vedanta had to put on more than one cap when they started mining in the unique landscape of South Africa's Succulent Karoo.

By Leon Louw

Leon Louw for WhyAfrica

When Vedanta Zinc International (VZI) broke ground at Gamsberg in the Northern Cape Province of South Africa in 2015, they not only opened-up the largest undeveloped zinc deposit in the world, but also inadvertently became the custodian of an extremely sensitive biodiversity hotspot. They were given the mammoth task to manage and preserve the unique succulents of Gamsberg and the immediate surroundings.

The Succulent Karoo Biome, shared between South Africa and Namibia, is one of five semi-arid biodiversity hotspots in the world, and is extremely rich in botanical diversity. Hundreds of succulent plant species occupy tiny ranges within the isolated inselbergs scattered throughout this vast landscape. Underlying the weak developed soils of the Karoo, are the valuable natural resources that gave birth to Gamsberg Zinc Mine, South Africa's youngest large-scale mine.

Gamsberg is about 30km from Vedanta's other South African mine, 42-year-old Black Mountain Mine (BMM) in Aggeneys, a small mining town in South Africa's northern hinterland, nestled within the spectacular hillocks of the Northern Cape that hosts rich deposits of zinc, lead, copper, and silver. Together, BMM and Gamsberg are known as the Black Mountain Mining Complex (BMC).

The BMC cluster forms the backbone of a modest provincial economy and with expansions at both Gamsberg and BMM in the pipeline, Vedanta's project is a ray of hope for a frail national economy.

Gamsberg comprises an open pit mine and a processing plant. At full production in Phase 1, the mine is expected to produce more than four million tonnes (Mt) of ore from the pit and about 250,000 tonnes per annum (tpa) of zinc-in-concentrate. In

Vedanta Zinc International's Gamsberg zinc mine is located in a very sensitive environment characterised by unique succulent plants.

Gamsberg plans to develop three new underground shafts that will increase the life of mine to more than 50 years (from 30 years).

April 2022, Vedanta announced a further investment of R7-billion for the development of Gamsberg Phase 2.

The investment into the open cast zinc mine promises to create 2,000 to 2,500 jobs during the construction phase and a further 800 to 1,000 permanent jobs during the peak operations phase. Once construction is complete, the expansion will double Gamsberg's annual ore capacity to eight million tonnes and the mine will produce an additional 200,000 (t) a year of metal in concentrate (MIC).

Gamsberg plans to develop three new underground shafts that will increase the life of mine to more than 50 years (from 30 years).

BMM comprises the Deeps shaft and Swartberg underground shafts and a processing plant. Plans are afoot to deepen Swartberg, which will increase production substantially. Further ramp-up is planned, taking copper and lead ore production past the two-million-tonne-per-annum mark. The Swartberg Expansion Project has received environmental approval. BMM has been in operation since 1980 and was acquired from Anglo American by Vedanta Resources in 2010/2011.

Building mother stock

But *WhyAfrica* was not in Aggeneys to visit Vedanta's mining operations. We were there to discover the secret world of some of the most threatened plant species on earth: the succulents of Aggeneys' isolated inselbergs.

Heading up Vedanta's conservation efforts at BMC, is Biodiversity Manager Koos Smit and his team. Smit is an experienced ecologist who has done important work with offsetting agreements at mining giant Exxaro Resources before joining Vedanta in 2017. Exxaro Resources owns 24.4% of BMM.

Smit met me in Aggeneys before driving to BMC's nursery where the biodiversity team is carrying out conservation initiatives on the threatened and endangered succulents of the area. The nursery is an important conservation initiative to secure mother stock for seed harvesting and purgation of plants for conservation and rehabilitation purposes. Threatened and/or protected plant species are identified, marked, and translocated to the nursery before mining or construction of infrastructure commences.

The succulents are kept in the nursery in conditions that closely resembles their natural habitat. Collected seeds, plants transferred from the areas of development and plants propagated from seeds/cutting in the nursery will be used to rehabilitate mined-out sections of the mining and infrastructure development areas

"As part of our commitment to no net loss at BMM and Gamsberg Zinc Mine, the team moves as many sensitive plants to the nursery as possible. The integrated flora permits issued in terms of the Northern Cape Nature Conservation Act, 2009 (Act No 9 of 2009) (NCNCA) and the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004) (NEMBA) requires Gamsberg to keep as

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The Succulent Karoo Biome, shared between South Africa and Namibia, is one of five semi-arid biodiversity hotspots in the world, and is extremely rich in botanical diversity.

a minimum five representative individuals of each species of all indigenous plants that occur naturally in the area, 50 representative individual plants of all the NCNCA listed protected species and 100 representative individual plants of all threatened or protected species listed by NEMBA: Threatened or Protected Species Lists. This will require a total of almost 130 000 plants in the nursery, excluding species propagated for future rehabilitation projects," Smit explains.

The objectives of Black Mountain's nursery are to, amongst others, conserve the required plant numbers per species as per integrated flora permit, to conduct research and ensure that there is always enough mother stock of the threatened species stored within the nursery. Gamsberg is currently planning a research project on how dust generated by mining activities affect the succulent plants of the area and will engage various universities in this regard as part of recommended research projects to form part of the implementation of the biodiversity management plan and biodiversity monitoring protocols.

BMM has engaged with and is finalising a service level agreement with the South African National Biodiversity Institute (SANBI) who will assists them with the training, skills development and harvesting of seeds in the field, training of nursery employees in the collection of seeds and the propagation of plants from seeds and/or cuttings. SANBI will also assist BMM in submitting material to the Millennium Seedbank for conservation as backup to eliminate the potential risk of extinction of certain plant species.

Vedanta appointed an external services provider, NM Restoration, in November 2013 and during April to mid July 2015 to assist with the search and rescue program within the development footprint (including the open pit, all roads, and offices) at Gamsberg.

At the time, there were more than 15 people who searched, identified, marked, and then translocated plants to the nursery before any vegetation clearance as part of construction activities took place and the first blast for mining commenced. Neil MacDonald, who was part of the NM restoration team was appointed as Biodiversity Officer in August 2015 and took care of all the plants in the nursery. A Nursery Management Plan was developed by external service provider and Agarob Nursery was appointed in October 2019 to obtain additional resources to assist with the growing plant numbers, care, maintenance, pest and nursing of all plants through the implementation of the nursery management plan.

"We now need sufficient mother stock in the nursery to not only collect seeds, but also to propagate for future rehabilitation within the BMM and Gamsberg mining areas," says Smit.

When Phase 2 of the Gamsberg expansion gets underway (which includes the construction of a second processing plant and the increase of production to 8Mtpa, current disturbed areas will be used to lay down construction materials, instead of clearing and disturbing new areas with natural occurring vegetation. "Therefore, a decision was made to delay the rehabilitation of current dis-

turbed areas, until construction of Phase 2 is completed. Once the processing plant is up and running, we will start rehabilitating available disturbed areas," says Smit.

Offsetting to ensure no net loss

According to Dr Urishanie Govender, Vedanta Director EHS and ESG, VZI is committed to be biodiversity positive by 2030. "We are aiming for biodiversity gains through various restoration programmes to enhance biodiversity within previously disturbed areas. BMM has embarked on a substantial offsetting programme that includes the acquisition of seven additional farms that will be handed over the Northern Cape Department of Roads and Public Works and will thereafter be declared protected areas under the National Environmental Management Protected Areas Act, 2003 (Act No 57 of 2003)," says Dr Govender.

"In 2017 we identified several farms with vegetation very similar to the areas that Gamsberg planned to mine. BMM managed to secure four farms by the end of September 2017. On the 5th of August 2020 the MEC of the Northern Cape Department of Environment and Nature Conservation (DENC) (recently changed to the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR)) proclaimed these farms a protected area and the Gamsberg Nature Reserve was born. The four farms secured to date was transferred to the Northern Cape Department of Roads and Public Works on 13 May 2022," says Smit.

In total, these four farms cover an area of about 22,000 hectares. Smit says that BMM is currently in negotiations to acquire two of the remaining three farms, that will be included in the Gamsberg Nature Reserve Protected Area.

According to the Biodiversity Offset Report, an Annexure to the Biodiversity Offset Agreement signed between BMM and DENC , they have to acquire 16 hectares for every one hectare of calcrete that they disturb.

"We first need to avoid sensitive areas. If that is not possible, we need to minimise and mitigate the impact. That means restoring and rehabilitating the area. Only as a last resort should you start looking at biodiversity offsets. To prevent any additional offsets going forward, we need to implement the biodiversity mitigation hierarchy first," says Smit.

So, what are the chances that the disturbed areas would be rehabilitated? "The chances are good to rehabilitate infrastructure layout areas once construction of mining and mining related infrastructure is completed. The results of rehabilitation monitoring reports of areas that were rehabilitated in the past indicate good results. It is encouraging to see several sensitive and threatened species have moved back into some of the areas through natural plant succession and with limited interventions.

Intervention such as in seeding and even propagation and transplanting of plants produced in the nursery will speed-up rehabilitation and species diversity in order to enhanced and improved rehabilitation success.

***WhyAfrica Tours and Travel* and its sister company Endorphin Expeditions undertakes a yearly trip to the Northern Cape to discover the succulents of the Northern Cape. Contact us for more information.**

Illegal collectors a threat to Southern Africa succulents

Southern Africa succulent plants are experiencing unprecedented rates of decline due to combined impacts of climate change and illegal collecting to supply a growing ornamental trade in succulent plants.

Since 2019 there has been a rapid rise in the global demand for collectable plants driven by emerging markets across Asia.

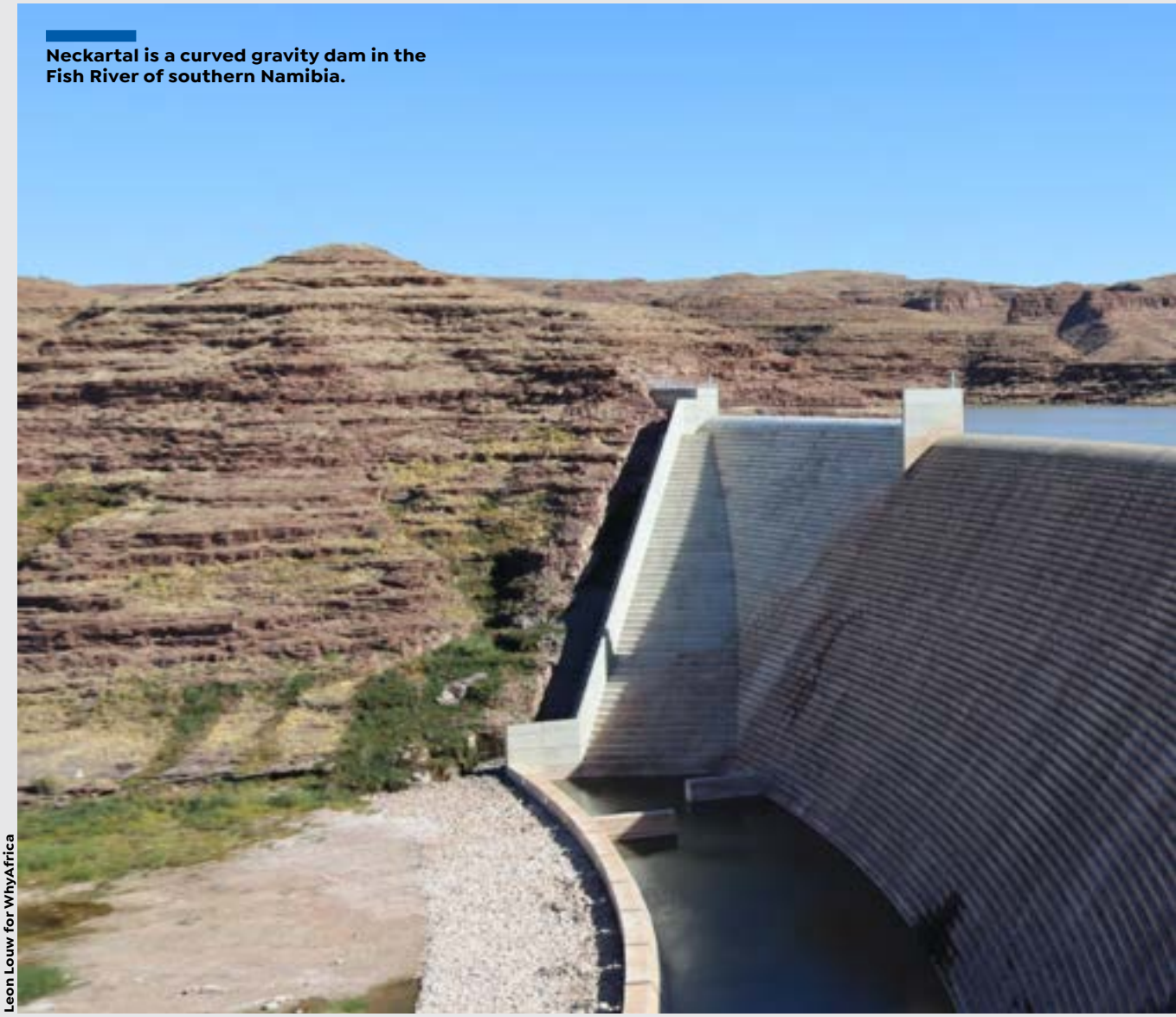
The Succulent Karoo Biome shared between South Africa and Namibia is one of five semi-arid biodiversity hotspots in the world and is rich in botanical diversity. Many of its unique species are desired by specialist plant collectors.

The IUCN Red List of Threatened Species includes 210 species of succulents listed for the first time due to the combined threats of illegal collection and climate change. Most of these species belong to the genus *Conophytum*, a large and diverse group of dwarf succulents commonly known as buttons.

A total of 97% of the genus is listed in one of the three threatened categories, whilst 45% are listed in the highest category as critically endangered, meaning they are on the brink of extinction. It is very likely that some species have already been poached to extinction in the wild because the number of confiscated poached plants being housed at secure locations for court cases often exceed the previously estimated total wild population size.

Previously, these succulent species were not assessed on the IUCN Red List, however, they were included on South Africa's National Red List. Since 2019, 143 (91%) of the 157 previously listed *Conophytums* have experienced an increase in threat status, with the vast majority because of illegal poaching.

Over the past three years plant material confiscated from plant traffickers by law enforcement agencies has increased annually by over 250%. Law enforcement and reporting of the poaching is proving valuable, and a national response strategy and action plan has been drafted as a collaborative effort by government departments, conservation authorities, non-governmental organisations, and local communities to ensure the survival of rich succulent flora whilst promoting sustainable socio-economic development in the country.



Neckartal is a curved gravity dam in the Fish River of southern Namibia.

Leon Louw for WhyAfrica

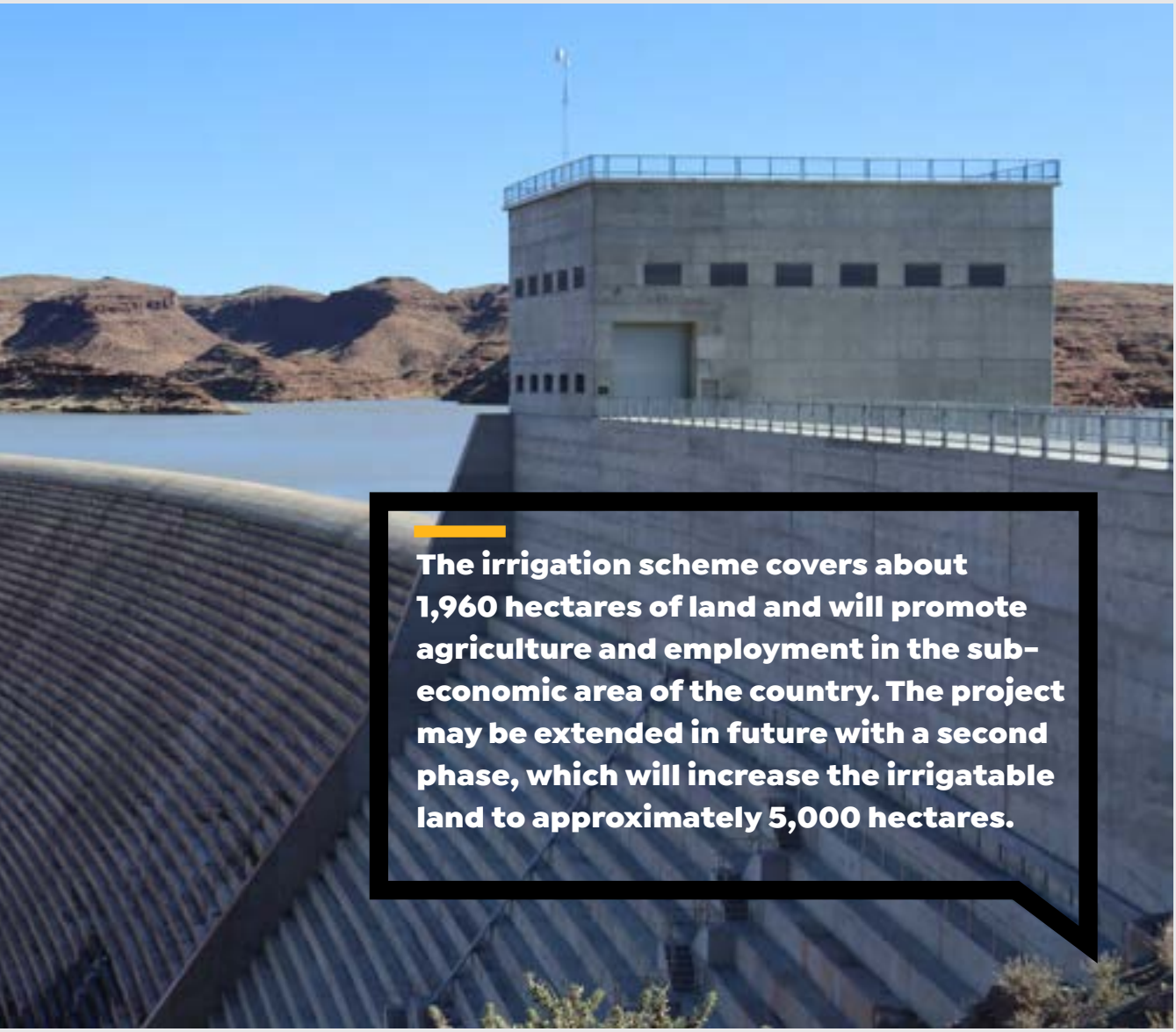
Desert Dragon's agricultural potential still on ice

Neckartal, nicknamed the Desert Dragon, is a curved gravity dam in the famous Fish River of southern Namibia. With three times more capacity that the Hardap Dam, Neckartal is the largest dam in Namibia. I took an off-road detour to visit the dam about 40km from Keetmanshoop in the /Karas Region.

By Leon Louw

The Neckartal dam and Phase 1 bulk water supply was inaugurated by the then Vice President of Namibia Dr Nangolo Mbumba, on 13 March 2020.

The dam was designed by South African based civil engineers Knight Piésold Consulting and constructed by Italian headquartered Salini-Impregilo. The project is located about 40km west of the small town of Keetmanshoop and is the first phase of the Neckartal Irrigation Scheme (NIS) which the Namibian government hopes will improve the region's agricultural



The irrigation scheme covers about 1,960 hectares of land and will promote agriculture and employment in the sub-economic area of the country. The project may be extended in future with a second phase, which will increase the irrigatable land to approximately 5,000 hectares.

development, especially for cultivating products such as lucerne, grapes and dates.

The dam is part of vital infrastructure planning to provide water and irrigation to the arid southern region of Namibia. "The irrigation scheme covers about 1,960 hectares of land and will promote agriculture and employment in the sub-economic area of the country. The project may be extended in future with a second phase, which will increase the irrigatable land to approximately 5,000 hectares," Mbumba said at the project's inauguration.

When I visited the dam as part of *WhyAfrica's* Road trip, the irrigation scheme was yet to be commissioned. According to the Namibian Ministry of Water, Agriculture and Forestry, there are several disputes about land acquisition and the delay in starting up the irrigation scheme is because the government has not been able to secure the necessary land needed to make the scheme a reality.

Once the scheme gets underway it would irrigate agriculturally developed land, aligned to the government's Green Scheme Policy, approximately 21km away. "From a downstream abstraction weir, pumped water is piped to a reservoir above the irrigation area, then gravity fed to farms. Controlled release of the dam water to the weir fills the reservoir and, simultaneously, generates hydropower," says David Stables, Principal Project Leader for the Neckartal Project at Knight Piésold Consulting.

Three dams in a parched landscape

Neckartal is in an extreme arid region of Namibia, and to see so much water in this part of the country, is impressive. Neckartal is the largest dam in Namibia with the volume exceeding that of the second largest dam in the country, Hardap, by a factor of three.

But Neckartal is not the only big dam in the southern parts of Namibia. In fact, Namibia's largest three dams are all located in the southern regions of ǂKaras and Hardap. After Neckartal and Hardap (also in the Fish River), the Naute Dam is about 50km south-west of Keetmanshoop and provides the town with potable drinking water. The

The Neckartal dam is located in an extremely arid part of southern Africa

Leon Louw for WhyAfrica

source of Naute dam's water is the Löwen River, a tributary of the Fish River. The Naute Dam was built between 1970 and 1972 by South African company Concor and was officially commissioned in September 1972.

Standing on Neckartal's dam wall is almost surreal. The water mass is surrounded by an expanse of parched land, in my experience only eclipsed by the extreme aridity of the Richtersveld desert lands and some parts of the Fish River Canyon, claimed to be the second largest canyon in the world after the Grand Canyon in the USA. When the sun beats down and the dry air almost suffocates you, it is not hard to understand why the dam was named the Desert Dragon.

The birth of a desert dragon

The Neckartal dam overflowed for the first time in January 2021, amidst a global pandemic. The structure across the Fish River has a crest length of 520m and a height of 80m and can store 850 million cubic metres (Mm^3) of water. Over one million cubic metres of reinforced cement concrete (RCC) was needed to complete the dam wall.

In a water scarce region of Africa with limited capacity for large dams, Neckartal is huge. It is the eighth largest dam in Southern Africa and the reservoir stretches more than 36km upstream. The dam has a shoreline of almost 290km.

Neckartal is in the Fish River, a major tributary to the Orange River. The outflow of the Fish River joins the Orange River (the longest river in South Africa) at the border with South Africa south of Neckartal and about 100km from the Atlantic Ocean to the west.

Environmental considerations

The Fish River is an ephemeral system, in other words the river only flows during periods of rainfall in the catchment. According to the environmental report the local fauna and flora have adapted to these harsh conditions and the lack of water limits the number of animals that can be sustained by the Fish River.

The impoundment of Neckartal Dam has generated a local sustainable water source, thereby creating a much larger habitat for plants and animals. According to locals in the area animal and birdlife have already increased significantly in the surrounding area since impoundment started.

During the design phase of the project, alternative options for installation of the 9 km-long pipeline between the pump station and the holding dam, above and below ground, were investigated. In the end, the decision was made, in combination with environmental requirements, that the pipeline be buried below the natural ground level, to limit the obstruction of animal migration and to ensure that the infrastructure is less intrusive to the natural surroundings.

Innovative construction technology

According to a report by Knight Piésold Consulting the Neckartal project consists of a 78.5m high RCC gravity arch main dam; a 10m high RCC abstraction weir (both structures have uncontrolled Ogee crests); a 2.1 square metre (m^2) per second pump station; a 9 km-long pipeline of diameter 1.1m; and an HDPE-lined embankment holding dam with a water storage capacity of 90,000m^2.

Projects of this magnitude need innovative construction technology to be executed successfully and even more so for the Neckartal Dam due to its desolate location in the arid climate of southern Namibia.

Construction of the project continued 24 hours a day, all year round, except for a short break between each Christmas and New Year's Day. This re-

The Necartal dam has a shoreline of almost 290km.

Leon Louw for WhyAfrica

quired that special thought be given to the seasonal variability during the design of the project.

For the duration of the wet season, large cofferdams had to be constructed, diverting the rushing waters of the Fish River to enable construction and allow access without flooding of the site.

Two large culverts, 4.71m wide by 5.8m high at the inlet side, were constructed transversely through the dam wall. These multipurpose culverts were used for vehicles to travel between the up- and downstream sides of the dam during the dry season and for routing river flow during the wet season.

To overcome the long concrete haulage distance of more than three kilometres, a 600m-long conveyor belt, traversing 95m down the side of the gorge, was used to quickly transport fresh RCC from the concrete batch plant situated high on top of the left bank down to where construction was taking place.

Throughout the peak of summer, high temperatures of more than 40 degrees Celsius required that thought be given to the placement of concrete to avoid excessive heat during the hydration process of concrete curing.

A special finite element model was designed to estimate concrete temperatures during the placement of the RCC, whilst the cast of Conventional Vibrated Concrete (CVC) was only allowed during the cooler hours of the night. All these design ingenuities contributed to the successful completion of the project.

The continuous uniform double curved shape for the dam spillway (an Ogee spillway) inherently posed some difficulties for the construction team. Innovation was required to decrease the construction time whilst maintaining the accuracy of the constructed profile and avoiding honeycombing and blowhole formation on the finished Ogee surface.

For the main dam, conventional construction methods (using sliding formwork or guide rails) needed reconsideration to reduce the time of construction of the Ogee crest. Eventually, construction was executed using controlled permeability formwork.

This technique reduced the construction duration of the Ogee crest by a factor of more than two when compared to the conventional construction techniques used for the construction of the abstraction weir's Ogee crest.

To aid the monitoring capabilities of the site engineers' supervision (monitoring, and quantifying different construction activities), unmanned aerial vehicles (UAVs) were introduced. UAVs were utilised for photographic surveys to develop accurate three-dimensional models that were used to monitor the construction progress of the project.

In addition, accurate surveys, project monitoring, material quantity measurements, building information modelling integration and the sharing of insights around the construction site were carried out with the aid of the UAVs. The project was one of the first dam construction projects in the Southern African Development Community (SADC) region to apply this technology.

Neckartal Dam is the most significant concrete structure built in the last decade in Southern Africa. It is one of the largest concrete structures constructed in southern Africa in recent years, if not the largest concrete structure of recent times. It is primarily constructed of concrete with very few other construction materials.

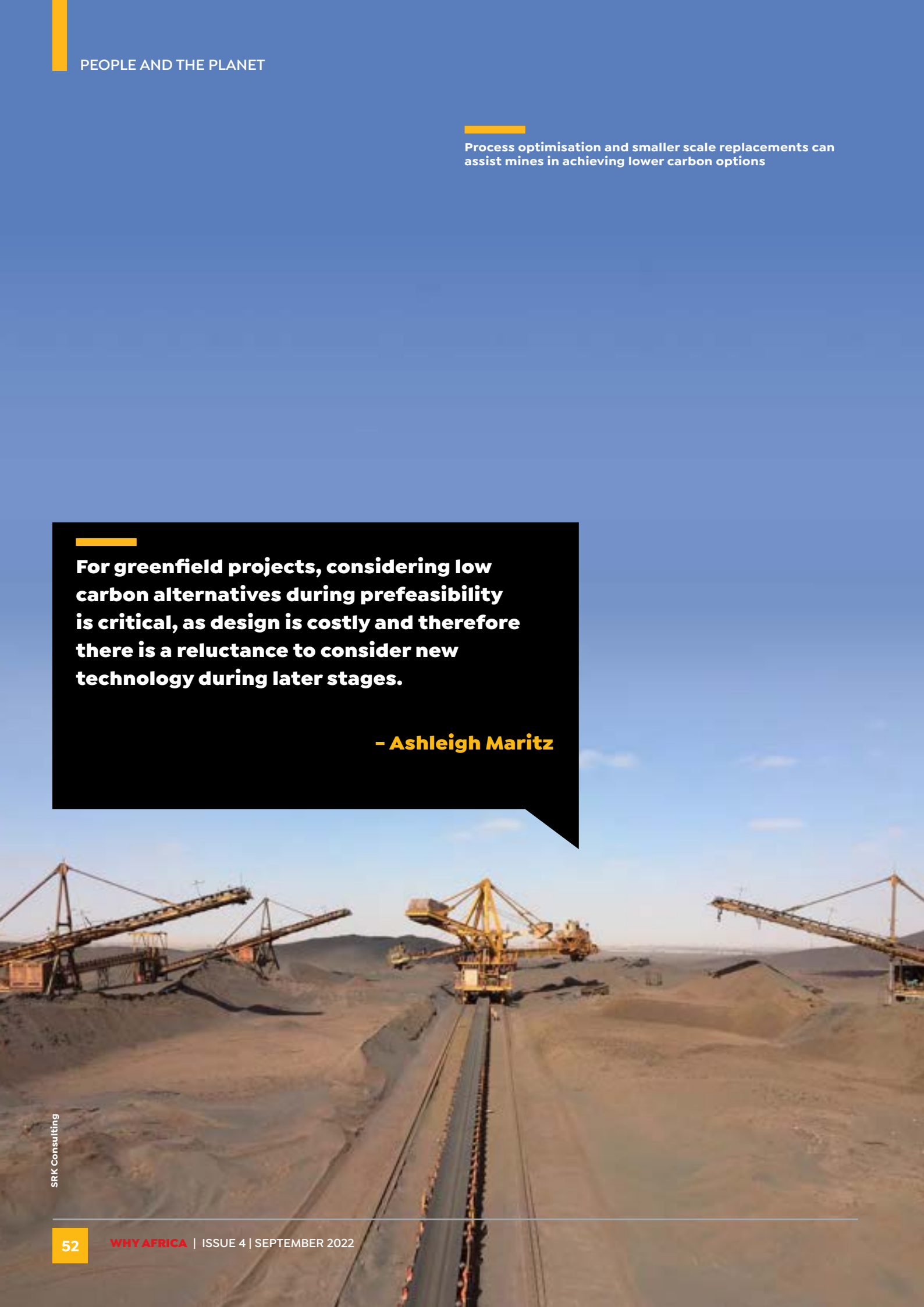
Source: Knight Piésold

Special thanks to Knight Piésold Consulting and David Stables for making the information available and to the Namibian Ministry of Water, Agriculture and Forestry who allowed me onsite at a difficult time.

Process optimisation and smaller scale replacements can assist mines in achieving lower carbon options

For greenfield projects, considering low carbon alternatives during prefeasibility is critical, as design is costly and therefore there is a reluctance to consider new technology during later stages.

– Ashleigh Maritz



SRK Consulting

Taking a strategic approach to mine decarbonisation

With growing stakeholder expectations for the mining sector to reduce its carbon footprint, current industry efforts are uncovering a range of practical opportunities to decarbonise at operational level.

"For existing operations, there are a range of reduction alternatives to consider, where energy consumption can be minimised," says Philippa Burmeister, associate partner and principal scientist at SRK Consulting. "There are also replacement alternatives, where a renewable source of energy is applied to replace the current carbon-intensive source."

Ashleigh Maritz, principal environmental scientist at SRK Consulting, notes that a recent study by SRK had explored a range of decarbonisation technologies being applied or tested by the mining sector across commodities. This had highlighted many opportunities, but their application had to be carefully assessed considering each project's specific conditions.

Burmeister says one key insight from SRK's involvement with existing operations transitioning towards lower-carbon options is that it is generally not feasible to replace existing plants and operations with more efficient alternatives before the end of their life.

Rather, process optimisation and smaller scale replacements to achieve reductions are more feasible. Optimisation and reduction however will not achieve the carbon neutral targets committed to by many organisations. Therefore, investing in renewable energy sources is also important.

"For greenfield projects, considering low carbon alternatives during prefeasibility is critical, as design is costly and therefore there is a reluctance to consider new technology during later stages," says Maritz.

The business case is stronger where infrastructure at the project location is weak, although there are practical considerations related to scale and local climate conditions. Maritz points out that renewable generation was also more attractive for mining projects in regions which experienced unreliable power supply from centralised grids.

"If a mine is currently on a national grid, for instance, it can transform its carbon footprint decisively by converting to renewable power," she says.

"The upgrading of hydropower projects holds potential for some areas in southern and central Africa, allowing mines to easily move away from coal-fired grid power – which has become less reliable in the region," she says.

Decarbonisation driven by investors

Much of the pressure for decarbonisation on mines is being driven by financiers, investors, stock exchanges, end-customers, and civil society. They increasingly insist on detailed reporting not just on Scope 1 and 2 emissions, but also on Scope 3 emissions.

According to Burmeister, the strategic approach for a mine is to quantify as far as possible its Scope 1, 2 and 3 emissions, and then to target the most significant emitters first.

Ashleigh Maritz, principal environmental scientist at SRK Consulting.

Philippa Burmeister, associate partner and principal scientist at SRK Consulting.

A useful starting point is a process flow diagram in which the largest carbon emitters can be clearly identified. This paves the way to developing a Greenhouse Gas (GHG) inventory, which can rank the business's carbon emission sources in terms of significance.

Reducing energy consumption needs to remain a key focus, as even the renewable technology for carbon replacement will create emissions in its manufacture. Energy reduction measures have the added advantage of generally cutting costs directly.

While Scope 1 covers GHG emissions that a company makes directly – for example, its boilers and vehicles – the Scope 2 emissions are mainly from electricity purchased from an external supplier. Scope 3 emissions are more difficult to quantify, being those produced by suppliers and customers up and down the supply chain.

"All the way along the supply chain, there is growing demand for green processes and products leading into mining or emerging from it," says Burmeister.

"While the emissions associated with these phases are often difficult to quantify, mines do need to identify and acknowledge these impacts in their reporting."

Burmeister says that a good way to begin controlling Scope 3 emissions is through the careful selection of suppliers. The transportation distance between the mine and the supplier, for instance, was one indicator of carbon footprint. The shift to local procurement may create challenges in terms of convenience and pricing but is becoming a national priority in many mining countries in Africa.

"The supply chain disruption caused by the Covid-19 pandemic has effectively promoted this trend towards local – and potentially lower-carbon – procurement," she says. "It has presented a useful overlap of the imperative to reduce carbon footprint and to support local economic development."

Burmeister highlights that the focus on decarbonisation is growing and is a valuable contribution to global climate change goals. The other side of the coin, though, is that climate change is presenting new and significant risks to the operation of projects themselves.

"Climate change is here, and companies need to proactively manage the risks to their own projects and developments," she says. "Higher rainfall levels are already a concern for designers and managers of tailings dams, for example, and these climate related factors apply across every aspect of mining and other industries."

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Leon Louw for WhyAfrica

Orano: worth its salt

Through an innovative energy recovery system and a PPA solar energy deal, Orano Mining Namibia has been able to reduce energy consumption at its Erongo Desalination Plant (EDP) close to Swakopmund in Namibia by more than 40%.

By Leon Louw

The water pipeline between Swakopmund and Henties Bay in Erongo, Namibia

The major costs in operating the desalination plant are the membranes, maintenance, and electricity. It is an extreme environment and therefore the maintenance costs are high.

Leon Louw for WhyAfrica

The Atlantic Ocean on the west coast of Namibia is cold, wild, and treacherous. It also provides the Erongo Desalination Plant with much needed water.

Leon Louw for WhyAfrica

The Erongo Desalination Plant (EDP) was inaugurated in 2010. In 2021, the EDP set a new record by producing 12.7 million cubic meters of fresh water.

The west coast of Namibia is a harsh environment. It is hot, cold, dry, wet, and windy; all in one day. The mist belt that gathers precipitation from the icy Benguela Current sustains the isolated patches of biological life that survives in this moon landscape of the Namib.

The mist drops its sustenance in the morning, for almost 300 days of the year. Its reach is limited though, and the moist bank of misty clouds stretches for only 20km inland before it dissipates in the dry Namibian sun.

Towns like Swakopmund, Walvis Bay, and the fishing village of Henties Bay (all in the Erongo region), have sprung up within this mist belt. Half-hearted green Salt Bushes, Dollar Bushes, and a range of orange, red and off-green lichens dot the flat earth close to the ocean.

Beyond this vegetation belt, which is maintained by the mist, lies the drylands. It is here where most of Namibia's uranium is found, in abundance. Several world-class uranium mines have been developed in the region, including Paladin Energy's Langer Heinrich, Rio Tinto's Rössing, and Swakop Uranium's Husab Mine. Before the 2011 nuclear disaster at Fukushima in Japan, nuclear energy was part of most countries' energy plans, the uranium price was sky-high, and the mines of Namibia were feasting on their large resources.

Although uranium is back in demand, for more than 10 years the mills in Erongo slowed down and most uranium operations avoided care and maintenance by the skin of their teeth. Mines, towns, and people need water, a natural resource not as abundant in the desert as uranium. In fact, Swakopmund and Henties Bay suffered from severe water

Leon Louw for WhyAfrica

EDP was the first, and remains one of the very few, desalination facilities to be built in southern Africa.

shortages in the past when Omdel aquifer, which provided the surrounding areas with groundwater, started running dry.

The Erongo Desalination Plant (EDP) was inaugurated in 2010. In 2021, the EDP set a new record by producing 12.7 million cubic meters (Mm^3) of fresh water. The cumulative production since 2013 has now reached over 83Mm^3.

EDP was the first, and remains one of the very few, desalination facilities to be built in Southern Africa and is located in the village of Wlotzkasbaken, about 30km north of Swakopmund. State entity NamWater taps into the treatment facility's water production and distributes it to Swakopmund and surrounds. Ironically, the desalination plant was initially constructed by a mining company; it was never intended to provide the Erongo region with drinking water.

From mining company to water provider

French company Orano Mining Namibia, previously Areva Resources Namibia (the company changed its name in January 2018), acquired a mining license to develop the Trekkopje uranium mine in 2008. The mine was poised to become the tenth-largest uranium mine in the world. The estimated life of mine was 12 years.

Construction got under way and the mine was nearing completion, on target to start production in 2011, when disaster struck at the Fukushima nuclear power station in Japan (the mine and plant actually completed a test run in 2011). Production was planned for that same year. Fukushima pulled the rug from the uranium market's feet, and Trekkopje postponed production until the jitters settled. The uranium price, however, tanked and continued its slide to rock bottom. Since then, it has recovered somewhat, but not enough to ensure Trekkopje's profitability. More than 14 years later, this project is still on care and maintenance.

Trekkopje was going to use a heap leach method to extract uranium, which requires a lot of water that is not readily available in the desert. The desalination plant was built for one specific reason: to ensure a continuous supply of good quality water to the mine. The water produced by the plant would be carried across the desert to Trekkopje by a 48km pipeline measuring 800mm in diameter and equipped with three pumping stations. A 132kV power line was also built along the pipeline to supply electricity to the plant.

At peak activity, the mine was expected to use about 12Mm^3 of water, so there was always going to be approximately eight million cubic metres surplus, which would have been available to industrial and domestic users in the Erongo region. So, when Trekkopje never actually started producing uranium, the town of Swakopmund, various mega uranium mining operations, and, most of all NamWater, were presented with a very welcome present. Mines like Husab and Rössing are major beneficiaries. In fact, Husab's fortunes are totally dependent on the water provided by the desalination plant.

The Erongo plant was built in two years. It is a simple and straightforward processing plant. Although, understandably, the process requires a lot of electricity and the initial capital costs were high, the long-term benefits far outweigh the costs.

The EDP is not only a case study for mining companies operating in desert or semi-desert areas, it is proof that salt water can provide coastal populations with potable water. More than that, it shows that if government and the private sector work together, it is much easier to find solutions to what is not always such complicated problems. EDP uses ultra-filtration (UF) and reverse osmosis (RO).

Desalination process

The first step in the desalination process is the collection of seawater through an intake unit anchored

one kilometre off the coast at a depth of 10m. The seawater passes through a screen that catches anything larger than 40mm in diameter, thus removing large debris, aquatic plants, fish, and animals.

Two pipelines transfer the seawater from the intake structure to a pump station located on the seashore. The seawater is pumped to the plant through a single pipeline which is 1.2m in diameter. The incoming seawater passes through a rotary screen fitted with panels that remove particles larger than 60mm in diameter. From the screening building, the water is collected in a tank that feeds the UF trains. There are five installed rotary screens, with provision for a further three if required.

The filtering in the UF process takes place in what can best be described as horizontal pressure vessels, each one six metres long and 200mm in diameter. Inside each pressure vessel, there are four UF membranes. Each membrane consists of hundreds of straws each about 0.5mm in diameter. The walls of the straws are the filter medium. The water enters the inside of the straw and passes through the pores in the wall.

The solids in the water collect in the straws as they are too big to pass through the pores. The effective cut point of the UF membranes is 0.01mm. The clean water that has filtered through the UF membranes is collected in the RO feed tank.

The UF membranes are backwashed regularly to remove the solid particles that build up in the straws. About once a month, the trains are cleaned with a detergent to remove the solids not cleaned out by the backwashing.

The plant was designed to have 14 UF trains at full capacity. There are currently 11 trains installed and nine in operation. Each train has 308 membranes installed, giving a total of 2 772 UF membranes on the site. The typical membrane lifespan is five years.

The next step in the desalination process is the RO unit. The clean seawater is pumped up to 70 bar pressure and into the RO vessels. These resemble the UF vessels, but they are eight metres long and have six membranes per vessel. The RO membranes consist of alternating layers of semi-permeable membrane. The membranes are wrapped in a spiral around the central collection pipe.

Approximately 47% of the water entering the RO vessels passes through membranes and out as pure water. The remaining 53% (and all the dissolved solids) leaves the membrane as brine. The brine is still at high pressure and is used to pressurise a portion of the feed to the unit before flowing back to the sea.

The plant was designed to have nine RO trains at full capacity. Of the nine trains, eight are in operation at present. There are 512 membranes per train – 4 096 installed on the plant and again, the expected life expectancy of a membrane is five years.

The permeate from the RO units is too pure and needs to be re-mineralised before it can leave the plant. This is achieved by passing the water through a bed of limestone where calcium carbonate dissolves into the water. Chlorine is dosed in the water to sterilise it and the pH is adjusted to the product specification before the water is pumped into the NamWater supply line.

The brine stream from the plant is a mixture of the brine from the RO units, the backwash water from the UF units, and flush water from the screens. Roughly 70% of the seawater pumped to the plant is returned to the sea as brine.

Costs of desalination

The major costs in operating the desalination plant are the cost of membranes, maintenance, and electricity. It is an extreme environment and therefore the maintenance costs are high. Another challenge is dealing with the algal blooms, red tides, and sulphur events that happen frequently along the Namibian coast. The region often experiences sulphur outbreaks in the ocean and when this enters the plant, it creates major problems in the UF and RO sections. Sulphur is very hard to remove from the membranes – you have to be careful not to damage the membranes. As soon as high sulphur levels are detected, the plant is shut to protect the membranes. It is a seasonal phenomenon, but it is more prevalent in summer.

Efficient energy recovery system

Orano Mining Namibia recently entered into a 10-year Power Purchase Agreement (PPA) with French company InnoSun Energy Holdings to provide 5MW solar electricity to EDP.

Orano's desalination plant is a landmark along the C34 from Swakopmund to Wlotzkasbaken. One can follow the large water distribution pipes all the way driving out of Swakopmund to Henties Bay on the west coast.

Desalination plants are by nature energy intensive and expensive to operate. Therefore, Orano has implemented an energy recovery system, and in addition signed an agreement with InnoSun to provide solar electricity to further reduce reliance on the national grid.

These energy reduction measures will enable Orano to make the provision of water to the Erongo Region from a green electricity source more affordable in the long term and contribute greatly to efforts to reduce the carbon footprint of the EDP. This project is part of the Orano group policy aiming to lower its carbon footprint and increase the share of low-carbon electricity at its operating sites worldwide

The EDP has contributed to the overall supply of potable water in the Erongo Region for more than 12 years of continuous operation without a single lost time injury (LTI) and its environmental management system adheres to the highest standards, as confirmed by ongoing impact testing around the operating site by independent third parties.

The EDP is a good example of what mines can achieve and what contribution they can make to the wider society.

Minnette Le Roux, Principal Environmental Specialist and Head of the Environmental Department at NSDV

Oil and gas: Let the people decide

The discovery of oil and gas off the coast of Namibia, South Africa and Mozambique is good news for the Southern African region. However, pragmatism is needed to prevent environmental degradation and adverse socio-economic impacts.

By Minnette Le Roux

NSDV

Several multinational companies have made promising oil and gas discoveries off the coast of Namibia.

Leon Louw for WhyAfrica

The recent offshore oil discoveries by Shell and TotalEnergies in Namibia are significant events that could reshape Southern Africa's growth trajectory. Moreover, the massive gas projects in the Rovuma Basin of Mozambique, and the oil and gas discoveries off the south coast of South Africa, could change the energy landscape of the region forever.

The downside is that the economic benefits of such large projects only trickle through to local communities after at least three to five years. In the meantime, these companies will have to manage community expectations, skills development, compliance and Environmental and Social Governance (ESG).

While there are limited opportunities for local communities during the discovery phase of a project, more employment opportunities are created when the projects are in the construction and operational phases, including training and education. Unfortunately, oil and gas developments require mostly skilled and specialised labour, which is in short supply in rural communities. Companies are therefore encouraged to invest significantly in skills development and training.

There are several additional risks that a company needs to mitigate when it decides to explore for and/or develop oil and gas deposits. For example, the proposed activities should be compatible with the conservation and ecotourism uses of the area and should not conflict with the local communities' dependence on the local ecosystem services.

In addition, demand for oil and gas should continuously be assessed as a decline in demand will have an adverse effect on the economic benefit which a community would otherwise enjoy. Another risk would be the climate related risk associated with the oil and gas industries, as countries are moving away from fossil fuels to meet their carbon emission reduction targets.

Limiting the social and environmental impacts in Namibia

The potential environmental and social impacts of developing the offshore discoveries in Namibia could be severe if regulations fail to promote sustainability and address environmental concerns.

Namibia should learn from the success and failures of countries like Angola and Nigeria, who discovered offshore resources many years ago. The authorisation of these projects by the authorities should consider the cumulative impacts these activities would have and if it would be a desired outcome for the area.

Namibia is an extremely sensitive environment. The Namib desert is not only the oldest desert in the world, but it is home to a range of endemic and protected plant and animal species. At the same time poverty and unemployment continue rising at an alarming rate.

The question is whether the country's environmental laws have enough teeth to ensure that development takes place without environmental or social degradation.

Although Namibia has good environmental laws in place, there are no integrated regulations governing the protection of the environment and social components in respect of mining. This is a major concern as there should be some Integrated Environmental Management objectives set for a country to ensure that development would not have an adverse impact and lead to irreplaceable loss of the environment, indirectly affecting the communities.

Namibia should ensure that the Integrated Environmental Management objectives are met and that the cumulative impact of these activities be considered during the assessment and decision- making process. Furthermore, it should be determined if the activities would be a desired outcome for the area, and if it is in line with the existing uses (conservation and ecotourism) and not in conflict with the local communities' dependence on the local ecosystem services.

Minnette Le Roux is a Principal Environmental Specialist and Head of the Environmental Department at NSDV, with over 13 years of experience in both the consultancy field and in environmental management.

By Leon Louw

Looking into Africa's crystal ball

Operationally speaking, one of the most challenging issues we have to deal with is the ability of people to identify risk and respond to that risk, during both working hours and non-working hours.

John Martin, Southern Africa Vice President at tyre management company Kal Tire, has worked in several African countries for close to 30 years. Over the years, he has gained exceptional on the ground knowledge about doing business in Africa. In this article he shares some of his insight with *WhyAfrica*.

Kal Tire's success can be attributed to a combination of many factors. However, one of the key success factors remains the competence and capacity that resides in every Kal Tire team member

Kal Tire

John, doing business in Africa for many years has given you great knowledge of what the real issues and challenges are in Africa. Can you share a few on the ground operational issues in African countries that you have to deal with on a daily and weekly basis.

Operationally speaking, one of the most challenging issues we have to deal with is the ability of people to identify risk and respond to that risk, during both working hours and non-working hours.

However, to mitigate this challenge, our in-house training program, LMS (Learning Management System), is purposely designed to incorporate safety practices, as well as risk and hazard identification, as an integral part of the competence development of every team member.

Kal Tire's LMS therefore provides ongoing competence development of the team members with the overarching objective to create a culture of safety.

Local legislation and governance practices in many countries is a critically important issue that always requires a full and clear understanding before entering a new market.

Poor insight into local legislation can very easily derail any of the best laid plans and intent. Kal Tire has the ability and the patience to accommodate varied demands and expectations of localised government and governance, however, we are unable to tolerate unfair tax assessments and all too common demand for facilitation fees that is often encountered.

What is your outlook for the continent, and for Kal Tire's operations in Africa?

I remain very optimistic about the outlook for the continent, specifically for the mining industry.

This continent is loaded with unrecognised and unutilised talent – employ your magic team, each of whom should align with and associate with your company's core values and culture. Thereafter, train and develop and nurture that talent as a means of retention and creating loyalty.

The world will always require significant volumes of metals, some of which can admittedly be provided through metal recycling processes, however the bulk will, for the foreseeable future, still come from mining operations. The African continent remains the host of some of the largest unexploited ore reserves on the planet, which over time will need to be mined, thereby supporting our growth as a continent. As mining opportunities develop throughout the continent, Kal Tire will be there to support and serve our customers, therefore the outlook for Kal Tire is aligned, in my opinion, with the optimism for the continent.

Why, in your opinion, has Kal Tire been so successful in Africa?

Kal Tire's success can be attributed to a combination of many factors. However, one of the key success factors remains the competence and capacity that resides in every Kal Tire team member. As a service focused organisation, we are heavily invested in the competence of our team members to ensure that every customer has a positive experience at every one of our touch points. Our training programs are standardised

Kal Tire

John Martin, Southern Africa Vice President at tyre management company Kal Tire

throughout Kal Tire internationally, meaning that our tyre technicians across the globe all receive the same training, resulting in a consistent level of capability.

Which countries and regions do you regard as great opportunities in Africa over the next five years or so?

The Southern Africa Region seems to be the one African region that has the most potential over the coming years. The range and variety of metals and minerals that is available in this region must place it as a top destination for exploration and investment. The southern regions of the DRC, Botswana and potentially Zimbabwe, appear to be attracting significant volumes of foreign investments into their respective mining businesses. Unfortunately, South Africa has not been able to position itself quite as well as its neighbouring countries when attracting the much needed foreign direct investment.

Kal Tire has or had operations in Zimbabwe, Mozambique, and Zambia. What is your view of these countries as markets for Kal Tire, and what are the challenges?

Kal Tire's current footprint in Southern Africa includes South Africa, Mozambique, Botswana and Zambia. These are the primary bases from which other countries in Southern Africa are served. Most countries in the Southern African region present opportunities for growth, however, not all opportunities are risk free. Currency risk in a number of Southern African countries, will likely prevent Kal Tire from opening up wholly owned subsidiaries, however, in the interim, we still manage to sell our products and services, as and when required.

John if you could give companies advise on how to successfully run a company in Africa, what would it be?

This continent is loaded with unrecognised and unutilised talent – employ your magic team, each of whom should align with and associate with your company's core values and culture. Thereafter, train and develop and nurture that talent as a means of retention and creating loyalty.

What new Kal Tire products can we look forward to being launched in the future?

Kal Tire has in recent times partnered with Maxam tyres on an international scale to offer our client base an additional option of high-end tyre performances for OTR applications. The measured performances in various applications have been extremely encouraging. There is now further justification for customers to invest in Maxam's performance with the release of their new EcoPoint 3 compound, which will certainly place the brand in the same echelons of the world's most reputed OTR tyres.

Additionally, Kal Tire continues to release innovations and value propositions that are attracting significant interest. The release of the Pitcrew AI technology is an exciting proposition and massive stride towards the automation and real-time condition monitoring of mining wheels. ●

In-country partnerships allows companies to build capacity in the local supply chains

Photographs by BME

Ralf Hennecke, BME Managing Director

Mining opportunities in SADC will favour those in the know

With mining seeing a more sustained improvement in many Southern African Development Community (SADC) countries, miners, and supply partners with experience on the ground are set to have greater gains in the coming year.

By Ralf Hennecke

Miners in the region are not only currently enjoying high commodity prices, but also benefiting from improved supply chains, despite the global disruptions because of the pandemic, and stronger production performances, marking an encouraging first half of the year for the sector. The positive trend is set to continue in the second half.

This year's Investing in African Mining Indaba, the first in-person event in two years, has further bolstered this sentiment.

The event again emphasised the fact that mining and agriculture are key economic drivers in economies in Southern Africa.

Strong commodities include iron ore, platinum group metals, gold, manganese, copper and cobalt, benefiting the economies especially of South Africa and Zambia.

Improving prospects for diamonds, uranium and coal also make for some optimism in countries like Botswana, Namibia and Angola. In the longer term, there is a hopeful outlook for platinum and other minerals in Zimbabwe.

The key to mining success in the region, however, lies not with commodity prices; these will always be cyclical and unpredictable. It resides really in the institutionalised knowledge of the companies that operate here, and their understanding of how to respond constructively to the prevailing conditions and future trends.

Dealing with supply chain issues

Among these considerations is supply chain security. As a supplier of critical mining inputs like explosives, BME often deals with supply chain issues such as weak infrastructure to border efficiency. It is hoped that through constructive dialogue, gradual improvements in supply chains can be ascertained, which will affect the cost of doing business in these economies."

Another consideration is evolving regulations on local business participation and a heightened concern with safety and environmental impact. Responsible mining companies have embraced these principles, and it has long been standard procedure for service providers to align with the stringent expectation of zero-harm.

As the mining sector strives towards shared value, practical empowerment measures call for more proactive partnerships with in-country entities. Those industry players with a long heritage in SADC can draw more readily on their business networks to implement this vision. They will also see the value in preparing in advance to meet localisation imperatives. While some countries in the region have well-developed regulatory frameworks on this score, others are yet to implement their plans. It will be vital to be well-informed of future demands on business, and to plan decisively.

These in-country partnerships also imply investment in local infrastructure and skills transfer, to build capacity in the local supply chains upon which mines are built.

A firm understanding of compliance requirements goes together with building a secure value chain that delivers fit-for-purpose solutions. Only if a mine can rely on receiving the inputs it needs, can it generate a secure future for itself and its host communities.

It is worth adding that mines are generally well supported by their key suppliers when it comes to achieving their social licence to operate, including the engagement and upliftment of host communities.

Re-looking operational efficiencies

In line with global trends, mining in Southern Africa is seeing the active acceptance of environmental and commercial sustainability. A decrease in greenfield investment opportunities, paired with higher environmental and regulatory hurdles to start new mines, has led to an increased focus on improving operational efficiencies. It is also a direction driven strongly by technological innovation. As the sector pursues the goal of smart mining operations, the region's miners are applying digital tools to streamline activities, further raising efficiencies, and reducing carbon emissions.

We are seeing this first-hand in the blasting sector, where the use of software, electronic detonators and other digital tools are constantly fine-tuning both the quality of blasting and the productive impact on the way mines work. By ensuring better fragmentation, for instance, energy use is optimised in downstream functions like loading and comminution – leading to less power consumption and a lighter carbon footprint.

Few of these innovations can be achieved, however, without decades of experience in the field, where mines and technology providers can develop and apply their technical insights. Nowhere is this currently more telling than in the field of data generation, gathering and analysis. As mines look to leverage real-time information from every machine and function on their sites, so technology must be developed to interrogate data for better and quicker decision-making.

Not only must this data be intelligible and useful, but it must also be integrated into the mine's chosen platforms. This has required suppliers of services, equipment, and materials to develop a depth of expertise in the digital space so that – whatever their core offering to mines – it can be tracked, measured, and assessed through the mine's dashboard.

Beyond the operational efficacy of such systems, mines and their partners must also be aware of how best to ensure the security of this data – and comply with evolving local regulations governing data protection. Once considered a niche field for technology specialists, data management is increasingly becoming core to every sector including mining.

The mineral opportunities of the SADC region remain exciting to all of those involved. It is the task of the mining sector to realise those prospects in the most responsible and sustainable way – sharing the value with a broad base of stakeholders. Those with local experience and expertise are best placed to do this.

by Leon Louw for *WhyAfrica*

How sustainable is coal mining in Hwange?

Coal mining in the Hwange belt could benefit Zimbabwe. On the other hand, unregulated and illegal mining in the region could lead to the collapse of an extremely sensitive ecosystem, and the degradation of an exceptional natural asset.

The article was first published on the WhyAfrica website during this year's WhyAfrica road trip.

Although there are encouraging signs that Zimbabwe's mining and tourism sectors are rebuilding in the aftermath of Covid-19, the country is facing several environmental challenges that could be detrimental to its economic growth.

As part of our Southern Africa Overland Road Trip, *WhyAfrica* visited the Hwange coal belt and Hwange National Park to ascertain the impact of numerous coal mining activities in the area, and found encouraging signs, but also red flagged several unsustainable endeavours.

While international tourists are returning to attractions like Victoria Falls and Hwange National Park in numbers, unregulated mining activities, overgrazing, population pressure, climate change and poverty could lead to environmental degradation and the eventual collapse of an entire ecosystem if solutions are not found urgently.

The 200km from Victoria Falls to main camp in Hwange National Park could be a golden corridor for Zimbabwe. Instead, an almost 80km stretch from Hwange to Dete, which is close to Hwange National Park, is turning into a wasteland because of unregulated mining activities, deforestation, and severe overgrazing.

The poor soil conditions and lack of surface water in and around the Hwange National Park makes it naturally difficult to farm or develop a healthy agricultural sector. Further degradation because of deforestation and overgrazing by large number of goats, donkeys, and cattle, has resulted in severe erosion and the removal of topsoil, and signs of the formation of erosion gullies and the onset of desertification are already visible.

Proliferation of mining activities

To add to these environmental challenges the number of coal mining operations in the area have increased substantially over the last three years. With the construction of Chinese owned Zimbabwe Zhongxin Electrical Energy's (ZZEE) thermal power plant close to Hwange last year, more people are moving to an already overpopulated area in the hope of finding work, in a country where large numbers of people are unemployed.

This has worsened the situation for local communities where running water and electricity remains only a promise. Even though the new Chinese operated thermal plant feeds 50MW into the country's power grid, Zimbabwe does not generate enough electricity to supply rural communities and villages across the country, or to boost its manufacturing and industrial capabilities.

For a full report and in-depth overview of coal mining in Hwange, please visit the WhyAfrica online shop in 2023.

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